Putting the social back into physical distancing: The role of digital connections in a pandemic crisis

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During the COVID-19 pandemic, physical distancing is necessary to reduce the spread of the coronavirus. To compensate for the lack of social encounters, people have been advised to connect with others via digital communication channels. Drawing on a psychological framework combined with assumptions from communication science, we therefore investigated whether technology-mediated communication can actually meet individuals’ social needs to foster compliance with distancing measures and whether there are differences between distinct communication channels. Based on an online survey (N = 301) during the first national lockdown in Germany, we found that the impact of audio-visual communication is limited. Instead, the data showed that text-based communication indirectly fostered willingness to adhere to physical distancing through the pathway of increased feelings of social support and life satisfaction. Three follow-up surveys (N = 180) revealed that while feelings of social support increased, people’s technology-based communication and willingness to adhere to distancing measures decreased. Our results challenge the assumption that audio-visual communication compensates for lack of physical contact more effectively than text-based communication. This study highlights the potential of text-based communication to increase feelings of social support, which may be particularly important during a pandemic.

Keywords: COVID-19; Technology-based communication; Social support; Social connectedness; Well-being.
individuals to adhere to distancing measures. As there are various communication channels that people can use to connect with others, it needs to be scrutinised which channels are most suitable for fostering satisfactory social contact. In this regard, communication science provides a valuable complementary theoretical perspective, as relevant approaches more strongly integrate technical aspects of interpersonal digital communication into (social) psychological perspectives. The electronic propinquity theory (Korzenny, 1978) was developed to explain the mechanism of mediated electronic communication. According to this theory, the greater the bandwidth of channels (i.e., the more signals are transmitted), the higher is the communicators’ experienced psychological closeness. Likewise, channels’ capacity for mutual directionality (e.g., immediacy of feedback) can also improve experienced propinquity. Therefore, we expected to find differences between richer channels such as telephone and video on the one hand and less rich channels like text-based messengers or social network sites on the other hand.

The goal of our study is twofold: First, with a view to fundamental research, we used the unique situation of extensive contact restrictions to determine the degree to which different forms of mediated communication can contribute to individuals’ well-being by enhancing feelings of social connectedness and social support during times of physical isolation. Second, we sought to contribute to applied questions which might be crucial in this or future pandemic phases: Which kind of mediated communication can foster willingness to adhere to physical distancing means of fulfilling users’ basic social needs?

Therefore, this study does not only contribute to understanding ways to encourage compliance with physical distancing measures, but also examines the impact of technology-based communication on fundamental psychological processes. The interdisciplinary approach applied in this study allows us to derive more tangible implications for interpersonal communication in times of physical isolation. Second, we sought to contribute to applied questions which might be crucial in this or future pandemic phases: Which kind of mediated communication can foster willingness to adhere to physical distancing means of fulfilling users’ basic social needs?

LITERATURE REVIEW

Challenges emerging from physical distancing

First studies have confirmed the concerns that distancing measures due to COVID-19 may have a negative effect on individuals’ psychological well-being. For instance, it was found that during the time of the most severe contact restrictions in Germany (March–May 2020), individuals’ positive and negative emotions as well as their life satisfaction decreased (Zacher & Rudolph, 2020). Likewise, compared to pre-pandemic times, mental health decreased in the UK (Smith et al., 2020) and people reported relatively high levels of loneliness (Groarke et al., 2020).

To understand why it is challenging for humans to refrain from meeting with their close contacts, theories addressing loneliness, and humans’ basic need to belong are informative. Following the evolutionary theory of loneliness as proposed by Cacioppo et al. (2006), individuals perceive social pain when separated from others with whom they feel connected. In turn, this social pain leads to a negative internal state, which is characterised by feelings of loss of control, distress/depressed affect, and lowered self-esteem. Accordingly, people are motivated to “repair the social disconnections” to overcome this aversive state and to gain feelings of social reward (Cacioppo et al., 2006, p. 1057). Similarly, the need to belong, as described by Baumeister and Leary (1995), implies that humans have an—evolutionary grounded—need to form and maintain strong, stable interpersonal relationships and to have frequent, non-aversive interactions. Based on a summary of empirical results, the authors specified that both strong relationships and frequent contact are important: If interaction happens with strangers or changing partners, or if people have stable relationships without frequent contact (e.g., when imprisoned), this is perceived as unsatisfying. In sum, “the need is for regular contact with those to whom one feels connected” (p. 501). Chronic deprivation is connected to negative affect insofar as general distress has been found to be a consequence of separation from important others.

