Finding My Voice over Zoom: An Autoethnography of Videoconferencing Experience for a Person Who Stutters

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Existing videoconferencing (VC) technologies are often optimized for productivity and efficiency, with little support for the soft side of VC meetings such as empathy, authenticity, a sense of belonging, and emotional connections. In this paper, we present findings from a 15-month long autoethnographic study of VC experiences of the first author, a person who stutters (PWS). Our findings shed light on the hidden costs of VC for PWS, uncovering the significant emotional and cognitive efforts that other meeting attendants are often unaware of. As the current burden of being heard in VC-based communications falls primarily on PWS, we propose a set of design implications for a more accommodating communication environment in which everyone, including technologies used for communication, share the responsibility and efforts to include and respect all voices.

CCS Concepts: • **Human-centered computing → Empirical studies in HCI**.

Additional Key Words and Phrases: Stuttering, videoconferencing, autoethnography, computer-mediated communication, accessibility

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1 INTRODUCTION

One percent of the population stutters[9]. While typically characterized by the speech behaviors such as repetitions, prolongations, and blocks, stuttering can also result in adverse emotional and cognitive reactions to everyday communication, negatively impacting the overall quality of life for people who stutter [80]. The communication challenges experienced by people who stutter are often driven by the negative responses of listeners rather than speech disfluencies themselves [15]. Ample research has demonstrated that people who stutter regularly face social rejection [19, 24], stigma [11], and discrimination [13], which can restrict all aspects of life, including socializing with others [10], achieving educational goals [34], and pursuing employment opportunities [37].

In the era of distributed work and telecommunication, the everyday communication challenges for people who stutter are often compounded by the use of telecommunication technologies that are *not* designed to accommodate and incorporate diverse speech and communication patterns. Recent benchmarking of automatic speech recognition (ASR) systems showed a significant disparity between system performances for fluent and stuttered speech [51], making speech interfaces inaccessible to people who stutter [8]. Similarly, previous research on stuttering and videoconferencing identified both benefits and challenges of videoconferencing (VC) for people who stutter, shedding light on the extra - yet invisible - emotional and cognitive efforts required for people who stutter to participate in personal and

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professional communication via VC [83]. This work expands on previous studies to better understand the *hidden* cost of videoconferencing for people who stutter through an autoethnographic study of the VC experiences of the first author, who is a person who stutters. Spanning over 15 months and a variety of VC situations, the collected autoethnographic data allow us access to the intricate cognitive and emotional labyrinth a person who stutters often needs to navigate through when participating in VC calls, offering unique insights on the experiences of videoconferencing for people who stutter.

Our contribution to HCI, CSCW, and accessibility research is twofold.

First, we bring a methodological contribution by deploying autoethnography to collect intimate, longitudinal data from a population that is often overlooked, yet significantly impacted by telecommunication technologies. The autoethnography process was designed and instrumented to cover a wide range of VC contexts and situations, representing the variability of stuttering and the dynamic relationship between the speaker, audience, and technology. Qualitative and quantitative data were collected over 43 VC meetings regarding the behaviors, feelings, and thoughts experienced by the first author before, during, and after the meeting, providing a rich source for our analysis and reflections.

Second, by examining the rich data collected through autoethnography, we also contribute to a first-person in-depth understanding on the dynamics and complexities of the thoughts and feelings underlying the meeting behaviors of people who stutter. Our findings suggest that, despite socio-technical constraints and speech difficulties created by stuttering, people who stutter can still achieve a satisfying and rewarding VC experience with mindfulness, self-compassion, and support from their audience.

As videoconferencing becomes the dominant medium for professional communications, it also introduces a host of new challenges, such as physical and mental fatigue [6, 32], distractions [52], and reduced sense of connectedness [77]. While these challenges are universal, they could have a disproportional impact on the lives of marginalized social groups, such as women [27, 72] and people with disabilities [62, 76, 83, 86], making workplace less equitable and inclusive. By extrapolating the experiences of people who stutter, our research offers important design implications for VC technologies that could benefit everyone. We argue that, instead of focusing on efficiency and productivity, future VC technologies should invest on improving the emotional experience of videoconferencing, attending to socially challenging moments, and facilitating the emotional exchange among participants. Researchers and designers of VC technology should also explore the value of vulnerability in video conferences, creating mechanisms and opportunities for participants to share vulnerable moments and identities to build deeper, trusting relationships with each other. Lastly, our autoethnography of VC experiences uncovers the potential for VC as an effective and convenient medium for self-therapy. Future VC technologies should explore the opportunities to support users in both difficult moments and long-term growth.

2 RELATED WORK

In this section, we review prior work on stuttering to provide more background information. Then we discuss current video conferencing technologies and their benefits and challenges to people with disabilities. Lastly, we review the method of autoethnography especially the adoption of autoethnography in accessibility research to situate our work.

2.1 Stuttering

Stuttering affects approximately 1% of the population worldwide [9]. Although the condition is typically characterized by the speech behaviors that people who stutter (PWS) may exhibit, such as repetitions ("li-li-like this"), prolongations ("lllllike this"), and blocks ("l—ike this"), stuttering also affects people on emotional and and cognitive aspects [9], and a

large part of stuttering-related struggles are internal and not easily observed by the listeners ("iceberg theory") [67]. PWS suffer from negative thoughts and feelings, poor self-image, and avoidance behaviors due to stigma towards stuttering [9], as a result, experience a reduced quality of life in many aspects including mental health, relationship, education, and employment [20].

Beyond these observable "speech disfluencies", stuttering is more and more understood and defined by the subjective experience of the speaker, such as the feeling of loss of control of one's speech [80]. The shift of emphasis on the subjective experience of stuttering in stuttering research and therapy led to a breakthrough on our knowledge about stuttering and therapy approaches that improve the long term wellbeing of PWS. Our work is inspired by this epistemic shift, gaining in-depth insights about stuttering and VC through autoethnography of a person who stutters.

As a neurodevelopmental condition, stuttering is incurable but highly viable - stuttering behaviors and experiences vary greatly across individuals, situations, and conversation partners [81]. Capturing the variability has been challenging in the clinical setting, limiting both the research on stuttering and the generalizability of techniques and strategies acquired during speech therapy sessions to real life situations outside the therapy settings. The causes for variability in stuttering are not well understood, however, research has suggested that it could be impacted by situations, tasks, audiences, and emotions of the speaker. Besides, fluency of the speech is not necessarily the goal for PWS. Research has shown that PWS find spontaneous speech, speech produced with litter premeditation and effort, more enjoyable and meaningful, rather than fluent speech [17].

In HCI research, work on stuttering is underrepresented [8, 25, 35, 60], despite the prevalence of stuttering. Prior work identified current technologies supporting PWS in interpersonal communication through two approaches [83]. One approach targeted at manipulating PWS and making them speak more fluently, for example, delayed auditory feedback (DAF) [74] enables speakers to hear their voice with delay to create a "choral effect" and improve temporarily fluency. Another approach aimed at manipulating the speech without necessarily changing the behavior of the speaker. For example, Google project Relate has a Repeat feature to repeat what speakers said in to clear and synthesized voice to help people with non-standard speech [2]. However, all these technologies focus on fixing or hiding stuttering speech rather than helping PWS accept and embrace the incurable nature of stuttering and improve the subjective experience of stuttering.

Although stuttering is incurable, many PWS could benefit from self-help groups and professional speech therapy [78], especially speech therapy that incorporates mental health approaches such as , Cognitive Behavioral Therapy (CBT) [47] and Mindfulness-based therapy [7]. Prior work on speech therapy highlights the importance of better understanding how people experience during and around moments of stuttering including personal (affective, behavioral, and cognitive reactions) and environmental contexts, which will bring improved treatments addressing both the speech behaviors related to stuttering and its associated negative impacts [78].

