Seismo

The value of face-to-face communication in the digital world: What people miss about in-person interactions when those are limited

Jonathan Gruber*, Eszter Hargittai, Minh Hao Nguyen
University of Zurich, Department of Communication and Media Research IKMZ, Switzerland
*Corresponding author: j.gruber@ikmz.uzh.ch

Abstract

Face-to-face communication is important for building and maintaining relationships. The COVID-19 pandemic led to severe limitations in people's face-to-face interactions, resulting in most people relying more heavily on digital communication for social connection. Existing research has contributed to the understanding of how face-to-face communication is used alongside digital communication. However, we know little about what elements of face-to-face interactions people miss especially when in-person meetings are heavily reduced, and how this is related to their use of digital communication for social connection. In this study, we draw upon survey data that we collected in spring 2020 from a national sample of U. S. adults to answer these questions. We find that most people missed elements of face-to-face interactions and particularly valued spontaneous interactions, physical closeness, and independence from technology about in-person interactions. More frequent and increasing use of popular digital modes such as voice calls, video calls, text messages, and social media were all positively related to missing face-to-face communication. Our results contribute to the understanding of the role and value of in-person interactions in a digital world.

Keywords

interpersonal communication, face-to-face communication, digital communication, computer-mediated communication, social interaction, survey, COVID-19, U. S.

1 Introduction

Face-to-face communication is an important part of building and maintaining relationships (Baym, Zhang, & Lin, 2004; Caughlin & Wang, 2019; Cummings, Butler, & Kraut, 2002), which in turn are vital for people's well-being (Baumeister & Leary, 1995; Cacioppo & Cacioppo, 2014; Holt-Lunstad, Smith, & Layton, 2010; Shor, Roelfs, & Yogev, 2013). In countries of the Organization for Economic Co-operation and Development (OECD), people spend (pre-COVID experiences), on average, six hours per week in social interactions (e. g., talking or going out) with family members and friends as a primary activity (excluding interactions that occur in conjunction with other activities such as working or studying; OECD iLibrary, 2021). But can face-to-face communication be replaced by digital communication?

Considerable existing research has contributed to the understanding of how digital communication is used alongside face-to-face (F2F) interactions (Baym, 2015; Cummings et al., 2002; Haythornthwaite & Kendall, 2010; Kujath, 2010; Larsen, Urry, & Axhausen, 2008; Wellman, Quan-Haase, & Harper, 2020). The consensus from this work is that digital communication cannot replace F2F communication, but offers an alternative and a complementary way for social interaction. However, apart from theoretical concepts, such as the "cues-filtered-out paradigm", which explains the differences between F2F and digital communication based on the amount of social cues transmitted (Baym, 2015; Daft & Lengel, 1986), we know surprisingly little about what it is exactly that people value in F2F interactions, and how this relates to people's use of digital communication modes. Yet, this

information is relevant as it helps understand the current limitations in (i. e., what can digital communication not replace when it comes to F2F communication?) and potential future developments of digital communication (i. e., how could future digital communication better replace F2F communication?). Against the backdrop of the growing popularity, variety, and dependence on digital communication technologies, this study generates fresh insight into what people value about face-to-face communication in the digital age.

In spring 2020, the COVID-19 pandemic resulted in F2F interactions being severely restricted with many people having to rely on digital communication methods for much of their social connections (Elmer, Mepham, & Stadtfeld, 2020; Nguyen et al., 2020, 2022). This presented an opportunity to study what people value in F2F interactions, as this likely becomes more salient to people when in-person interactions are less available. We also took this opportunity to study how missing certain elements of F2F communication relates to people's use of digital communication (i. e., video calls, voice calls, text messages, email, social media, online games). In this paper, we draw on survey data we collected from a national sample of U.S. adults during the early months of the pandemic to answer these questions. At the time of our study (May 4–9, 2020), most U.S. states had enacted physical distancing guidelines and stay-at-home orders with only 4.3 percent of the population living in states without such policies (Hauck, Gelles, Bravo, & Thorson, 2020; Moreland et al., 2020; Wikipedia, 2021).

2 The role of F2F and digital communication in social interactions

Some researchers have highlighted F2F communication as the benchmark for ideal interpersonal communication (see Baym, 2015 for a review). With F2F communication, people are co-located and can see and hear each other speaking, the interaction partners can observe facial expressions and body language, and there is a high degree of synchronicity. During in-person interactions people can have eye contact and can see where other people are looking, as well as physically touch and smell each other (Chandler & Munday, 2020; Hantula, Kock, D'Arcy, & DeRosa, 2011, p. 343). Thus, in this study, we define F2F communication as social interactions where people are co-present. A long tradition of scholarly work has studied the differences between F2F and mediated communication, highlighting that F2F interactions are where most social cues (i. e., both verbal and non-verbal) can be communicated and thereby allow the most effective and satisfying way of interacting (Daft & Lengel, 1984; Walther, 1992). Investigating pairs of young female friends in the U.S., one study found that participants had the strongest bonding experience and conveyed the most affiliation cues in F2F communication, followed by voice and video chat, and the least in text communication (Sherman, Michikyan, & Greenfield, 2013).