In a similar vein, Lee and Robbins (1995) introduced the concept of social connectedness to describe a specific aspect of belongingness. Social connectedness does not simply describe individuals’ network size, but is defined “as the subjective awareness of being in close relationship with the social world” (Lee & Robbins, 1998, p. 338). Although this aspect of belongingness refers primarily to enduring relationships (Lee et al., 2001), it was demonstrated that people feel less socially connected in times when they do not interact with others (Sun et al., 2019). Moreover, feelings of social connectedness can enhance individuals’ subjective well-being (e.g., Lee et al., 2008). Baumeister and Leary (1995) described a strong connection between stable social relationships and general social support. Likewise, Cacioppo et al. (2006) found that loneliness is associated with lower feelings of general social support and an increased negative affective state. In this line, research also indicates that general social support is related to better health and subjective well-being (e.g., Wang et al., 2003; Zeidner et al., 2016). The close connection between social support and loneliness was also demonstrated in the context of the COVID-19 pandemic-related lockdown in the UK, with findings that perceived general social support mitigated feelings of loneliness (Groarke et al., 2020).
It is important to note that although social support is often treated as a unidimensional construct, it needs to be conceptualised as a multidimensional construct. With this in mind, House (1981) defines social support as social exchange, an interpersonal transaction regarding four different dimensions (emotional concern, instrumental aid, information, appraisal). Baumeister and Leary (1995) argued that especially companionship in the sense of the expressive aspects of social interaction is more important than practical help.

In sum, maintaining feelings of social connectedness and social support are important to promote individuals’ well-being and a positive affective state. In the context of the current COVID 19 pandemic, a sufficient degree of social connectedness and perceived social support may be important not only to prevent an additional mental health crisis, but also to encourage individuals to follow strict physical distancing measures, as was required in Germany from March to May 2020. According to the evolutionary theory of loneliness (Cacioppo et al., 2006), increased feelings of loneliness will lead to a motivation to restore (physical) contacts. Only if this need is satisfied by other, more indirect means, will the motivation to actually meet people decrease and people will be better able to adhere to physical distancing. In this regard, the theory of electronic propinquity (Korzenny, 1978) suggests that feelings of (psychological) proximity can also be achieved by employing electronic communication devices. By drawing on psychological theories such as Lewin’s (1951) field theory and Sommer’s (1967) small group ecology, this communication science theory states that the perceived psychological distance does not necessarily correlate with physical distance, but rather that perceived propinquity is influenced by attributes of the communication channel (i.e., of the electronic device).

Sociality with technology

Modern computer-mediated communication technologies provide valuable opportunities to compensate for the absence of physical social contact. However, people have various communication channels at hand, which can function very differently. Following the electronic propinquity theory (Korzenny, 1978), the interplay of channel characteristics, communication object, and individuals’ characteristics determines the experienced propinquity to the communication partner. Propinquity is conceptualised as the experienced feeling of electronic nearness or presence independent of the actual physical proximity of communication partners. Although the theory by Korzenny (1978) focused on group communication in organisations at its time (e.g., audio conferencing), Walther and Bazarova (2008) argued that the theory can also be applied to modern computer-mediated communication.

Korzenny (1978) presented six major propositions that explain which factors increase or decrease feelings of propinquity: (a) the wider the bandwidth, the more propinquity; (b) the more complex the information which is exchanged, the less propinquity; (c) the more mutual directionality, the more propinquity; (d) the more communication skills individuals have, the more propinquity; (e) the more communication rules are needed for the exchange, the less propinquity; and (f) the fewer choices of other communication channels, the more propinquity. In times of physical distancing, the last proposition (i.e., number of choices) seems to be particularly important, as Korzenny (1978) argued that individuals regard a communication as satisfactory when no alternative is available. Thus, if physical contact is not possible, the usage of alternative communication channels should function as compensation to some degree. Although individuals prefer communication channels with more bandwidth for complex conversations, the electronic propinquity theory acknowledges that lower-bandwidth channels can also be satisfying when higher-bandwidth media are not available (Walther & Bazarova, 2008).

Technology’s impact on feelings of social support and social connectedness

In line with the assumptions of electronic propinquity, research has indeed demonstrated that technologies can serve to foster social support and social connectedness when physical contact is not possible. For instance, contact via mobile phone has been identified as an important facilitator of people’s social relationships (Wei & Lo, 2006). Mobile phones seem to facilitate the symbolic proximity to the people one calls. Especially for geographically isolated people, mobile phone calls with strong ties have been shown to be an important source of social support in to reduce loneliness (Liu et al., 2014). Frequently, audio-video applications such as Skype are also suggested as a means to help, for example, family members to stay in touch (Biemans et al., 2008). Moreover, residents of a nursing home for the elderly were shown to experience social support (Tsai et al., 2010) and fewer depressive symptoms (Teo et al., 2019) when using videoconferences. In line with the assumptions of the propinquity theory (Korzenny, 1978), Sherman et al. (2013) found that people experience a stronger connection to close friends when communicating via video or audio chats compared to text-based computer-mediated channels.