In our research, we followed the practice and kept a detailed record of these factors in collecting autoethnography data to better understand the variability and the moment of stuttering, which we elaborate more on in our method section.

2.2 Videoconferencing

Videoconferencing(VC) has become an integral part of people's daily professional and social lives, especially in the wake of the global shift to remote work and social distancing practices since the COVID-19 Pandemic. VC offers real-time interactions across distances with diverse affordances of audio and video communication, when a face-to-face meeting

is not feasible[31]. Despite the benefits, videoconference also poses challenges such as reduced non-verbal cues, turn-taking confusions, constant distractions, "Zoom fatigue", reduced physical movement, heightened self-consciousness from self-view, and connection issues [6, 52]. The shift to VC also comes with implications for our social connections. While VC keeps people connected over distance, it doesn't necessarily facilitate spontaneous interactions and deep connection as in face-to-face settings, potentially leading to feelings of loneliness [59].

In accessibility research, VC brings people with disabilities unique benefits and accessibility challenges. For people who stutter, VC brings the benefits of reducing mental barriers to show up and makes it easier for them to hide their stutter via various ways such as rehearsal, turning off the camera to hide physical tension, and using fluency-inducing technologies [83]. While prior work found general consistency in the aforementioned VC challenges, such challenges are often amplified by the nature and social consequences of stuttering [83]. For PWS, video conferencing presents distinct hurdles: the constant self-monitoring from self-view which brings stress and negative emotions, heavy leans on voice for turn-taking that puts PWS at a disadvantage, and the reduction of non-verbal communication channels that PWS relied on.

We also observe and compare our experiences with other disability communities. Zolyomi et al. [86] interviewed autistic adults on their VC experiences and found sensory sensitivities, cognitive challenges, and anxiety made VC interactions difficult for them. Similarly, Tang et al. [76] interviewed 25 individuals with different types of disabilities on their telework experience, and found that while telework provides users with disabilities more flexibility and control to work in a preferred environment, they experienced unique challenges centered around turning on videos, e.g., People who are blind turn off their videos as they can't see or don't want to show themselves, so they will only be represented as a picture with their name. Neurodiverse people often need to put in more effort to manage their video and audio. Findings from prior work offer valuable insights into the unique challenges and VC experience through interviews with people with disabilities, which informs the design of more accessible technologies. However, we still lack a longitudinal, personal, and reflective perspective, and emotional depth of the VC experience for PWS that are hard to capture via interviews. To fill this gap, we review the method of autoethnography and justify our adoption of this approach in the next section.

2.3 Autoethnography

Autoethnography, a subset of first-person research methods, refers to an approach in that researchers become participants in an ethnographic study to get a first-hand understanding of users' everyday lived experiences [4]. Autoethnography method has become increasingly popular in HCI in the past decade [33, 40, 42, 43, 55, 57, 63, 73]. It provides a unique perspective that embraces the subjectivity in the research, *"Autoethnography is one of the approaches that acknowledges and accommodates subjectivity, emotionality, and the researcher's influence on research, rather than hiding from these matters or assuming they don't exist"* [29].

Autoethnography also has the unique benefit of obtaining an intimate and long-term understanding of nuanced experiences when studying users is difficult and out of reach [26]. For example, Jain conducted a 2.5-year autoethnographic travel journey of him as a hard-of-hearing individual, offering valuable insights on accessible travel technologies design [42]. Homewood [40] employed an 18-month autoethnography of using self-tracking technology to mitigate long COVID and provided rich design implications of pacing technologies.

In accessibility research, researchers with specific disabilities or challenges adopt autoethnography to provide rich and firsthand insights into their experiences and enhance the design of more accessible technologies [42, 43, 57, 73]. For example, a microsoft research team provides an autoethnographic reflection on their experiences as a mixed-ability,

virtual team, discussing the changing accessibility barriers and offering guidelines to support accessible virtual team collaboration [57]. While VC is a routine activity for many, for those with speech disorders like PWS, it's layered with the emotional and cognitive effort required to manage one's speech and identity [83]. Although prior work utilized interviews with PWS to understand the challenges of participating in VC for PWS, the diverse internal in-the-moment challenges faced by PWS during VC, varying across contexts, are difficult to grasp fully through conventional research methods.

In light of this, we adopt autoethnography for a longitudinal exploration of the first author's VC experience. By drawing from the deep and personal experiences of the first author, both as someone who stutters and an HCI researcher, we aim to provide a unique and complementary perspective that goes beyond the insights gained from traditional user-centered design and research methodologies. It's worth noting despite the unique benefits, autoethnography also presents challenges such as the inherent subjectivity and bias, balancing the personal and the analytical voice, emotional intensity, and vulnerability of the researcher [5, 44, 50]. Considering those challenges and benefits, we carefully adopted the autoethnographic method by (1) having structured detailed documentation for the first author's VC experience through Google form (2) having other authors supporting the first author practicing reflexivity in research meetings and the writing process.

3 BIOGRAPHY

This paper is based on the autoethnographic account of the first author's experience with videoconferencing over a 15-month period from May 2022 to July 2023. To contextualize the autoethnography, we first share the background information about the first author, in particular, her history with stuttering, her use of videoconferencing, as well as other aspects of her identity that could impact her stuttering and videoconferencing experiences.

The first author is a person who stutters and has been stuttering since childhood. Consistent with recent research reports [56], the first author has experienced strong negative reactions and social stigma to her stutter, and no professional or peer support, as she grew up in China. As a result, the first author has developed strong emotional reactions and self stigma of stuttering, and acquired a variety of avoidance strategies [69] to conceal her stutter. The top strategies include word substitution, use of filler words, circumlocution, and avoidance of high-stress speaking situations such as showing up to meetings late to miss self introductions. With decades of practice, many of these avoidance strategies have become an integral part of the first author's speech behavior in place of typical stuttering behaviors such as sound repetitions and prolongation. The first author's stutter can be described as covert stuttering, "*a type of stuttering experience that occurs when a person who stutters conceals his or her stutter from others, attempting to be perceived as a nonstuttering individual*" [28].

The first author started receiving speech therapy services in the US in her late twenties, with a focus on fluency shaping techniques [36] that alter the speaker's speech-motor behaviors (e.g. speech rate, breathing pattern) to produce more fluent speech, with little support on attitudes and feelings associated with stuttering [85]. Similar to the experience of many other stutterers who received fluency shaping therapy [85], the first author did not find those techniques sufficiently effective in real life situations and withdrew from the therapy after 1.5 years of weekly individual sessions. After a 7-year break from speech therapy, the first author was then referred by a co-worker who stutters to an acceptance-based speech therapy program for covert stutterers [12] that met weekly for two hours over Zoom and lasted for six months between October 2021 and April 2022. The first author found this program tremendously helpful in coping with the negative emotional and cognitive impact of stuttering. The first author then participated in a few other acceptance-based stuttering therapy programs that featured different approaches including Acceptance and

Commitment Therapy (ACT) [7], Avoidance Reduction Therapy for Stuttering (ARTS) [69], and Trauma-Informed Therapy [70]. The positive experience with acceptance-based speech therapy helped the first author establish and accept her identity as a person who stutters and contributed to the change in her perspective to value open and comfortable stuttering over fluency.