In the last decades, literature has emerged that offers a different perspective on why people use different communication channels, complementing the cues-filtered-out-paradigm (Baym, 2015). The concept of affordances describes how people interact with technology by focusing on the possible actions that a technology enables a user to do (Evans, Pearce, Vitak, & Treem, 2017). Studying the perceived social affordances of communication channels, Fox and McEwan (2017) described certain disadvantages of F2F communication compared to digital communication channels. Participants perceived F2F communication as less accessible, as allowing for less control over their conversations, and as not being persistent. Unlike in the cues-filtered-out paradigm, F2F communication is not described here as fundamentally superior to digital communication, but is considered to have both weaknesses and strengths.

In the 21st century, most people use a mix of in-person and mediated communication to interact with others (Baym, 2015; Hall, 2020; Haythornthwaite, 2005; Larsen et al., 2008; Wellman et al., 2020). In recent

years, research has especially focused on how digital communication affects F2F communication and the implications this has for social interactions and well-being (Grieve, Indian, Witteveen, Tolan, & Marrington, 2013; Kross et al., 2013; Subrahmanyam, Frison, & Michikyan, 2020). Work has noted that even with the rise of communication technologies, F2F interactions have remained an important way of socially connecting (Baym et al., 2004; Caughlin & Wang, 2019; Flaherty, Pearce, & Rubin, 1998; Gonzales, 2014; Hall, 2018; Sherman et al., 2013). In March 2020, with Coronavirus cases surging and guidelines for physical distancing imposed (Muccari, Chow, & Murphy, 2021), the Pew Research Center asked a representative sample of U.S. adults whether – given the recommended distancing guidelines – they believed they could replace many of their everyday face-to-face interactions with the Internet or phone (Anderson & Vogels, 2020). The majority (64 %) responded that while the Internet and phones could be useful means for communication during COVID-19, they could not completely replace everyday F2F interactions.

Some research suggests that computer-mediated interactions can be as helpful as F2F interactions in certain situations and are sometimes even preferred to in-person meetings (Fox & McEwan, 2017; Gonzales, 2014; Litt, Zhao, Kraut, & Burke, 2020; Thulin, 2018). In a mixed-methods study from researchers at Facebook that included qualitative analysis of open-ended questions with 4632 people from the United States, India, and Japan in 2018, participants reported on their most recent social interaction (Litt et al., 2020). Results indicated that computer-mediated interactions can be just as meaningful as F2F interactions. One study found that text-based interactions (i.e., texts, emails, Facebook interactions) had a positive effect on self-esteem, while F2F interactions had only a marginally significant effect (Gonzales, 2014). Research has also shown that people with lower self-esteem tended to use email rather than F2F communication in four hypothetical communication scenarios (Joinson, 2004). Additionally,

although preferring in-person meetings in some situations, people reported disclosing more personal information in text messages and phone calls (Gonzales, 2014; Thulin, 2018).

Instead of comparing F2F and computer-mediated communication, and putting them in competition with each other, some researchers have theorized (Calhoun, 1998; Haythornthwaite, 2005) and empirically tested how these different communication means are used together to build and maintain social relations (Mesch, 2009; Ruppel, Burke, & Cherney, 2018; Wellman et al., 2020). For instance, polymedia theory argues that the selection and combination of available communication means between people is influenced by the nature of the specific relationship (Madianou & Miller, 2013). Media multiplexity (Haythornthwaite, 2002, 2005) suggests that the closer a relationship the more communication modes people use to interact with each other (e.g., F2F communication, text messages, voice calls, video calls). This is illustrated by a study that showed how constant connectivity – through a mix of F2F and digital communication technologies – positively affected romantic partners' well-being (Taylor & Bazarova, 2021). Other research has found that voice and phone calls are mostly used to interact with close social ties whom people know well and often see face-to-face (Jin & Park, 2010; Kim, Kim, Park, & Rice, 2007; Tawiah, Nondzor, & Alhaji, 2014; Thulin, 2018). People coordinate and plan activities relying on voice calls, text messaging, and email (Larsen et al., 2008; Ling & Lai, 2016; Thulin, 2018). An early study of the relationship between offline and online social ties in Los Angeles suggested that people who were more involved in an offline community were also more likely to be socially active online (Matei & Ball-Rokeach, 2002). Subsequent studies supported this finding, showing that the more socially active people are, the more they communicate online and offline (Baym et al., 2004; Dienlin, Masur, & Trepte, 2017; Jin & Park, 2010, 2013).

Together, these studies show that F2F communication has continued to play a

vital role in social relationships alongside computer-mediated communication. Instead of F2F communication being replaced by online communication, the two complement each other and are used in comparable ways to maintain and develop social relations (Flaherty et al., 1998; Wang & Wellman, 2010; Yau & Reich, 2018). However, what happens when F2F interactions are suddenly severely limited, like during the COVID-19 lockdowns, and people are left to rely more heavily on digital communication to connect with people in their networks? What exactly do people end up missing about F2F interactions in this situation and are certain characteristics of F2F communication missed more than others?