In terms of social network sites (SNS), large-scale studies (Hampton et al., 2011) confirm that people who use Facebook perceive more social support than those who do not use Facebook. Similarly, Manago et al. (2012) observed that the number of Friends on Facebook is positively correlated with perceived social support. In
addition, it was demonstrated that the use of SNS helps to maintain social connections, which can also have positive outcomes for psychological well-being (Ellison et al., 2007). This seems to be especially true for individuals who are at higher risk of being isolated in the physical world (Krämer et al., 2017). However, other findings suggest that individuals’ network size (i.e., number of Facebook friends) only increases well-being through the pathway of social support if people can devote sufficient time to maintaining the relationships (Kim & Lee, 2011). Moreover, Kim (2018) identified passive social media use (i.e., not reacting to or posting content) as a mitigating factor for well-being. In this light, other studies specify that the way in which SNS are used is important: Vitak and Ellison (2013) showed that direct communication (private messengers, likes, comments) is related to increased perceived emotional, informational, and instrumental support. These studies imply that text-based communication helps to increase connectedness and feelings of social support. In particular, the active exchange via social media seems to be an important driver of these positive effects.

**Current study/hypotheses**

The current COVID 19 pandemic poses challenges for individuals in many ways. As humans have an evolutionarily grounded desire to socially connect with others (Baumeister & Leary, 1995; Cacioppo et al., 2006), one of the most important limitations with which people have to deal is the lack of physical contact. This could even lead to people taking distancing measures less seriously because they feel stressed and are motivated to decrease negative emotions by restoring contact (Cacioppo et al., 2006). Therefore, in the context of the COVID-19 pandemic, the present study examines whether technology-based communication can help to enhance feelings of social connectedness and social support in a situation of strict physical distancing policies, in order to encourage compliance with these measures. According to the electronic propinquity theory (Korzeny, 1978), technology-based communication can indeed enhance psychological propinquity and satisfy people’s need for contact. Therefore, when people do not have the opportunity to meet physically, it is assumed that:

\[ H_1: \text{Higher frequency of audio-visual communication (} H_{1.1} \text{) and text-based communication (} H_{1.2} \text{) will increase feelings of } (a) \text{ social connectedness and } (b) \text{ social support.} \]

However, since people prefer communication channels with more bandwidth for complex conversations when they have a choice (Korzeny, 1978; Walther & Bazarova, 2008) and because these channels allow for higher feelings of propinquity, it is further hypothesised that:

\[ H_2: \text{Higher frequency of audio-visual communication has a stronger effect on } (a) \text{ social connectedness and } (b) \text{ social support than the usage of text-based communication channels.} \]

As found in previous studies (e.g., Lee et al., 2008; Wang et al., 2003; Zeidner et al., 2016), we expect that social support and social connectedness enhance well-being. However, well-being is a broad concept that can be operationalised in various ways. Commonly, life satisfaction and a balanced emotional state are considered as core dimensions of subjective well-being (e.g., Jose et al., 2012; Lee et al., 2008). Diener et al. (2010) also introduced psychological flourishing as a core dimension of subjective well-being addressing humans’ need for relatedness, and self-acceptance. Therefore, we further expect that:

\[ H_3: \text{Social connectedness (} H_{3.1} \text{) and social support (} H_{3.2} \text{) will increase } (a) \text{ life satisfaction, } (b) \text{ psychological flourishing, and } (c) \text{ emotional balance.} \]

Consequently, we expect that feelings of well-being encourage individuals to follow physical distancing measures as prescribed in many countries during the COVID-19 pandemic. Following the evolutionary theory of loneliness (Cacioppo et al., 2006), when people suffer less feelings of social disconnection, they should be less motivated to improve their emotional state by seeking physical contact:

\[ H_4: \text{Life satisfaction (} H_{4.1} \text{), psychological flourishing (} H_{4.2} \text{) and emotional balance (} H_{4.3} \text{) will decrease } (a) \text{ behavioural intentions to violate distancing measures and } (b) \text{ individuals’ perceived difficulty to follow the distancing measures.} \]

Finally, based on the previous hypotheses, we argue that:

\[ H_5: \text{Communication via audio-visual channels (} H_{5.1} \text{) and communication via text-based channels (} H_{5.2} \text{) will indirectly influence } (a) \text{ the behavioural intention to follow distancing measures and } (b) \text{ individuals’ perceived difficulty to follow the distancing measures.} \]

In addition, we addressed how these variables evolve over time in the unique situation of the COVID-19 pandemic, because events were largely unpredictable. Therefore, we asked:

\[ RQ_1: \text{How will individuals’ feelings and behaviour change over time under distancing policies?} \]

**METHOD**

**Sample**

In total, 526 people living in Germany registered for the survey, most of whom were recruited via social media platforms. Three-hundred eighteen completed the first questionnaire, of whom 17 were excluded due to several missing or obviously erroneous misleading
answers in the input fields, for example, by reporting the usage of the wrong channels, “E-Mail, WhatsApp” or “Phone call” regarding physical contacts. Most of the remaining participants \(N = 301, 81\%\) females, \(M_{age} = 31.72, SD = 12.10\) were university students \((47.5\%)\) or employees \((35.5\%)\) and overall were highly educated, with university entrance-level qualifications \((37.5\%)\) or a university degree \((47.2\%)\). During the pandemic, a total of 63.8\% of the participants continued their profession, of whom 14.6\% continued as usual, 42.5\% switched to home office and 6.6\% had to reduce their working hours. Regarding housing, 22\% were living alone, 38.9\% with another person and 37.3\% with two or more persons. With respect to the additional surveys over time, a total of 180 participants completed all four surveys \((78\%)\) females and provided longitudinal data.