Despite the documented benefits of self-help groups and community support for people who stutter [41], the first author did not participate in any stuttering-related self-help group or community events until recent years, as she had been deliberately concealing her stuttering behavior and rejecting her identity as a person who stutters. The first author was first exposed to the stuttering community in 2019, when she was introduced by a co-worker to the employee resource group (ERG) for employees who stutter at her workplace. Although reluctant, the first author participated in group meetings hosted by the ERG and soon started to appreciate the value of shared vulnerability and overwhelming support within the community. As the first author explored her identity as a person who stutters, she started engaging with other local and global stuttering communities in the US, UK, and China in early 2022. As of the time of this research, the first author has found a diverse network within the stuttering community, participated in and led various community social events, conferences, and workshops. The extensive interactions with the stuttering community exposed the first author to the prevalence of structural barriers faced by people who stutter, motivating the first author's current work to create an accommodating and supportive social environment for stuttering.

Aside from stuttering, the first author works in technology research and development, with experiences and expertise on data science, accessibility, HCI, and AI. The first author had worked as a software engineer and research scientist in a large US technology company, and is now working in a small nonprofit organization. Throughout her professional career, the first author has used videoconferencing extensively for distributed collaboration, however, as she became a permanent remote worker and work from home full time since March 2022, videoconferencing becomes the dominant medium for her professional communication and she on average spends one to two hours each day on work-related video calls. She also spends on average two to three hours per week participating in stuttering-related events such as speech therapy and self-help groups over videoconferencing (i.e. Zoom). Overall, videoconferencing is currently the most prominent channel for the first author to connect and communicate with the external world outside her immediate family. Understanding and improving her videoconferencing experience is thus particularly meaningful for the first author, both professionally and socially.

Intersectionality plays a role in the first author's videoconferencing experiences as well. As a woman, an immigrant, a non-native English speaker, and a tech worker in the male-dominated field, the first author has experienced constant pressure to "lean in" and to pass as fluent. At the same time, the first author recognizes her privileges as cis-gendered, upper-middle class Asian woman due to her socio-economic status and educational attainment. The first author acknowledges that her experiences might not be shared by other people who stutter, as stuttering community is not monolithic but immensely diverse over personal and sociocultural dimensions.

The other authors, who do not self-identify as people who stutter, joined the first author later in the research journey in supporting her in analysis and the presentation of the autoethnographic data, especially connecting her personal narratives with wider social, political, and cultural meanings [4]. Their positionality introduces a more balanced perspective of analyzing autoethnography while still keeping the authenticity in the personal account of the first author.

4 METHOD: AUTOETHNOGRAPHY

4.1 Motivation for autoethnography

The first author started documenting her videoconferencing experiences in early 2022, inspired by her conversations with other people who stutter and her participation in different speech therapy programs including the Acceptance and Commitment Therapy (ACT) [7] and the Avoidance Reduction Therapy for Stuttering (ARTS) [69].

Similar to many other people who stutter, the first author found videoconferencing have unique, new challenges for her communications [83]. When discussing these challenges in self help groups, the first author was recommended writing therapy [65], for its effectiveness in helping other group members reflect and heal from difficult speaking experiences. The first author thus started documenting her most challenging speaking experiences in free-form writing to record the situation and her feelings.

Around the same time, the first author started participating in a group speech therapy program with ACT approach, which emphasizes on recognizing and accepting emotions and thoughts associated with stuttering without letting them dictate one's actions. To practice the ACT principles outside the therapy sessions, the first author decided to set goals around certain emotions and thoughts she wanted to experience during certain video calls and be mindful about her emotions and thoughts, especially when physically struggling with her speech.

The first author was concurrently participating in ARTS therapy, which encouraged people who stutter to identify and challenge their avoidance behaviors such as avoiding certain words or avoiding to speak at all. This therapy approach inspired the first author to start tracking her avoidance behaviors in VC meetings.

The first author then structured her free-form journaling about videoconferencing into a Google form with sections covering goals and summary of speaking situations, emotional, cognitive, and speech experiences, as well as avoidance behaviors. The first author also extended coverage of situations beyond the difficult ones, so that she would be able to practice different strategies and understand factors impacting her speaking experiences across a variety of situations.

4.2 Journaling tool

To document the first author's VC experiences quantitatively and qualitatively, we designed a Google form survey based on SLP literature and practice [17]. The original SLP survey focuses on the everyday speaking context of stuttering, including multiple choice questions and Likert scales. We adapted the wording to the context of VC, and added open-ended questions to document subjective and emotional experiences. Specifically, this survey was structured into six primary sections:

(1) Speaking goals: This section captured the utility, behavioral, emotional, and cognitive goals for the virtual meeting, alongside 5-item self-rating scales of how successfully these goals were met.
(2) Speaking partner: Information about the conversation partner(s) such as their gender, social status, and if the partner also stutters.
(3) Fluency: Questions included 5-item rating scales on speech fluency such as frequency of blocking, usage of filler words, and sentence restarts, and open-ended reflections on fluency.
(4) Spontaneity: Spontaneity refers to how speech is *"with little premeditation and effortless production, and it is enjoyable and meaningful."* [17]. Questions included a 5-item scale on the degree to which the first author could communicate spontaneously, the physical and mental tension involved, and open-ended reflections on spontaneity.

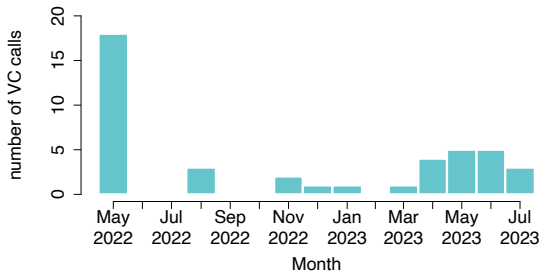


Fig. 1. Data entry frequency per month

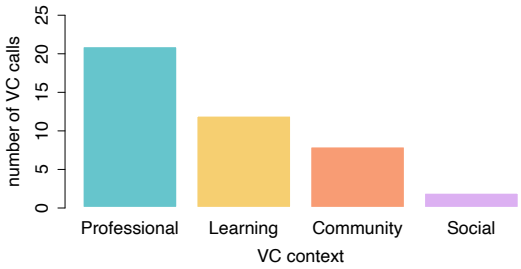


Fig. 2. Breakdown of autoethnographed VC calls by context.

(5) Avoidance: Questions of 5-item scales on the tendency to avoid certain words and direct eye contact, and open-ended reflections on avoidance.
(6) General assessment: Questions on overall satisfaction and emotions after meetings.

4.3 Data collection

The first author used the Google form to document her experiences of 43 VC meetings over a 15-month period from May 2022 to July 2023. Figure 1 shows the temporal distribution of the documented VC meetings. While she managed to document her meetings regularly at the beginning of the period, the data became sparse at times: there were some breaks in recording when her regular work schedule was disrupted by traveling and vacations; the data collection was less frequent when her workload got heavy (Nov 2022 - Mar 2023). Further, the manual journaling was repetitive and time consuming. It took on average 20 minutes to document just one VC meeting, which became laborious and emotionally taxing after being already exhausted and overwhelmed by videoconferencing, making it challenging for her to maintain momentum and consistency.

The data collection documented a variety of VC meeting contexts and speaking situations, as seen in Figure 2. Almost half of the documented meetings were in a professional setting (21, 49%), including team meetings, partnership calls, interviews, and work-related public presentations. 12 VC meetings (28%) were related to learning, including speech therapy sessions and online training sessions such as parenting workshops. 8 community events (19%) included speaking at community gatherings or with other people who stutter (e.g. National Stuttering Association's chapter meeting, the World Stuttering Network's annual conference). Finally, two documented VC meetings (4%) were purely social, as one-on-one meetings to hang out with friends and acquaintances who lived in other places.