Unlike previous studies that have merely compared a unidimensional measure of F2F communication with digital communication modes, we aim to extend the current literature by diving deeper into the specific elements that make F2F communication valuable to people. Moreover, we examine how missing certain elements of F2F interactions relate to one's use of different digital communication methods. As such, we address the following research question:

› RQ: What did people miss about F2F interactions during the initial COVID-19 pandemic lockdowns?

3　How digital communication can compensate for missing F2F interactions

Digital communication encompasses a wide range of options including video calls, voice calls, text messaging, email, social media, and online games. Research has shown that people rely on one or the other depending on their circumstances (e. g., private or work-related contexts; Baym et al., 2004; Ling & Lai, 2016; Lufkin, 2018; Neustaedter & Greenberg, 2012; Radicati Group, 2017), their reasons for communication (e. g., disclosing personal information, coordinating meetings, sharing information, hanging out, browsing infor-

mation; Buhler, Neustaedter, & Hillman, 2013; Cui, 2016; Gonzales, 2014; Larsen et al., 2008; Lin & Lu, 2011; Thulin, 2018), and their interlocutor (e. g., close ties or weak ties; Kim et al., 2007; Kirk, Sellen, & Cao, 2010; Ling & Lai, 2016). When face-to-face communication is less possible, these digital means might have to make up for missing F2F interactions.

Existing research has focused especially on how digital communication is used to maintain social relations in situations where friends and relatives are geographically dispersed (Baym et al., 2004; Buhler et al., 2013; Nedelcu & Wyss, 2016; Neustaedter & Greenberg, 2012; Yang, Brown, & Braun, 2014) and some work has explored the same questions in the context of the COVID-19 pandemic (Elmer et al., 2020; Hall, Pennington, & Holmstrom, 2021; Nguyen et al., 2022). While digital communication cannot replace the physical closeness of in-person meetings, it can help physically distant people feel as if they are together in the same place (Nedelcu & Wyss, 2016). For example, people use video calls despite technical limitations and challenges to watch TV (e. g., synchronize watching something simultaneously), share meals, hang out, and celebrate birthdays (Buhler et al., 2013; Kirk et al., 2010; Neustaedter & Greenberg, 2012). People play online games together with friends to maintain their relationships (Domahidi, Breuer, Kowert, Festl, & Quandt, 2018; Liu & Yang, 2016; Williams et al., 2006). In a study about the social lives of online game players, one participant said in an interview about their gaming experience with a friend: "Since we can't golf, we WoW [play World of Warcraft]" (Williams et al., 2006, p. 351). Additionally, when not physically together, people use text messages (Cui, 2016) and social media (Thulin, 2018) to share experiences from everyday life to maintain constant awareness of their peers. Such studies suggest that people who use digital communication modes like voice calls, video calls, text messages, or online games more frequently to interact with people in their networks and share experiences might be less likely to miss

F2F interactions when those are limited. This leads to the following hypothesis:

› H: People who use digital communication modes (i. e., voice calls, video calls, text messages, email, online games) more frequently to interact with people in their networks are less likely to miss F2F interactions during the COVID-19 pandemic.

4   Data and methods

We administered a survey to adults 18+ in the United States from May 4–9, 2020 ($N = 1551$) to address the above-stated research question and hypothesis. We contracted with the online survey firm Cint, which uses a double opt-in procedure to recruit participants to its national panel. We implemented quotas for age, gender, education level, and region to ensure a diverse sample. The respondents received financial compensation for their participation in the survey. We included attention-check questions and the 1551 respondents reflect those that satisfied the attention criteria.

4.1   Measures

In this section we describe our dependent, independent, and control variables used in the logistic regressions to answer the research question and test the hypothesis.

4.1.1   Dependent variables

Our dependent variable captures what people missed about F2F communication. To construct this survey question, we relied a) on prior literature about the characteristics of F2F communication; and b) a pilot study in April 2020 of twenty young adults who were living under physical distancing guidelines due to the COVID-19 pandemic. Guided by previous literature, we formulated items based on the fact that during in-person interactions people are co-located and can see and hear each other speaking, the interaction partners can observe facial expressions and body language, and there is a high degree of synchronicity. During in-person interac-

tions people can also have eye contact and can see where other people are looking, as well as physically touch and smell each other (Chandler & Munday, 2020; Hantula et al., 2011, p. 343). In the pilot study we asked people: "What do you currently miss about social interactions?" The answers included comments such as: "What I miss the most from offline interaction is the physical closeness and the shared activity. I'd rather go out and drink a coffee with my best friend to share a special and unique moment with her, instead of just talking through the phone." Another discussant said: "Personally, as [...] 95 % of my conversations are in Italian (which is my mother tongue), my behavior when I talk tends to be very theatrical and I gesticulate a lot. Even though there is the possibility of video-calling each other, I still can't express myself in a satisfactory way." From these responses, we drafted several more survey items.