The procedure performed in this study was approved by the ethics committee of the department of Computer Science and Applied Cognitive Science of the University Duisburg-Essen and is in accordance with standards of the institutional research committee and with the 1964 Helsinki Declaration including later amendments.

Informed consent was obtained from all individual adult participants included in the study; children were not allowed to participate in the study.

**Procedure**

The online survey was conducted in Germany during weeks two to five of the national lockdown (15th of March until 19th of April 2020) during the COVID-19 pandemic, that is, contact restrictions and closure of public meeting points for educational, entertainment and shopping purposes (including kindergartens and schools, gastronomic and cultural establishments and shops not selling essential items such as groceries). Once participants had registered via e-mail, the first of four invitation links at 5-day intervals was sent, asking participants to report, within 36 hours, their current feelings and communication behaviour during the last 5 days since the previous questionnaire. The four questionnaires were identical, with the exception that the first survey included additional scales, as described in Measures section below. At the end of the last questionnaire, participants were debriefed and given the opportunity to enter a lottery to win online shopping gift cards.

**Measures**

The first survey contained additional items which were only measured once, pertaining to sociodemographic background (age, sex, education, number of household members), psychological flourishing as well as additional measures not relevant for the current analyses (need to belong, self-esteem, Big Five personality traits, and pandemic-related life circumstances). As reliability measure, Cronbach’s alpha was employed. Reported alpha values refer to the cross-sectional data. We mainly applied standardised and well-validated scales. When measuring constructs for which no validated scales existed, we used a straight-forward approach to derive items from the theoretical construct. Self-constructed scales are presented in the Open Science Framework (OSF).

**Psychological flourishing** was measured with the scale by Diener et al. (2010) (eight items, for example, “I lead a purposeful and meaningful life.”; 1 = strongly disagree, 7 = strongly agree; \(\alpha = .89; M = 5.29; SD = 1.05\)).

**Communication channels.** To measure individuals’ communication behaviour, participants were asked about their number of contacts with people living outside their own household. It was specified that this encompassed any coherent communication activity, both private and professional, regardless of length, duration, or number of words exchanged. The frequency of contacts was assessed with respect to five different communication channels: physical contact, text/voice messages, social network sites, telephone and video calls. For each channel, a brief explanation of the contact type was presented and participants were asked how often they had contact via the respective channel with individuals from strong, medium, and weak ties. To define tie strength, above each question, the respective tie strength was illustrated by circles that overlapped more or less closely, and examples were also given—for instance “family or close friends” for strong ties. For each tie strength, participants were asked to indicate the number of contacts they had (“Overall, how often did you have contact with people from this group via [communication channel]?”). To obtain the proposed independent variables, sum scores were calculated for the frequency of contacts via audio-visual (telephone and video calls) or text-based (text messages and social network sites) communication channels and physical contacts across all ties.

**Life satisfaction** was measured with the satisfaction scale from the German Socio-Economic Panel (Richter et al., 2017). The domain-specific life satisfaction items were adopted for the current study (six items, e.g., “How satisfied are you currently with your …” “leisure,” “health,” “work”; 1 = very dissatisfied to 7 = very satisfied; \(\alpha = .69; M = 4.52; SD = 1.15\)).

**Emotional balance** was measured with the Positive and Negative Affect Scale (Watson et al., 1988). Participants’ current emotional balance was assessed by subtracting the mean scores on the Negative scale from mean scores provided in the Open Science Framework (OSF).
on the Positive scale as recommended (Lee et al., 2008; 10 items each, e.g., “enthusiastic” (PA), “upset” (NA); 1 = not applicable to 7 = totally applicable; αPA = .83; αNA = .87).

All of the following measures were employed using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

Isolation difficulties were measured on two dimensions by building the sum scores of the following measures: (two items; e.g., “I may soon be meeting others outside my home, regardless of the negative consequences”; α = .77; M = 4.12; SD = 2.72) and perceived difficulty to follow distancing measures (two items, e.g., “I have a strong urge to meet people outside my home”; α = .77; M = 7.38; SD = 3.65).

Social connectedness. The scale by Lee and Robbins (1995) was employed to measure perceived social connectedness (eight items; e.g., “I feel disconnected from the world around me”; α = .91; M = 2.51; SD = 1.36). All items were recoded before calculating the mean, with higher scores indicating more social connectedness.

Social support was captured using adopted items based on the categories outlined by House (1981): emotional (e.g., “I am in contact with people from whom I can get emotional support [open ear, compassion, caring, etc.]”), informational (e.g., “I am currently communicating with people who can provide me with information that is relevant for me [e.g. recipe ideas, film or shopping recommendations]”), instrumental (e.g., “I am currently communicating with people who would help me in non-material ways [e.g. shopping assistance in quarantine] if I asked.”) and appraisal support (e.g., “I am currently in contact with people who would give me negative feedback about myself [e.g. criticism]”; eight items; α = .84; M = 5.23; SD = 1.31). The items we applied were validated within an earlier unpublished study, with each dimension correlated with the actual received support and several strategies for relationship-maintaining behaviour such as supportive communication, shared interests, and passive consumption.