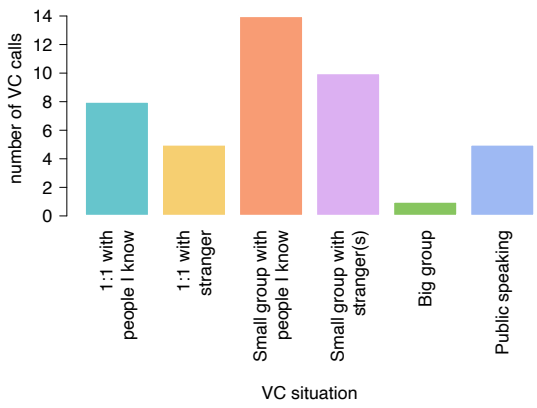


Fig. 3. Breakdown of autoethnographed VC meetings by group size and familiarity. Smaller groups and familiar partners are considered less stressful.

Figure 3 presents the distribution of the autoethnographed VC meetings based on the VC meeting size and the familiarity of the meeting partners. The smaller the group (e.g., 1:1 meetings) and the more familiar the meeting partners, the first author expected lower stress levels. Most meetings (24, 56%) involved a small group, followed by 13 (30%) 1:1 meetings, and 6 (14%) VC meetings with a large group or public speaking.

4.4 Data analysis

Our data includes the first author's 43 responses to the Google form questions, including her answers to multiple choice questions, self-ratings of fluency, spontaneity, avoidance, overall satisfaction, and reflection notes.

We used the statistical computing language, R, to analyze the distribution and relationship of quantitative data. We first explored the dataset by plotting and calculating the general distribution of collected data over dimensions such as meeting context, situations, and the types of audience. We then normalized all the likert-scaled rating into the range of $(0-1]$ to calculate the Pearson correlations between all the variables to understand the relationship among them. Our correlation analysis showed statistically significant correlations among variables under the same group. For example, almost all the ratings for questions under the "Spontaneity" section correlate strongly with the rating for "*Talking was ...*" (from "*Easy*" to "*Effortful*"). This finding allowed us to pick the most representative question from each section in the overall analysis and filter out highly correlated questions in the future version of the autoethnography. Lastly, we deployed linear regression model to understand the key factors associated with general meeting satisfaction. By using the rating for overall satisfaction as the independent variable and representative questions from each section as the dependent variable, we found strong association between satisfaction and avoidance ($p < 0.05$) as well as fluency ($p < 0.05$).

In general, our quantitative data analysis provided useful insights that informed further explorations in our qualitative analysis. Although limited in scale, our quantitative data also offered sufficient statistical power for us to unpack themes observed in our qualitative analysis in some cases.

Our qualitative findings are based mostly on the analysis of the first author's reflection notes in the Google form entries. This analysis included open- and axial-coding [66] and the practice of reflexivity including the following steps:

(1) In the first round, the first author and the second author read through the data separately and conducted open coding, creating open codes and memos as brief comments that represented interpretations of the first author's reflection entries (open-coding). For instance, we have comments such as "hard to gauge audience reactions without video" and "talking about stuttering in a large group" to describe challenges that the first author experienced during VC, "using filler words to get out of blocks" and "turn off self-view" to indicate strategies she used during VC, and "encouraging words from the audience" and "affirmative facial expressions from the audience" to represent supporting factors she documented.
(2) Next, then two co-authors met to discuss the codes and refine them, grouping codes into categories (axial-coding). For example, "staying in blocks" and "open stuttering" were grouped under the category "strategies used during VC". We performed the open- and axial-coding process iteratively several times.
(3) In addition to coding the reflection notes, the first two co-authors also engaged in three 75- to 120-minute conversations, in which the second author asked questions based on the first author's journal entries. These included clarification questions and deeper reflection questions to help her develop personal narratives (e.g., How has this challenge changed over time? How has your strategy of to get yourself out of blocks changed over time?), and practice reflexivity.

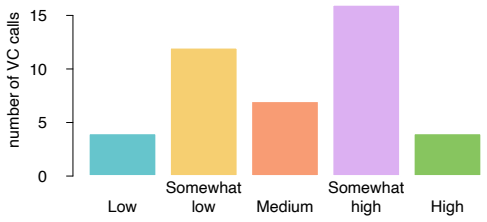
In reporting our qualitative findings, we present vignettes of three representative videoconferencing situations, where we provide rich and vivid descriptions and interpretations to show an intimate account of the first author's VC experience as a PWS, uncovering hidden cognitive and emotional struggles she experienced, and how the current VC affordances supported or marginalized her in social interactions.

For the findings sections, we shift to a first-person singular narrative to bring out the first author's emotional and inner voices. We also hope that a closer and more intimate voice will enable the reader to better empathize with the lived experiences of a person who stutters. Quotes are taken from the first author's journal for videoconferencing situations and are lightly edited to fix grammar errors and typos. Sensitive information, such as names of peoples and organizations, are redacted to protect the privacy of other parties.

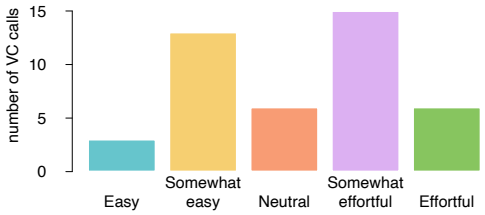
5 FINDINGS: QUANTITATIVE OVERVIEW

Across different VC contexts, I spoke at different situations that were associated with a range of stress levels for me. Stuttering is highly variable and often situation dependent [81]. Some situations, such as public speaking, were the most challenging for me, while others, such as one-on-one meetings with a friend or colleague, often felt easier.

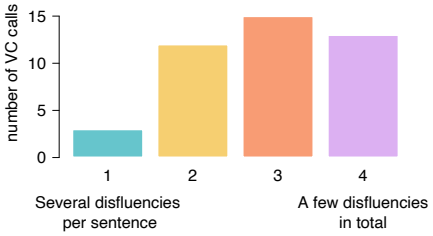
It is important to note that my autoethnography is not a random sample of all my VC meetings, but oversampled high stressed, challenging situations, as it also served as a form of writing therapy [65] for me. As a result, I was more likely to report the experience of stronger physical tension, which led to more struggled speech. As illustrated in Figure 4, for nearly half of the VC meetings (20, 46.5%) in my autoethnography, I experienced "*somewhat high*" or "*high*" physical tension (Figure 4a); and speaking was "*somewhat effortful*" or "*effortful*" in 21 (49%) autoethnographed calls (Figure 4b). As a result, my speech fluency varied (see Figure 4c, ranging from "*4 - one or two disfluencies in total*" (13, 30%) - which is my baseline speech, to "*1- several disfluencies per sentences*" (3, 7%) - which is when my speech was most struggled (see Figure 4c. For most VC meetings, my fluency felt in between, and I would have one or two disfluencies per sentence (12, 30%), or several disfluencies in total (15, 35%). Although I stuttered in most of my VC meetings, I have been making conscious efforts to not let my speech difficulties dictate what I said. As shown in Figure 4d, for 33 out of 43 VC meetings (77%) in my autoethnography, the possibility of disfluency had a little or no effect on what I said.



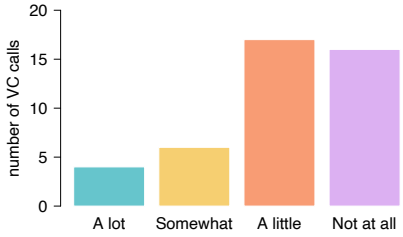
(a) "The amount of physical tension I felt while speaking was..."



(b) "Talking was ..."



(c) "How fluent was my speech overall?"