The final question asked: "During the Coronavirus pandemic, many people have reduced or completely stopped face-to-face social interaction with those not in their household. Have you missed any of the following about face-to-face social interactions with people who do not live in your household? Check *all* that apply."[1] Answers were: "physical closeness," "non-verbal communication," "having spontaneous conversations," "having conversations without the use of digital technology," "the convenience of having conversations without too much effort," "none of the above, because I still see people face-to-face outside of the household," and "none of the above, I don't miss these things even though I don't go out as much." We created dummy variables for each of these (0 = no; 1 = yes), and also created a summary dummy variable indicating whether someone had missed any elements of F2F interactions (1 vs. none = 0).

We also gave participants the opportunity to indicate other things they missed about F2F interactions, by including the answer option "Something else, please

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1   The survey used underlining rather than italics for emphasis throughout the instrument.

specify." We received 14 responses and recoded three responses as missing physical closeness, as this was exactly what respondents indicated (e. g., hugs). Seven responses described activities related to F2F which we had measured separately in another item (i. e., the control variable "social activities"). As such, we did not recode these responses. Finally, four responses were without meaning and we recoded them as missing values (e. g., "I don't talk to people if I'm out").

4.1.2 Independent variables

Our independent variables are people's frequency of and changes in digital communication. To measure frequency of digital communication, we asked: "Since the Coronavirus pandemic, how often have you used the following methods to communicate *with friends and family who do not live in your household?* Do not include work-related communication." Participants answered this using a 4-point scale ranging from "daily / almost daily" to "never" for six digital communication methods: voice calls, video calls, text messages (through any messaging app), email, social media, and online games. We recoded this into a continuous variable with midpoint daily values reflecting the frequency per week (daily / almost daily = 6.5, few times a week = 3, less than weekly = 0.5, and never = 0).

We also asked participants, whether they had changed their communication frequency: *"Compared to before* the Coronavirus pandemic, has your communication with *friends and family who do not live in your household* increased, decreased or remained the same for these methods? Do not include work-related communication." We recoded the answer options "more," "about the same," and "less" into a binary variable, indicating whether someone increased their communication ("more") versus not ("about the same" and "less").

4.1.3 Control variables

Sociodemographics. We measured age by asking about birth year. For gender, options included male, female, other; since no one picked the latter category, we cre-ated a 0 (male) and 1 (female) dummy. We measured race and ethnicity mirroring how the U. S. Census approaches it: by first asking if people are of Hispanic or Latino descent and then what race(s) they consider themselves to be, including White, Black or African American, Asian, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, and / or other. We recoded these into mutually exclusive dummy variables pooling American Indian, Alaska Native, Native Hawaiian, and Pacific Islander into one group due to their low numbers and similar social status. People indicated their educational level (recoded into completed high school or less, attended some college, completed college or more), annual household income (13 category ranges from less than US$ 10 000 to US$ 200 000 or more, recoded into midpoint values) and metropolitan status (recoded into three dummy variables: rural, suburban, and urban).

Living alone. To control for the extent to which respondents had the opportunity for F2F interactions within their household, we asked participants whether they lived together with other adults or with children (under 18 years of age). From these, we created a dummy variable reflecting whether participants lived alone or with other people.

Social activities. To account for the extent to which people had F2F interactions with people outside their household during COVID-19 lockdowns, we relied on a survey item measuring why people had left their home in the past two weeks. The answer options included the following social activities: "meeting with friends," "attending religious services," "going to the movies," "theater or a concert," "going to a bar or café," and "going out for beauty and care services." Having picked any of the listed activities is signaled with a dummy variable in the analyses indicating participation in optional social activities.

Going to work. We also controlled for whether people had left their home to go to work in the past two weeks, as the workplace could be a potential location for face-to-face interactions and might

Table 1:   Sample characteristics

	Percent	Mean	*SD*	*N*
Sociodemographics				
Age		46.8	17.0	1391
Female	55.4			1392
Education				1392
High school or less	47.8			
Some college	16.5			
Bachelor's degree or more	35.7			
Race and ethnicity				
White	68.6			1392
African-American	11.1			1392
Hispanic	13.7			1391
Asian	5.4			1392
Native American	0.9			1392
Household income		US$ 60 833	US$ 51 682	1389
Community type				1391
Rural	17.8			
Suburban	38.1			
Urban	44.1			
In-person experiences				
Living alone	20.2			1392
Going out for non-essential social activities	21.9			1389
Digital communication frequency*				
Voice calls		3.1	2.5	1392
Video calls		1.8	2.3	1392
Text messages		4.3	2.5	1392
Email		2.7	2.6	1392
Social media		3.4	2.8	1390
Online games		1.8	2.5	1392

Note: *Digital communication is recoded to frequency in days per week.

influence whether people miss F2F interactions.