RESULTS

Preliminary analyses

Before testing our hypotheses, we conducted a series of repeated measures ANOVAs (SPSS 25) to ascertain whether participants’ frequency of social contacts differed depending on the type of communication channel and whether participants’ contact frequency with each channel varied depending on the strength of social ties. As Mauchly’s test of sphericity was significant for each ANOVA, Greenhouse–Geisser correction was applied in each case. Pairwise comparisons with Bonferroni correction were employed to examine differences in detail.

First, a one-factorial repeated measures ANOVA was conducted to investigate whether individuals’ contact frequency differed between the different communication channels. The data revealed significant differences (F(1.337, 401.128) = 75.15, p < .001, η² = .200): Participants had fewer contacts via audio-visual channels (M = 21.16, SD = 43.24) compared to text-based channels (M = 82.67, SD = 124.45; p < .001) and more contacts via audio-visual channels compared to physical contacts (M = 12.79, SD = 48.10; p = .042). Likewise, individuals had more contacts via text-based communication channels compared to physical contacts (p < .001).

Moreover, for each communication channel, an one-factorial repeated measures ANOVA was calculated to test whether contact frequency within the channel differed according to social tie strength. As presented in Table 1, regarding audio-visual communication channels, it was found that participants had significantly more contacts with strong ties via these channels than with moderate ties (p < .001) or with weak ties (p < .001). However, the difference between moderate ties and weak ties was not significant (p = .999). Likewise, regarding text-based communication channels, participants had significantly more contacts with strong ties via text-based channels than with moderate ties (p = .003) or weak ties (p < .001). The data also revealed that participants had significantly more contacts with moderate ties than with weak ties via these channels (p < .001). Regarding physical contacts, participants more often had physical contact with strong ties than with moderate ties (p = .014) or weak ties (p = .032). In contrast, the frequency of physical contact did not differ between moderate and weak ties (p = .833).

Analytical plan and hypothesis-testing

To test our hypotheses, we conducted a path analysis (SPSS Amos 25), with maximum likelihood estimation. Indirect effects were tested using bias-corrected bootstrapping with 5000 resamples (95% CI). We choose to calculate the model with manifest variables and not with latent variables, because we considered this approach most suitable as it allowed us to examine the complex relationships between the different variables with a number of parameters appropriate for our sample size. To investigate our research question, repeated measures ANOVAs were calculated for each variable included in the path model. Only data from individuals (N = 180) who completed all four surveys were used.

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Within-differences in means and standard deviations regarding participants’ frequency of usage of different types of communication channels by tie strength

| Type of channel          | Strong ties M (SD) | Moderate ties M (SD) | Weak ties M (SD) | F(df)        | p          | η²  |
|-------------------------|--------------------|----------------------|------------------|--------------|------------|-----|
| Audio-visual channels   | 39.27 (67.77)      | 4.31 (8.67)          | 5.08 (33.52)     | 63.96 (1.324,397.174) | < .001    | .18 |
| Text-based channels     | 44.34 (80.57)      | 28.54 (61.72)        | 9.80 (23.99)     | 31.50 (1.840,552.063) | < .001    | .10 |
| Physical contact        | 9.11 (46.20)       | 1.50 (6.84)          | 2.18 (8.74)      | 7.18 (1.080,323.988) | .007      | .02 |

Figure 1 for a visualisation of the model.

Contrary to $H_{1a/b}$, the frequency of audio-visual communication did not increase feelings of social connectedness ($β = -.01, p = .933$) or social support ($β = -.03, p = .584$). Likewise, in contrast to $H_{1a}$, the frequency of text-based communication did not increase feelings of social connectedness ($β = .07, p = .215$). However, in support of $H_{1b}$, contacts via text-based channels positively affected feelings of social support ($β = .15, p = .011$).

As frequent audio-visual communication had no significant effect on social connectedness and social support, however, we were unable to find conclusive differential effects of tie strength based on our data.

As expected ($H_{3a}$), social connectedness significantly increased perceived life satisfaction ($β = .48, p < .001$), psychological flourishing ($β = .44, p < .001$), and emotional balance ($β = .36, p < .001$). Likewise, in accordance with $H_{3b}$, social support increased life satisfaction ($β = .15, p = .002$) and psychological flourishing ($β = .26, p < .001$). In contrast, however, social support did not influence emotional balance ($β = .11, p = .005$). Thus, $H_{3c}$ had to be rejected.

In support of $H_{4a/b}$, life satisfaction decreased individuals’ behavioural intention to violate distancing measures ($β = -.19, p = .008$) and also significantly decreased the perceived difficulties to follow distancing measures ($β = -.24, p < .001$). Contradicting $H_{4a}$, psychological flourishing was not related to behavioural intentions to violate distancing measures ($β = -.02, p = .778$). Likewise, contradicting $H_{4b}$, psychological flourishing increased rather than decreased the perceived difficulties to comply with distancing measures ($β = .21, p = .002$). Furthermore, against the assumption of $H_{4a}$, emotional balance was not related to the behavioural intention ($β = -.06, p = .468$). Nevertheless, in accordance with $H_{4b}$, emotional balance significantly

$^2$ Note that we also calculated the model adding demographic variables and variables related to participants’ living situation (i.e., age, sex, the number of persons living in the household, whether the participant can continue his or her profession as usual, and whether the participant can work from home). However, the effects of the communication channels on social support and social connectedness did not change significantly.