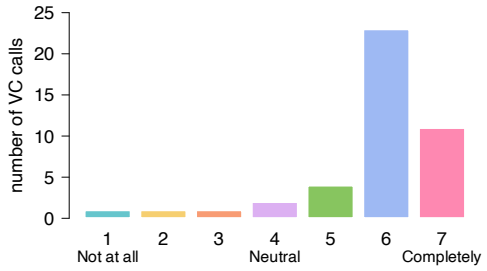
(d) "How much did the possibility of disfluency affect what I said?"

Fig. 4. Breakdown of collected autoethnographic data over key dimensions, including the amount of physical tension experienced during the call (a), the effort it took for me to speak (b), my speech fluency during the call (c), and how much I altered what I said due to the fear of stuttering (d).

In fact, I was often able to catch myself when I was about to switch words I had difficulty with, and forced myself to struggle through those words with effort and disfluencies.

Despite a relatively large percentage of higher-stressed VC meetings in my autoethnography, I was generally satisfied with myself in VC meetings. As shown in Figure 5a, I found myself positively satisfied (5-7) after an overwhelming majority (38, 88%) of VC meetings in the autoethnography. While the satisfaction did drop with the increasing amount of physical tension I experienced during the VC call (see Figure 6a, I was able to find satisfaction from situations when I was able to say what I wanted to say despite my stutter (see Figure 6b). Not letting stuttering get in the way of one's authentic self is one of the most essential goals for acceptance-based speech therapy and something I had been struggling with the most in the past. Being a covert stutter meant that I have developed and internalized a whole set of avoidance strategies to conceal my stutter, including avoiding certain words, sounds, people, and situations. Being mindful about my avoidance tendencies and committing to what I wanted to say had been both challenging and rewarding: making me feel frustrated and embarrassed in the moment of stuttering but accomplished and satisfied afterwards (see Figure 5b).

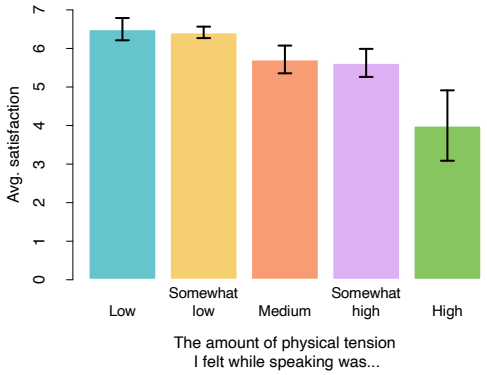
To sum, my autoethnographic data covered a wide range of speaking contexts and situations in which I experienced different levels of stress and physical tension, resulting in different amounts of physical tension and stuttering behaviors. This degree of variability in speaking situations and stuttering behaviors is typically difficult to capture in observational or interview studies. Despite speech challenges, I was able to find satisfaction in most of the VC meetings with commitment to what I wanted to say and acceptance of my stutter. The emphasis on speaking situations with higher



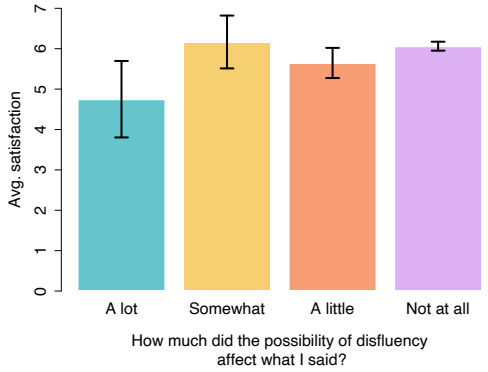
(a) "How satisfied was I after the speaking situation?"

(b) Word cloud made with feelings words picked to describe "Top feelings after the speaking situation".

Fig. 5. Overall satisfactions and experienced emotions with VC meetings in autoethnography



(a) Average meeting satisfaction rating at different tension levels. As the amount of physical tension increases from left to right, the VC meeting becomes less and less satisfying.



(b) Average meeting satisfaction rating, group by how much stuttering affect what I said. The difference between "*A lot*" and "*Not all all*" is statistically significant (Mann-Whitney test p-value<0.05).

Fig. 6. Relationship between meeting satisfaction and experienced tension (a), and satisfaction and avoidance (b)

tension and the longitudinal data collected offer a unique opportunity to understand what made videoconferencing challenging for a person who stutters and how such challenges impact someone in the long term.

6 QUALITATIVE FINDINGS: THREE VIGNETTES

6.1 Public speaking in a panel: stress, struggle, and accomplishment

Public speaking is often my most challenging speaking situation, causing the worst physiological struggles when I speak, as well as the highest stress before, during, and even after the speaking situation.

In April 2023, I was invited to speak at a research panel over Zoom. The panel targeted academic and industry researchers working on speech-related AI technologies, and the audience, about 50 people, also included SLP researchers, therapists, and people with speech diversities.

Provided with a list of pre-selected questions for the panelists, I outlined rather than scripted my answers, to force myself to be more spontaneous during the panel. The primary goal I set for myself for participating in this panel was to make a valid contribution through sharing my ideas, knowledge, and experiences, and engaging with ideas shared by other panelists and audience. Anticipating the tension for me in this situation, I expected to feel anxious, embarrassed, and scared, and to have automatic negative thoughts about myself when I speak. I was feeling nervous days before the panel. Behavior-wise, while I expected to have speech struggles, I set goals around reducing filler words and using words I'm typically afraid of using.

As soon as I joined the Zoom call, I experienced a rush of physical tension, and had several serious blocks when introducing myself. Being the last one to introduce myself, I realized that I was the only panelist who stutters, which made me more self conscious, as noted in my reflection:

> *None of the other panelists stutter. I was the only speaker who stutters, it definitely made me stand out and feel alone. But I made a point at the beginning that I will stutter more openly to give others an exposure to stuttered speech.*

In my introduction, as part of my self disclosure as PWS, I explained that my stutter was somewhat unique that I use lots of filler words and pauses, rather than the more typical stuttering patterns such as sound or word repetition or prolongation. While the self-disclosure did not necessarily reduce the tension I felt while speaking, it did help me to clarify potential misinterpretations of my use of filler words as being unprepared or forgetting what I was about to say, and served as self advocacy.

Another stressor in this situation was the technical setup of the panel that spotlighted the speaker. As a result, I couldn't turn off the self-view and had to see myself speaking the whole time. I wrote in my autoethnography: *"it was distracting and not empowering."* My experience echos previous findings that for PWS, the self-view in VC often puts them in direct confrontation with their stutter, creating heightened stress and additional distractions [83].

Overall, several factors in this situation played against me and made speaking particularly challenging: a large, unfamiliar audience that I cannot see or directly engage with, the expectation for me to perform and speak as an expert, being the only speaker who stutters, and the technical setup of the Zoom panel. Consistent with the reported experiences of other people who stutter under similar conditions [81, 83], I struggled with my speech throughout the panel session. I felt a high physical tension while speaking, and later documented: *"I used a lot of filler words... several times a sentence. And I also did some retries when I blocked".* As a result, I was uncomfortable with the situation, was worried and lacked confidence every time I was about to speak, and felt embarrassed by my speech. I noticed the automatic negative thoughts such as *"I am the worst speaker"*, *"People will not be able to understand me"*, and *"People will not value my opinion since I stutter so much"*.