4.2 Sample characteristics

When asked what they missed about F2F interactions, 142 (9.2 %) people picked the following answer: "None of the above, because I still see people face-to-face outside of the household." Since these people do not meet our criterion for having limited in-person interactions we dropped them from our analyses. Men and people of lower income were more likely to give this response. We also dropped all cases that were missing on F2F interactions measure since it was our key question of interest ($N=17$). Of the remaining 1392 participants, slightly more than half were female (55.4 %) and on average 47 years old ($SD=17.0$) (Table 1). The majority of the participants (68.6 %) identified as White, fourteen percent as Hispanic, eleven percent as African-American, five percent as Asian, and less than one percent (0.9 %) as Native American or Pacific Islander. Almost half (47.8 %) had no more than a high school education, seventeen percent had some college experience and about one third (35.7 %) had a Bachelor's degree or more. The median annual household income was US$ 45 000 ($M=$ US$ 60 833, $SD=$ US$ 51 682). About one in five participants (17.8 %) said that they lived in a rural community, thirty-eight percent in a suburban community, and somewhat un-

der half (44.1%) in an urban community. A fifth (20.2%) of the respondents lived alone and 21.9% of the sample reported going out for optional social activities in the previous two weeks.

4.3 Analysis procedure

To answer the RQ – whether people missed elements of F2F interaction during the COVID-19 pandemic despite sheltering in place, and which elements they missed the most – we present frequencies. To investigate how the use of digital communication for social connection related to what people missed about F2F interactions, we ran logistic regression analyses, with digital communication as independent variables and elements of missing F2F interactions as dependent variables. In these models, we controlled for demographics, living alone, and going out for social activities. We tested for multicollinearity among the independent variables with VIF values ranging from 1.02 to 1.59 suggesting that multicollinearity is not a concern.

5 Results

In this section, we present the results from the descriptive statistics and logistic regressions to answer the research question and test the hypothesis.

5.1 What do people miss about F2F interactions during the COVID-19 pandemic?

Our results show that the majority of participants (77.1%) missed at least one element that characterizes F2F interactions (Table 2). Regarding the research question, most missed being able to have spontaneous conversations with people when being together (50.5%), followed by physical closeness (43.4%) and having conversations with people without the use of digital technology (43.1%). Some people missed the effortlessness and ease of communication when meeting others in person (34.5%). Non-verbal communication, such as body language and facial expressions was missed by the fewest people (25.8%). All in all, our research shows that

what people value most about F2F interactions are the spontaneity of communication, physical closeness, and not having to depend on technology.

Table 2:   What people miss about face-to-face communication

	Percent	*N*
Missing F2F communication*	77.1	1392
Miss spontaneous conversations	50.5	1392
Miss physical closeness	43.4	1392
Miss conversations without digital technology	43.1	1392
Miss convenient conversations without much effort	34.5	1392
Miss non-verbal communication	25.8	1392
Miss something else	0.8	1392
Miss nothing, despite fewer face-to-face interactions	22.6	1392

Note: *All respondents who missed at least one element of F2F communication.

5.2 How does the use of digital communication for social connection relate to what people miss about F2F interactions during the COVID-19 pandemic?

Physical closeness. Logistic regression results showed that people who reported a higher usage frequency of voice calls, of text messages, and of social media to communicate with friends and family since the start of the pandemic were more likely to miss physical closeness as an element of F2F interactions (Table 3). The same was true for people who, compared to before the COVID-19 pandemic, had *increased* their use of voice calls, of video calls, of text messages, and of social media (Table 4).

Non-verbal communication. More frequent and increased use of voice calls and of text messages was associated with missing non-verbal communication, while people with higher and increased usage frequency of online games were less likely to miss non-verbal communication.

Having spontaneous conversations. People who used voice calls and text messages more frequently as well as those who increased their use of voice calls, of video calls, and of text messages compared

Table 3:   Logistic regressions: relationship between *frequency* of use of digital communication modes and missing F2F interactions

	Miss any F2F			Miss physical closeness			Miss non-verbal communication			Miss spontaneous conversations			Miss conversations without tech			Miss convenience			Miss nothing, despite less F2F interactions		
	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE
Voice calls	.13**	.11	.03	.09*	.07	.03	.09*	.07	.03	.11**	.09	.03	.09*	.07	.03	.09*	.07	.03	-.13**	-.10	.03
Video calls	.20***	.18	.05	.06	.05	.03	.03	.03	.03	.02	.02	.03	.11**	.09	.03	.01	.00	.03	-.20***	-.18	.05
Text messages	.11**	.09	.03	.15***	.11	.03	.09*	.07	.03	.15***	.11	.03	.14***	.11	.03	.09*	.07	.03	-.11**	-.09	.03
Email	-.01	-.01	.03	-.11**	-.08	.03	.03	.02	.03	-.02	-.01	.02	-.13***	-.1	.03	-.01	-.01	.03	.01	.01	.03
Social media	.07	.05	.03	.16***	.11	.02	.06	.04	.03	.04	.03	.02	.08*	.06	.02	.05	.03	.03	-.07	-.05	.03
Online games	-.03	-.02	.03	-.03	-.02	.03	-.1*	-.08	.03	-.09**	-.09	.03	-.02	-.01	.03	-.04	-.03	.03	.03	.02	.03
Pseudo R²	.11***			.06***			.08***			.05***			.05***			.05***			.11***		

Note: ß = standardized coefficient; b = unstandardized coefficient; SE = standard error. *p < .05; **p < .01; ***p < .001.