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**TABLE 2**

Bivariate correlations of variables in the path model

|                               | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. Text-based communication    |  ---|     |     |     |     |     |     |     |     |
| 2. Audio-visual communication  | .16**| .18**|     |     |     |     |     |     |     |
| 3. Physical contact           | .16**| .18**|     |     |     |     |     |     |     |
| 4. Social connectedness       | .08 | .01 | .04 |     |     |     |     |     |     |
| 5. Social support             | .14* | .01 | .02 | .28***|     |     |     |     |     |
| 6. Emotional balance          | -.05| -.02| -.03| .39***| .21***|     |     |     |     |
| 7. Flourishing                | .01 | .06 | .02 | .51***| .38***| .58***|     |     |     |
| 8. Life satisfaction          | -.02| -.03| -.03| .52***| .29***| .61***| .53***|     |     |
| 9. Intention to violate measures| .11 | .09 | .02 | -.15* | -.08 | -.19* | -.16* | -.24***|     |
| 10. Difficulties to follow    | .09 | .11*| .09 | -.22***| .06 | -.34***| -.10 | -.32***| .42***|

*p < .05. **p < .01. ***p < .001.
decreased the perceived difficulties to follow distancing measures ($\beta = -0.32, p < .001$).

Finally, as the usage of audio-visual channels affected neither social support nor social connectedness, there was no indirect effect of the independent variable on the behavioural intention to violate distancing measures ($\beta = 0.00, p = .709, CI = [-0.01, 0.01]$) or on the perceived difficulties to follow distancing measures ($\beta = 0.00, p = .904, CI = [-0.01, 0.01]$). Thus, $H_{5.1a/b}$ had to be rejected. However, text-based communication revealed a significant indirect effect on the behavioural intention to violate distancing measures ($\beta = -0.02, p = .046, CI = [-.03, -.002]$), supporting $H_{5.2a}$. Contradicting $H_{5.2b}$, the usage of text-based channels was not indirectly related to the perceived difficulties to follow distancing measures ($\beta = -0.01, p = .122, CI = [-.03, .001]$).

Finally, we addressed the changes over time in participants’ feelings and behaviour under distancing policies (RQ1). Repeated measures ANOVAs were conducted for text-based communication, audio-visual communication, and physical contacts, social connectedness, social support, emotional balance, life satisfaction, behavioural intention to violate distancing measures and perceived difficulties to follow distancing measures, respectively (see Table 3). For each ANOVA, Mauchly’s test indicated that the assumptions of sphericity had been violated; therefore, Greenhouse–Geisser corrections were applied. To investigate differences, pairwise comparisons with Bonferroni correction were employed. The results demonstrated some significant differences between the measurement times: Text-based and audio-visual channels were used most frequently at the beginning and decreased over time. In contrast, social support, but also behavioural intentions to violate distancing measures and perceived difficulties to follow distancing measures, were perceived as higher over time (for details see superscripts in Table 3).

**DISCUSSION**

The present study aimed to examine whether the frequent use of technology-based communication can meet fundamental social needs when physical contacts are highly restricted and, therefore, facilitate the adherence to physical distancing measures in situations like the COVID-19 pandemic. We found that the frequent usage of text-based communication indirectly enhances individuals’ willingness to avoid physical contacts by increasing feelings of social support and life satisfaction. Contrary to our assumptions, however, the frequency of using audio-visual communication did not show such effects. Technology-based communication can therefore indeed help to encourage individuals to comply with distancing measures. However, the effectiveness of such communication as alternative to physical contacts must not be overrated—for and beyond the pandemic situation.

In accordance with assumptions regarding the need to belong (Baumeister & Leary, 1995), our data revealed that people mainly had contact with strong ties, that is, close others, for both types of channels. Moreover, highlighting compliance with the distancing measures, participants had significantly more contacts via technology-based communication than physical contacts. Interestingly, participants had more frequent social contacts via text-based communication than via audio-visual communication. As text-based communication does not require synchronicity, it might be easier to frequently communicate with others without being simultaneously available.