However, I managed to not let the negative emotions and thoughts stop me from engaging with the panel. Instead, I mindfully noticed and accepted the emotions and thoughts without letting myself get distracted by them, and proceeded with my intentional actions: I raised my hand every time I had something to say, even for questions I did not plan to speak about; I made conscious efforts to not switch my words, even those that are always challenging to me; I also pushed myself to make connections with other panelists and the moderator by acknowledging the points they made earlier during my turn and debating with their opinions that I did not agree with, even though saying names and

contradicting with others are both typically difficult for me speech-wise. I ended up speaking more than I planned to and eagerly jumped into the conversation - which was typically harder for me and other people who stutter to do so over VC [83]. I felt compelled as the only speaker who stutters to share my lived experiences and advocate for the stuttering community, and found my perspectives valuable for the panel that I was willing to take the risk to speak up. As I reported for this speaking experience:

> *I had lots of blocks but did not change what I wanted to say. I did feel embarrassed and had lots of physiological reactions before I started speaking, but I was glad that I did it!*
>
> *I made an effort to reference other panelists and participants by names and credit their points. The self intro was hard but I self-disclosed at the beginning and made a point about why I did that.*

In the end, this speaking experience was satisfying to me, the top feelings recorded in my journal were "*satisfaction*", "*pride*", "*accomplishment*", "*frustration*", and "*exhaustion*". Feeling frustrated and exhausted from my speech struggles did not negate my experience in this situation, but contributed to my sense of accomplishment and pride that made the whole experience even more satisfying. The satisfaction was achieved by my commitment to challenge myself and my actions to speak authentically, as well as from the audience's acknowledgment and appreciation to what I said and did in this panel:

> *I was able to say everything I prepared to say, as well as raising my hand every time when I felt I had new things to add. I was quite spontaneous and definitely showed both the enthusiasm and the knowledge I have on the topic. One participant private messaged me to say that I was a good speaker, and thanked me for both the content and the passion.*
>
> *Several audience members messaged me to thank me for saying what I said. And several other panelists added me on LinkedIn.*

In this high stakes situation, I was able to come across as an expert in the field and felt that my contribution was valued, and at the same time my authenticity and vulnerability was respected and appreciated by my audience. I believe that these factors together helped build meaningful connections with the audience. The support from the audience and the recognition of my own efforts helped me get through the frustration and exhaustion caused by the physical and mental struggle with my speech, and reframed this challenging experience into a rewarding one. It proved that despite the high tension and low fluency, I can still feel satisfied and enjoy speaking, as I refocus my efforts away from my struggle and toward actions that align with my core values of authenticity, connection, and growth.

6.2 Public speaking with community: finding strength in shared struggle

I started participating in various stuttering community gatherings and conferences in early 2022, when most of these events were online or hybrid. While speaking to a big group was still a challenge for me, I found public speaking with and to other people who stutter immensely valuable - as documented in previous research [41], interaction with and support from other people who stutter could help me desensitize myself to the speech behavior of stuttering, and eventually develop self acceptance and efficacy with the identity of a person who stutters.

In April 2023, I was invited to give a 5-min speech at a stuttering community virtual conference organized by a U.S. university. There were about 30 speakers, all people who stutter, who had participated in the same speech therapy program at the host university. There were about 100 people in the audience, including people who stutter, their friends and families, and speech language pathologists (SLPs).

I prepared an outline, rather than a script, for my speech, as I wanted to speak to my audience in a direct and authentic way rather than reading from a script. In addition to setting a goal to myself to accept negative emotions and thoughts while speaking publicly, I wanted to challenge myself with behaviors I usually avoid when speaking to a large non-stuttering group. For example, I intended to stay in a block silently instead of trying to cover it up with filler words, and to stutter voluntarily at words that I do not normally stutter - both activities used in my past speech therapy to desensitize myself to stuttering.

Although public speaking at this scale is usually preceded with lots of anxiety, I was feeling relatively relaxed before this event, as I noted: *"it helped that it was a stuttering community event, since stuttering was understood and expected. I definitely felt more calm with a group at this scale than in a non-stuttering event."* During the event I was more relaxed right before I spoke, noting that *"When I waited for my turn, I didn't get the strong heart bumping sensation that I normally have, but felt relatively calm."* Knowing that other speakers and people in the audience also stutter made me feel safe and understood ahead of and during this situation, since we all shared the same struggle.

Consistent with findings from stuttering research [79], shifting my communication goal from fluency to authenticity and connection did help reduce my speech struggles. During my presentation, I was in turn more fluent than usual with this size of audience, but nevertheless still had one or two blocks per sentence. Although my speech was not as struggled as it sometimes is, I did find myself frustrated and disappointed each time I habitually employed my avoidance behaviors - such as using filler words to get over the speech block and looking away from the camera when I blocked.

While my visceral reactions towards speech blocks showed the fear of stuttering that was still ingrained in my body, the supportive reactions from the audience, similar to the experience reported in the previous vignette, helped me overcome my fear and find joy in my experience:

> *I was spotlighted on Zoom but I immediately switched to gallery view that allowed me to see more of the audience's reaction, and that was quite helpful. I especially appreciated a few audience members whose facial expressions changed along with my speech (smiling when I was saying something lighthearted or sarcastic, and intensified when I was saying something emotional and raw). I felt supported and felt the connection with my audience. I really enjoyed this connection, although my frustration with my speech kept on distracting me from it.*

I noticed that, contrasting to a virtual conference with non-stuttering audience, most of the participants turned on their camera and appeared engaged throughout the two-hour Zoom call, making it much easier for speakers like me to see and connect with the audience through the gallery view.

Hearing other speakers stutter also had a tremendous impact on me. First, it helped to normalize disfluencies, and enabled me to notice and challenge my own self-stigma towards stuttering. As I noted:

> *I did notice that I maybe subconsciously paid attention to other speakers and compared myself with them. I even felt a bit more nervous when several speakers in a row who sounded very confident and fluent, and felt a bit of a relief when a speaker had more severe stuttering. I was able to notice this thought pattern and caught my desire to fluency...*

Second, I also learned from, and was inspired by other speakers communicating effectively while stuttering. I noticed, for example, a couple of speakers positioned their cameras to show more of their body language and gestures, and several people held their eye contact the whole time while having intense speech struggles, and wanted to model myself on their VC communication strategies and their ability to keep the audience engaged over long, silent blocks. Besides the speech behavior, I was also empowered by self-compassion, and self-advocacy attitudes demonstrated by several of

the younger speakers, for example, I recorded, *"(I) really liked the message from one college student who advised everyone to 'give yourself permission to talk the way you wanted, and live the way you wanted.' Very inspiring! "*

Despite the frequent speech disfluencies in the virtual conference, I found the speakers engaging, their messages resonating, and my own speaking experience highly enjoyable. Even though I did not know most of the participants or speakers before, I felt connected and energized afterwards, and the VC experience satisfying. This experience demonstrated that emotional connections can be built over videoconferencing with mindfulness and intentions, and it takes real work to *be present* rather than merely having a presence. Showing-up on camera, attentive listening from the audience, and the speakers' full-body communication and demonstration of vulnerabilities, all contributed to the positive experience of a large virtual conference that could easily be lost to anonymity, fatigue, and disengagement [6, 77]. Speaking with the larger community enabled me to learn and grow with other people who stutter, and find strength and inspiration for my own VC communications from the shared struggle.

6.3 Struggle and frustration over a one-on-one meeting

In contrast to the satisfying experiences of speaking to large audiences presented in the previous vignettes, I now share a VC experience that, while it started as low tension, ended up very intense and unsatisfying. This was a 1-on-1 meeting with Kelly (pseudonym) , whom I met for the first time over Zoom as a potential consultant for my organization's work. I was pretty excited going into the meeting, as I usually enjoy introducing our work to new people who are interested in getting involved. Further, I find one-on-one meetings with peers to be generally low stress for me.

I usually have more speech struggles at the beginning of a conversation, especially when meeting someone new, before I build connection and trust with them to feel safe to stutter. Often, it is even harder to establish this initial connection and trust I need via videoconferencing. My strategy is often to start with small talk, finding something interesting in the other person's Zoom background to comment on, and gradually ease into self-introduction.