Table 4:   Logistic regressions: relationship between *increased* use of digital communication modes and missing F2F interactions

	Miss any F2F			Miss physical closeness			Miss non-verbal communication			Miss spontaneous conversations			Miss conversations without tech			Miss convenience			Miss nothing, despite less F2F interactions		
	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE	ß	b	SE
Voice calls	.18***	.83	.20	.08*	.30	.14	.08*	.32	.15	.10**	.38	.14	.09**	.35	.14	.07	.26	.14	-.19***	-.86	.20
Video calls	.18***	.86	.22	.14***	.58	.14	.06	.26	.16	.10**	.40	.14	.20***	.83	.14	.07	.28	.15	-.18***	-.85	.22
Text messages	.21***	.91	.19	.12**	.47	.14	.13**	.52	.15	.13***	.52	.14	.15***	.60	.14	.08*	.29	.14	-.20***	-.89	.19
Email	.03	.17	.24	-.01	-.03	.16	.03	.14	.17	.00	.00	.16	-.03	-.12	.16	.04	.17	.16	-.03	-.16	.24
Social media	.03	.12	.20	.08*	.31	.14	.04	.18	.16	.04	.16	.15	.05	.21	.15	.03	.11	.15	-.02	-.10	.20
Online games	.00	.01	.22	-.05	-.21	.16	-.08*	-.40	.18	-.03	-.13	.16	.2	-.07	.16	-.08*	-.36	.17	-.01	-.06	.23
Pseudo R²	.15***			.06***			.09***			.06***			.08***			.05***			.15***		

Note: ß = standardized coefficient, b = unstandardized coefficient, SE = standard error. *p < .05; **p < .01; ***p < .001.

Table 5: Summary of the significant relationships between frequency of use and increased use of digital communication modes, and missing F2F interactions

	Miss any F2F		Miss physical closeness		Miss non-verbal communication		Miss spontaneous conversations		Miss conversations without tech		Miss convenience		Miss nothing, despite less F2F interactions	
	Frequency	Increase	Frequency	Increase	Frequency	Increase	Frequency	Increase	Frequency	Increase	Frequency	Increase	Frequency	Increase
Voice calls	+	+	+	+	+	+	+	+	+	+	+		−	−
Video calls	+	+		+				+	+	+			−	−
Text messages	+	+	+	+	+	+	+	+	+	+	+	+	−	−
Email			−						−					
Social media			+	+										
Online games					−	−	−							

Note: + = positive significant relationship; − = negative significant relationship.

to before the COVID-19 pandemic were more likely to miss having spontaneous conversations as an element of F2F interactions. In contrast, people who played online games with friends or family more often were less likely to miss having spontaneous conversations.

Having conversations without the use of digital technology. The aspect of not having to depend on technology in F2F interactions was more likely missed by people who used voice calls, video calls, text messages, and social media more often and by those who increased their use of voice calls, of video calls, and of text messages compared to before the pandemic. People with higher use frequency of emails were less likely to miss having conversations without the use of digital technology.

The convenience of having conversations without too much effort. More frequent use of voice calls and of text messages as well as increased use of text messages was related to missing convenient conversations without much effort. People who played online games more often were less likely to miss the convenience of having conversations without too much effort.

None of the above, I don't miss these things even though I don't go out as much. People who reported to miss none of the queried elements of F2F interactions although their in-person interactions were limited, were more likely to use voice calls, video calls, and text messages less frequently.

All in all, we see that higher and increased usage frequency of voice calls, video calls, text messages, and social media were all positively related to missing certain elements of F2F interactions, while higher and increased usage frequency of writing emails and playing online games was associated with missing certain elements of F2F interactions less (see Table 5 for a summary of the results). In sum, only in the case of these latter two modes of communication did we find support for our stated hypothesis. In the next section, we discuss these findings in the context of the larger literature about interpersonal communication.