Based on the electronic propinquity theory (Korzenny, 1978), we argued that the frequent use of audio-visual communication would increase feelings...
of social support and social connectedness ($H_{1,1a/b}$). However, such effects did not emerge. Likewise, we argued that the frequent use of text-based communication would increase feelings of social support or social connectedness ($H_{1,2a/b}$). Whereas the frequency of contacts via text-based channels indeed facilitated feelings of social support, social connectedness was not affected. Thus, people’s need for social support is better satisfied with the usage of text-based communication channels. This is surprising given our expectation that audio-video communication would be more beneficial due to their higher bandwidth (Walther & Bazarova, 2008). Indeed, previous empirical data suggest that individuals feel stronger connections to others when communicating via video chats compared to text-based messengers (Sherman et al., 2013) and that isolated people experience social support from audio-visual computer-mediated communication (Liu et al., 2014; Tsai et al., 2010). However, the situation surrounding the COVID-19 pandemic is much more complex: People were not discouraged from meeting others merely because they were geographically too far away to reach. Even healthy people living next door to one another were not allowed to physically meet and were instead encouraged to connect digitally. It might be speculated that this could have led to video chats in particular being perceived as an odd way to communicate with others, and may even have made the situation more salient because people used this channel as a substitute for easy-to-arrange physical meetings. In our study, several participants indicated in open-ended questions that they used videoconferencing tools to imitate physical meetings (e.g., watching a movie together or playing games). However, this may not have led to the desired compensation, as bonding via physical contact is still most powerful (Sherman et al., 2013). In contrast, text-based communication might have been more easily available to frequently and quickly exchange information, in turn, fostering propinquity (Korzenny, 1978) by signalling that one’s social network is close at hand (Krämer et al., 2017). Here, in open-ended questions, individuals often stated that they used text-based channels to effortlessly exchange personal information or simply shared funny pictures and videos. The lack of influence of physical contacts on social support and social connectedness can probably be explained by the fact that physical contact has been severely restricted by law and was therefore rather infrequent and potentially very brief (e.g., short meeting in the staircase). Therefore, physical contact was probably not satisfying enough.

As social connectedness was not affected by any communication channel (not even physical meetings), individuals’ feeling of social connectedness might be less susceptible than expected. In addition, repeated measures analyses showed that social connectedness was particularly stable over time. This might hint that social connectedness is indeed rather stable—in line with its conceptualization as the sense of being enduringly close with the social world (Lee et al., 2001). Alternatively, the distancing measures in Germany might not have been experienced as sufficiently severe to destroy feelings of close-ness or connectedness was catered for by a mix of alternative interactions.

Supporting $H_{3,1a/b} \& H_{3,2a/b}$, both social support and social connectedness facilitated life satisfaction and psychological flourishing. Likewise, in support of $H_{3,1c}$, social connectedness increased participants’ emotional balance. Contradicting $H_{3,2c}$, social support did not enhance emotional balance, which is surprising given that social support is thought to facilitate a positive emotional state (Oh et al., 2014). However, recent research found that during the lockdown in Germany, not only individuals’ positive emotions decreased over time but also their negative emotions (Zacher & Rudolph, 2020). Thus, people’s emotional balance is probably affected in much more complex ways. In sum, however, in accordance with previous findings (e.g., Lee et al., 2008; Wang et al., 2003; Zeidner et al., 2016), social connectedness and social support affected core dimensions of subjective

### Table 3

| Variables                                      | $t1$ M (SD)          | $t2$ M (SD)          | $t3$ M (SD)          | $t4$ M (SD)          | $F_{(df)}$ | $p$   | $\eta^2$ |
|------------------------------------------------|----------------------|----------------------|----------------------|----------------------|------------|-------|----------|
| Text-based communication                        | 83.62$^{3,13,14}$ (9.90) | 51.83$^{13}$ (6.29)  | 34.17 (2.99)         | 39.90 (4.10)         | 20.11 (1.73,300.08) | <.001  | .10     |
| Audio-visual communication                      | 19.10$^{3,14}$ (2.26) | 16.94 (3.28)         | 10.81 (1.93)         | 9.75 (1.14)          | 5.52 (1.62,290.74)  | .008  | .03     |
| Physical contacts                               | 13.45 (55.63)        | 9.82 (39.63)         | 9.20 (39.54)         | 10.03 (40.67)        | 1.25 (1.22,271.18)  | .280  | .01     |
| Social connected.                               | 5.53 (1.39)          | 5.53 (1.41)          | 5.53 (1.46)          | 5.58 (1.48)          | 0.30 (2.63,470.55)  | .798  | .00     |
| Social support                                 | 5.23$^{13,14}$ (1.34) | 5.36$^3$ (1.27)      | 5.48 (1.29)          | 5.55 (1.31)          | 9.32$^{13,14}$ (1.19) | <.001  | .05     |
| Emotional balance                               | 1.24 (1.59)          | 1.45 (1.63)          | 1.33 (1.75)          | 1.33 (1.77)          | 2.17$^{3,13,14}$ (1.87) | .094  | .01     |
| Life satisfaction                               | 4.57 (1.13)          | 4.66 (1.22)          | 4.61 (1.24)          | 4.60 (1.28)          | 0.74 (2.64,494.39)  | .518  | .00     |
| Intention to violate distancing measures        | 3.64$^{12,13,14}$ (2.29) | 4.54$^{3,14}$ (2.65) | 4.95$^{13}$ (2.92)   | 5.39 (3.14)          | 38.67 (2.69,481.55) | <.001  | .18     |
| Difficulty to follow distancing measures        | 6.86$^{12,13,14}$ (3.61) | 7.47 (3.55)         | 7.67 (3.47)          | 7.67 (3.58)          | 7.77 (2.67,478.12)  | <.001  | .04     |

Superscript numbers indicate the significantly ($p < .05$) different means across the respective times. Note. Superscript numbers indicate the significantly ($p < .05$) different means across the respective times.
well-being and explained a large amount of variance in the distinct variables.