Following this strategy, I started the conversation by commenting on Kelly's room in the background and asked where she was located. Kelly answered laconically, not picking up the small talk or reciprocating an interest in me. After another awkward attempt at small talk, I quickly recognized her lack of interest in it, so I moved on to introduce myself, with an informational self disclosure about my stutter. Her reaction to my self disclosure was: "*It's okay*", which I found disempowering, as I was not asking for permission to stutter.

Despite the bumpy start, I continued on to share some personal stories related to the history and motivation for my current project. I had done similar introductory calls many times before and always had a good experience starting with personal stories, as they help build an interpersonal connection that is valuable for long-term collaborations.

Kelly muted herself while I was talking, and she did not give any verbal responses nor did show much of a facial expression, although it seemed that she was occasionally taking notes with pen and paper. With the lack of verbal and non-verbal feedback, it was difficult for me to assess her interest or engagement with the conversation via VC. A familiar, yet uncomfortable feeling of insecurity started to rise in me, with thoughts like *"I am losing her and making a fool of myself because of my stutter"* popping up in my head.

Such emotional and cognitive reactivity to stutter was stressful, triggering the "*fight-or-flight*" responses in my body, building up noticeable physical tension in my chest and speech musculature, and making my speech even more struggled. Noticing myself in this reinforcement cycle of struggle, I spent some effort to calm myself down by telling myself that, as she was taking notes, she must have found some value in what I said. This positive thought also encouraged me to continue talking instead of self censoring.

A few more minutes in, as I was talking, Kelly raised her physical hand. I immediately stopped and waited for her to speak. The first thing she said was that my introduction was too long and ineffective and that she did not know where it was going. Getting this response from her was unexpected and discouraging, as I reflected later:

> *I was mainly trying to tell my personal stories to connect, but she was here for business. (...) I was actually feeling okay before that, especially when I saw her taking notes, I thought she was getting insights that were useful and already had ideas for me and [Organization name redacted]. But at that moment I realized that she was not getting anything, and that was both a surprise and a disappointment.*

While I did not mind her interruption and understood the good intention in her comments, the sudden realization of the misalignment between her and my goal half way through the meeting made me feel like a failure, and her comment about my introduction made me feel judged and incompetent. I wished I was able to pick up cues about this misalignment earlier in this call, but with her side muted and fewer non-verbal signals compared to in-person, it was nearly impossible until she gave me this explicit feedback. I wrote later that *"I was extremely embarrassed by that comment, almost to the point that I wanted to hang off the call and hide."*

The feeling of embarrassment and inadequacy was so overwhelming, that *"it lingered and impacted my willingness to speak for the rest of the meeting"*. As a result, I spoke less, with more struggles, and often looked away from her to hide my discomfort:

> *My fluency was not great at the beginning, but it really suffered after she interrupted me and started giving me feedback about the elevator pitch. However, the bigger problem after that moment was that I did not want to speak any more. (...) I was not able to maintain eye contact when I spoke, especially in the later part of the meeting when the embarrassment was looming over my head.*

This experience was also traumatizing as it brought back lots of painful memories from my past of being asked to talk faster, being interrupted, and being questioned about my competence and intelligence due to my speech speed. As recorded in my notes:

> *I felt unheard and inadequate again. I felt reminded that I should not take up space, even if I was trying to believe otherwise. (...) This meeting left me feel like both a big disappointment and emotional trauma.*

This experience demonstrates that while the stutter itself does not prevent me from speaking up and connecting with my speaking partners, it is others' reactions to the way I speak - shaped by traumatic past experiences with stuttering - that create the disabling barrier for me to engage and enjoy the conversation. Microaggressions towards stuttering, even unintentional, can result in self-censorship, disengagement, losing connection by avoiding eye contact, disappointment, and low self-esteem for people who stutter. It stands in stark contrast to my experience presented in previous vignettes, where feeling valued and appreciated by my conversation partners can lift these barriers and lead to a sense of achievement in spite of struggled speech.

Lastly, despite the strong cognitive and emotional reactions during this call, reflecting on the experience postmortem through journaling was effective for externalizing and distancing my negative thoughts and feelings. Through writing my experience I was able to examine my struggle with self-compassion instead of blaming myself.

7 DISCUSSION

We summarize our findings and discuss their implications to VC technology and virtual meeting practices.

7.1 Supporting emotional experiences of videoconferencing

Videoconferencing can be exhausting [6]. The limited nonverbal channels to connect with people [61], the mental stress from the "Zoom gaze" [6, 32], and the constant distractions from one's environment [52], all contribute to the heightened cognitive load of video conferences for all participants [77]. For people with disabilities, such extra cognitive cost, combined with the accessibility and technical barriers created by videoconferencing technologies, could make videoconferencing more emotionally draining and unsatisfying [23, 76, 83, 86]. Not sharing a physical space also makes these cognitive and emotional challenges with videoconferencing less visible to others in the meeting, leading to further marginalization and disengagement of people with disabilities.

However, existing technical investigations on videoconferencing technologies have been largely concentrated on efficiency and productivity in the context of collaborative work [46, 64, 84], with a recent trend on AI-facilitated note-taking and seamless transitions between auditory-visual-textual content to facilitate information delivery and exchange [1, 48, 49, 71]. Yet the emotional experience of videoconferencing remains overlooked and under-supported. Our study offers a first-person account of VC experiences, across a wide range of situations, revealing unique insights into the emotional challenges and socio-cognitive efforts needed to participate in VC meetings. For example, although it would be easier to read a scripted presentation over VC for efficiency, in some cases, the first author prioritized spontaneous, authentic connections with the audience over the precision of the message. Given the rising popularity of auto-transcription and note-taking by AI, how to create and preserve the value of spontaneity and authenticity when speaking via VC is a question worth investigation. Besides, as observed in previous research [38], ableist microaggressions in the virtual environment - such as telling the first author "it's okay" for her to stutter when she self-disclosed - also become harder to ignore or push back on when the lack of nonverbal cues makes it difficult to "read" people and situations.

Stuttering also introduced extra constraints to the first author's VC experience, which not only imposed a significant emotional and cognitive cost to participate, but also amplified the gap between *presence* and *being present* in virtual meetings, allowing us to better understand the inner workings and complexities of the thoughts and feelings underlying the meeting behaviors. For example, when experiencing frustration and exhaustion from speech struggles, the acknowledgment and connection with the audience could have a dominant effect on a person's willingness to speak openly or self censor.

We thus urge videoconferencing researchers and developers to design for the "soft" side of VC experiences such as authenticity, empathy, a sense of belonging, and emotional connections. Those elements are essential for human communications and very often, what make the communication experience meaningful and satisfying. Instead of focusing on the words spoken, VC technology can help us respect and pick up the meaning of the silence between words, and empower its users during those challenging moments of embarrassment, hesitancy, and isolation, with acceptance and compassion. For example, rather than auto switching to the next speaker with detectable speech, VC technologies can facilitate turn taking by providing a mechanism for the current speaker to indicate end of their turn. Similarly, when a speaker demonstrates speech challenges, the VC platform can empower them by showing affirmative messages, amplifying supportive feedback from the audience, and informing others to be patient and accommodating. While the significant, yet invisible, emotional and cognitive labor required to be heard is currently shouldered solely by people who stutter, future VC technologies need to be more attuned to the emotional experiences of the participant, facilitating the fair share of responsibilities and efforts to create an enjoyable and rewarding telecommunication experience for all.