6　Discussion

What do people value about face-to-face interactions when these are less possible and how does missing face-to-face interactions relate to people's use of digital communication? We find that during the initial COVID-19 pandemic lockdowns, most participants missed at least one characteristic of F2F interactions. Thereby, our study supports existing research that highlights the importance of in-person interactions for relationships (Baym et al., 2004; Caughlin & Wang, 2019; Cummings et al., 2002; Daft & Lengel, 1984; Flaherty et al., 1998; Gonzales, 2014; Hall, 2018; Sherman et al., 2013; Walther, 1992). We extend this line of research by showing *what elements* people missed about face-to-face interactions when these were limited, namely the spontaneity of communication, physical closeness, and independence from technology. These elements of F2F communication all relate to the experience of being together in the same place (Nedelcu & Wyss, 2016), where people can communicate spontaneously (e.g., about something they are experiencing together with their interaction partner), can touch and smell each other, and are not constrained by or dependent on any form of technology. Surprisingly, nonverbal communication as an element of in-person interaction, such as body language and facial expressions, was missed by the fewest participants – even though existing work describes this as a central element of F2F interactions compared to other types of communication (Daft & Lengel, 1984; Walther, 1992). One reason for this could be that nonverbal communication often happens unconsciously (e.g., barely visible changes in facial expressions; or the smell of people) – which means that people cannot explicitly indicate that they are missing it, because they are not in fact aware of it in the first place. More conscious nonverbal signs (such as tone of voice and a smile) are communicated in some forms of digital communication, such as voice and video calls, and may therefore be missed less often.

In their analysis of the social affordances of communication channels, Fox and McEwan (2017) show that F2F communication is perceived as less accessible, less conversation-controlling, and less persistent compared to digital modes (e. g., video calls, email, social media). However, our findings suggest that F2F communication has its own unique social affordances that cannot be replaced by digital communication:

› Having spontaneous conversations while being together and not having to wait for a response, for example, when writing a message to someone or trying to call someone.
› Allowing physical closeness, such as smelling, feeling, touching, and seeing each other.
› Not having to depend on technology, which may sound trivial, but in a society increasingly dominated by technology, moments without technology might become more relevant and actively sought by people (Nguyen, 2021; Vanden Abeele & Nguyen, 2022).

We found that varying degrees of use of different digital communication modes related differently to what people missed about F2F interactions. Participants who used voice calls, video calls, text messages, and social media more frequently were more likely to miss certain elements of F2F interactions. Socially active people tend to communicate more online *and* offline (Baym et al., 2004; Dienlin et al., 2017; Jin & Park, 2010, 2013; Matei & Ball-Rokeach, 2002). Since the latter was only possible to a limited extent during COVID-19 lockdowns, socially active people might have been more likely to miss offline interactions.

Interestingly, people who *increased* their use of voice calls, video calls, text messages, and social media compared to before the Coronavirus pandemic were also more likely to miss elements of F2F interactions. A possible explanation is that highly sociable people increased their online communication to substitute for the lack of F2F communication, but that did not meet all of their needs,

hence they still missed in-person interactions. While existing literature suggests that people use digital communication to maintain relationships when in-person meetings are less possible (Baym et al., 2004; Buhler et al., 2013; Cui, 2016; Kirk et al., 2010; Liu & Yang, 2016; Nedelcu & Wyss, 2016; Neustaedter & Greenberg, 2012; Thulin, 2018; Williams et al., 2006; Yang et al., 2014), our results indicate that voice calls, video calls, text messages, and social media cannot completely replace in-person meetings. This is in line with findings about U. S. adults not believing that digital communication could replace everyday F2F interactions even while recognizing that it would be a useful means for communication during COVID-19 (Anderson & Vogels, 2020). Text messages and social media posts in which personal experiences are shared (Cui, 2016; Thulin, 2018) might have even further motivated people's desire for shared in-person experiences.

While voice calls, video calls, text messages, and social media were all positively related to missing elements of F2F communication, writing emails, and playing online games with friends and family were negatively related to missing certain elements of F2F interactions. In the case of email, more frequent users were less likely to miss physical closeness and conversation without the use of technology. The latter could be because people consciously choose to communicate via email to write longer texts and appreciate the technology that allows them to do so. One possible explanation for the finding that frequent email users are less likely to miss physical closeness may be related to research showing that emails are a preferred way to communicate with less close others (Kim et al., 2007; Ling & Lai, 2016; Yang et al., 2014), i. e., with whom people might be less likely to desire or expect physical closeness regardless of COVID-19 lockdowns. This echoes polymedia theory (Madianou & Miller, 2013), which states that the nature of a relationship influences the choice of communication means.

People who played online games more frequently with friends and family and

those who increased playing online games during the COVID-19 pandemic were less likely to miss non-verbal communication as an element of F2F interactions. It could be that the way players control their characters while playing together (e. g., through movements, actions, or in-game communication options) might resemble non-verbal communication during face-to-face encounters and thus players are less likely to miss these. Moreover, participants who played more frequently were also less likely to miss spontaneous conversations. This might be because players are often connected via voice channels (e. g., Discord) while playing together (Williams et al., 2006). Thus, they can spontaneously communicate about topics, whether concerning the game or not. In this sense, online gaming might resemble F2F engagement, where people share experiences and can communicate with each other spontaneously about various topics.