7.2 Designing for vulnerability

Vulnerability - "*the quality or state of being exposed to the possibility of being attacked or harmed, either physically or emotionally*" (Oxford Dictionary) - is a common part of human experience, especially for people with disabilities. However, as pointed out by Dagan *et al* in [22], existing HCI research and technology design rarely explore vulnerability as a design value, but instead focus on protecting and lifting people from their vulnerabilities. This idea of "resolving vulnerability" is also pervasive in the fields of accessibility and assistive technologies, with numerous efforts on *masking* or *fixing* disabilities [82] to enhance "productivity, efficiency, normalcy, and speed" [45].

Our autoethnographic data highlight the value of vulnerability in VC-based communications. ***Vulnerability draws attention and engagement***. As documented in the second vignette (see Section 6.2), while a large online conference is typically wearying for its anonymity and lack of interactivity, the occurrences of intense disfluencies in the presentations by people who stutter infused the situation with such unpredictability and excitement that made the speech instantly more memorable and interesting - a phenomenon described as "*stuttering gain*" by Christopher Constantino (CCC-SLP and a person who stutters) [14]. ***Vulnerability builds trust and intimacy***. As explained by Constantino in the same article, "*Every moment of stuttering is an exercise in trust, a verbal trust fall. We are asking the person we are speaking with to catch us*" [14]. Borrowing this metaphor, when the first author showed her speech struggles in professional and public settings (see Section 6.1 and Section 6.2), the support and the acknowledgment from the audience successfully "*caught*" her in her "*trust fall*", allowing her to form an intimate, trusting relationship with her audience that led to mutually rewarding, satisfying communication experiences in naturally stressful settings. ***Vulnerability leads to authenticity and openness***. By self identifying as a person who stutters at the beginning of the research panel (see section 6.1), the first author claimed the agency and privilege to speak openly about her authentic experience with speech technologies as a person who stutters, contributing valuable insights that would otherwise be missed in the conversation. In a nutshell, while the socio-technical constraints of videoconerencing make it harder to focus, connect, and be authentic in VC meetings than in person [77], vulnerability offers unique opportunities for engaging, trusting, and open communications over videoconferencing, enabling us to build deeper, intimate connections with friends, colleagues, and strangers in the telecommunication environment.

On the other hand, vulnerability does come with risk. When the first author's self disclosure of her stutter was treated as seeking permission, the act of openness became disempowering. When her conversation partner showed little interest or patience to listen to her personal stories, she experienced strong emotional trauma that led to self censorship and social withdrawal.

We thus argue for the potential and the needs to design for vulnerability, and invite VC technology researchers and developers to explore the benefits of vulnerability, along with mechanisms for compassion and risk management. Drawing inspiration from the emerging norm of appending pronouns after one's name in VC meetings, new socio-technical solutions can be designed to make self disclosure of vulnerable identities more natural and effective. Accessibility and telecommunication research should also be mindful about potential ableist assumptions when trying to help users "fit in" in virtual meetings [82]. Instead of focusing on constructing fluent speech [3, 30, 48], we need to dedicate more technical efforts and investments to recognize and normalize disfluencies and spontaneity [17] in telecommunications.

7.3 Reappropriating VC for self-therapy

Our autoethnography study also points to the potential for people who stutter to reappropriate their videoconferencing experience as a form of self-therapy. The reappropriation of everyday technology has mainly been studied in HCI in the

Maker context, as a form of technological resistance and self expression [75]. Recent research in accessibility explored the reappropriation of digital fabrication technologies as a rapid prototype tool for assistive technology, finding both the opportunity to create personalized, intimate assistive devices, and the technical and clinical challenges with this practice [39, 58].

The first author's autoethnographic experiences with VC show that VC can be an effective and convenient medium for people who stutter to practice and track their communication skills and strategies outside speech therapy sessions, into everyday situations with a variety of audiences, tasks, and stress levels - which is recommended but hard to achieve in traditional speech therapy programs [18, 81].

Videoconferencing comes with unique affordance for self therapy. As reported in previous study [76, 83], videoconferencing offers greater control and flexibility over the environment where the conversation takes place. While the speaking situation varies, the familiarity and the ability to customize their physical and virtual environment could be useful for people to better manage both the risk of the situation they are exposed to and the corresponding tension they experience. As the "loss of control" was reported as the core and most frustrating part of stuttering experience [78], additional control for the speaking situation is naturally therapeutic and empowering. By taking control of the speaking environment and having easy access to tension-diffusing tools and systems, people who stutter can prepare themselves to systematically approach feared situations with a safety net - a key component of Avoidance Reductions Therapy for Stuttering (ARTS) [69]. In practice, the first author would choose different types of avoidance behaviors that are appropriate for different types of VC meetings. For example, in a low stress situation, she would work on reducing word switching and filler words, while in high stress situation, she would let herself switch words and use filler words when she struggles, but aim for showing up and self disclosing.

Both Acceptance and Commitment Therapy (ACT) and ARTS encourage people who stutter to actively desensitize themselves to negative feelings and thoughts associated with stuttering, noticing them with curiosity and acceptance. However, it is often challenging to disengage with these feelings and thoughts, which often lead to struggles and self-reinforcement. Similar to what was reported for many people who stutter [83], the first author took advantage of the out-of-the-camera-view calming objects (e.g. artwork) and actions (e.g. breathing exercise) to go through challenging stuttering moments, developing her mindfulness skills in coping with the stress and panic caused by stuttering. We call designers to welcome such appropriations and incorporate such mindfulness practice in VC to support PWS in dealing with difficult moments and develop resilience over time, turning VC experience into *everyday mindfulness* practice [53, 54].

The practice of autoethnography for VC experiences provided therapeutic value as well. As described in Section 4.2, the first author's autoethnography entry was designed to begin with the utility, behavioral, emotional, and cognitive goals for the virtual meeting, which needed to be filled up before the meeting started. Deliberating and writing down these goals enabled the first author to reorient her communication around her core values, incentivizing her to concentrate on value-based actions despite socio-emotional challenges. The free-form reflections over different aspects of the speaking situation was also beneficial, allowing the first author to reframe automatic negative thoughts and develop self compassion - a quality shown to reduce negative reaction to stuttering and improve overall quality of life for people who stutter [21].

As such, we find videoconferencing a meaningful channel for self therapy, and implore marginalized users to reappropriate videoconferencing as an opportunity to practice and develop mindfulness and communication skills, in additional to being a collaboration and information tool. Keeping the therapeutic use case of videoconferencing in mind, VC technologies can incorporate practices and interventions developed in speech and mental therapy to support users'

growth and development in mindfulness, self-compassion, and emotional resilience. For example, similar to having a sticky note with positive messages at the edge of the computer monitor, VC platforms can have built-in, customizable affirmative messages as seen in stutter-affirming therapy [16, 68]; VC platforms could also suggest users have quick breathing exercise before the meeting starts, during the stuttering moments to reduce stress, and body scan meditation after the meeting to wind down. This incorporation could make mindfulness more contextual and pertinent to users beyond a separate daily practice [54].

8 CONCLUSION

This paper presents findings from a 15-month autoethnography of videoconferencing experiences of a person who stutters. Drawing from the intimate, longitudinal data over a variety of VC situations, our study sheds light on the hidden cost of videoconferencing for people who stutter, uncovering the significant emotional and cognitive efforts that are often invisible to other meeting attendants. Our findings highlight the disproportional burden carried by people who stutter to participate and engage in video conferences, calling for a more accommodating communication environment in which everyone, including technologies used for communication, shares the responsibility and efforts to include and respect all voices.

While current videoconferencing technologies tend to be optimized for productivity and efficiency, our findings also draw attention to the "soft" side of VC experiences such as authenticity, empathy, a sense of belonging, and emotional connections. We thus urge VC researchers and designers to prioritize these values in videoconferencing, as they are the vital elements of human communications and very often, what make the communication experience meaningful and satisfying for participants.

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