For social interactions during pandemic times, our findings imply that while digital communication allows people to stay in touch with others and maintain relationships, it cannot make up for elements unique to F2F interactions. Since social interactions are critical to people's well-being (Baumeister & Leary, 1995; Cacioppo & Cacioppo, 2014; Holt-Lunstad et al., 2010; Shor et al., 2013), it is important to be careful and thoughtful about limiting people's in-person interactions. In contexts beyond the pandemic, such as situations where friends and relatives are geographically dispersed, our results suggest that some modes of digital communication (such as playing online games together) may be better suited to compensate for missing F2F interactions. Furthermore, based on our research, we recommend using digital communication means to create situations where people share experiences with each other (e. g., watching a movie or having a meal together), as this allows for spontaneous conversations – one of the aspects of in-person interactions that people value the most.

7 Limitations and future research directions

While helpful in recognizing general trends regarding what people miss about face-to-face interactions when these are restricted and how this relates to people's use of digital communication, there are limitations to what questions our data allow us to answer. First, we cannot draw conclusions about the causal direction of the relations we measured as we use cross-sectional data. Although existing literature suggests that people turn to digital communication for maintaining and building relations when in-person meetings are less possible (Baym et al., 2004; Cui, 2016; Elmer et al., 2020; Kirk et al., 2010; Neustaedter & Greenberg, 2012; Williams et al., 2006), it may also be the case that being in touch through such methods reminds people about what they are missing by not getting to see people in person, thereby exacerbating a longing for in-person interactions.

Second, we only measured what people missed about F2F communication, but not how much each element was missed. Future studies could, for example, include a Likert-type scale so respondents can indicate how much they miss certain characteristics of F2F communication. This would increase data granularity and provide further insight into the importance of each element. Nonetheless, our study is one of the few to provide valuable insight into the importance of F2F communication under pandemic conditions and thus makes a contribution to the literature in its current form.

Third, we conducted our study in the context of one country only, putting limits on the findings' generalizability. At the time of study, the United States had one of the highest relative numbers of COVID-19 cases in the world (Hauck et al., 2020; Moreland et al., 2020; Wikipedia, 2021), providing a helpful case for studying reactions to limited F2F interactions. It is important to note that these results might be different depending on the national context of the pandemic (i. e., strictness of lockdowns), digital infrastructure (e. g., uptake

of digital communication), and cultural conditions (i. e., importance of F2F communication).

Fourth, we encourage future research – especially qualitative work – to investigate in more detail what people value about F2F interactions. While our study provides important insights into what elements of F2F communication most people miss, there remains much room for additional research into questions such as: What do elements of face-to-face communication such as *spontaneous interaction* or *physical closeness* mean for different people? What bothers people about digital technology that makes them wish they would not depend on it in social interactions? What other elements do people value about in-person interactions and why? What is it exactly about online games that links with missing certain elements of offline interactions less? Why was more frequent and increased use of video chats positively linked with missing F2F, despite existing research highlighting the richness of its social cues (Daft & Lengel, 1984; Sherman et al., 2013) and potential for shared experiences in video chats (Buhler et al., 2013; Kirk et al., 2010; Nedelcu & Wyss, 2016; Neustaedter & Greenberg, 2012)? Furthermore, future research could also include questions about immersive technologies such as virtual reality (VR) or augmented reality (AR) to investigate how such shared virtual experiences might relate to missing offline interactions. All in all, such research would help better understand how F2F interactions and digital communication modes supplement each other, and how digital technologies can be used and developed to meet better the needs of people who are limited in their face-to-face interactions for different reasons (e. g., a lockdown or being geographically dispersed).

Finally, we would like to note that we – as researchers – conducted our study under less-than-ideal conditions because we (1) had to act quickly to "catch the moment" of initial lockdowns (which at the time no one knew would last as long as they did); and (2) were coping with lockdown measures and a sudden transition to home office ourselves. We reflect on the study design and data collection process – including data quality and ethical considerations – elsewhere (Hargittai et al., 2020). Our study caught people's experiences at a unique moment in time that lends it value.

8   Conclusion

The COVID-19 global pandemic resulted in much of the world going into lockdown, thereby significantly curtailing people's face-to-face interactions. In-person communication that most people had taken for granted was suddenly out of reach for many. This natural experiment offered a unique opportunity to investigate what it is that people may miss most about F2F interactions, and how such experiences related to people's use of digital communication methods. Using a survey administered a few months into lockdowns in the United States, this paper looked at these questions in a sample of adults aged 18 and older.

The study extends our understanding of face-to-face communication and what people value about it, while also having a broad range of sophisticated digital communication technologies available. Contributing to the concept of affordances (Evans et al., 2017), we show that F2F communication has its own unique social affordances, such as having spontaneous conversations, physical closeness, and having conversations without the use of digital technology. Thereby, our study provides insights into the current limits of digital technology when it comes to replacing F2F interactions. Digital communication modes such as voice calls, video calls, text messages, and social media might allow people to connect and communicate, but cannot mitigate their need for in-person experiences. Yet, some digital communication modes like writing emails or playing online games together with friends and family do seem to address certain needs as they link to missing elements of F2F communication less. This suggests that certain communication strategies can help deal with situations in which personal encoun-

ters are severely restricted. How this may play out in the long run is something we hope future research will investigate.

Conflict of interests

The authors declare no conflict of interests.

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