Finally, as expected ($H_{4.1\text{a/b}}$), life satisfaction decreased the behavioural intention to violate distancing measures and participants’ perceived difficulty to follow the distancing measures. Similarly, higher emotional balance led to a decreased feeling of difficulty to deal with the measures ($H_{4.3\text{b}}$). It did not, however, affect participants’ behavioural intentions to follow these measures ($H_{4.3\text{a}}$). Surprisingly, and in contrast to $H_{4.2\text{a/b}}$, psychological flourishing did not affect participants’ behavioural intentions, and actually increased rather than decreased perceived difficulty to avoid physical contact. In sum, life satisfaction proved to be a particularly important dimension of well-being, which should be promoted to encourage individuals to avoid physical contacts. However, it should also be kept in mind that other dimensions of well-being can be destructive in this case. As psychological flourishing stresses, inter alia, the basic need for relatedness (Diener et al., 2010), individuals who score high on this variable might rather be motivated to seek contact instead of avoiding it.

Regarding indirect effects of mediated communication on behavioural intention and perceived difficulty to comply with the measures, we did not find an effect of audio-visual communication ($H_{5.1\text{a/b}}$). Likewise, the frequency of text-based communication did not indirectly affect the perceived difficulty ($H_{5.2\text{a}}$). Nevertheless, the data revealed that the frequency of text-based communication indirectly decreased participants’ intention to violate the distancing rules through the pathway of social support and life satisfaction. This is a major finding, as it indicates that text-based communication seems to be most helpful in overcoming the burdens of the crisis. It is astonishing that text-based communication emerged as more effective than audio-video communication, since text-based communication is associated with a lower bandwidth that involves the transmission of fewer communicative cues (Walther & Bazarova, 2008). However, signalling that one is thinking of each other with short messages might be more beneficial than more elaborate interactions. Thus, text-based communication cannot necessarily mitigate the inherent desire to connect physically with others, but does seem to be perceived as sufficiently socially rewarding to refrain from actually violating the distancing measures. This can presumably be traced back to a decreased motivation to connect with others, as the motive to avoid loneliness (Cacioppo et al., 2006) is satisfied by other means.

Paradoxically, although the frequency of text-based communication decreased over time, feelings of social support increased. Notably, only a small amount of social support was explained by the frequency of contacts in the cross-sectional analysis. Thus, there were probably additional factors that increased feelings of social support over time and that were not assessed in this study. Furthermore, participants’ intention to violate the distancing measures and the perceived difficulty to avoid physical contacts increased over time. This suggests that people are less willing to persistently follow the rules, and that intervention must therefore be continuous.

We found that people predominantly had contact with strong ties, indicating that these ties might be particularly important in times of pandemics (although this is already observable with regard to general social media use (Krämer et al., 2014). However, we could not find conclusive differential effects of tie strength based on our data. While this might suggest that tie strength and communication channels do not interact, and that (specifically) text-based communication with every form of tie is beneficial, we strongly recommend that future studies focus more clearly on the role of tie strength.

**Theoretical and applied implications**

The present study aimed to contribute to both a better understanding of fundamental mechanisms of the benefits of mediated communication during times when personal contact is not possible, and to more practical knowledge about what to recommend for future pandemic crises. Regarding the study’s design, it proved to be valuable to combine psychological assumptions on motivations for social contact with communication science reasoning, which contributes knowledge about differential effects of technology.

With regard to theoretical implications, the most important finding is that only the frequency of text-based communication, but and not the frequency of audio-visual communication, indirectly decreased people’s intention to violate the distancing rules through the pathway of social support and life satisfaction. This contradicts the assumptions of the electronic propinquity theory of Korzenny (1978) and its successors (Walther & Bazarova, 2008), as they state that using channels with higher bandwidth will lead to greater perceived propinquity. As discussed above, the reason for this deviation might lie in the special situation of the pandemic—in which friends are close at hand but not allowed to meet. However, although this kind of communication was also found to have positive effects for individuals in similar contexts (e.g., for elderly in a nursing home; Teo et al., 2019; Tsai et al., 2010), the effectiveness of audio-visual communication as a compensation for a general restriction of physical contact should not be overestimated. In the long-term, technical communication does not seem to be able to serve as an alternative to physical contact.

With regard to practical implications, the finding that text-based communication seems to be most helpful in supporting people to adhere to the measures can be
exploited. Here, policy makers and health organisations could amend their recommendations with the notion that regular, low-level text-based interaction might be sufficient to foster perceived social support as well as life satisfaction and—in this way—help people to avoid physical contact. However, longitudinal data indicate that people are less motivated to frequently use technology-based communication channels in the long term. Simultaneously, it has become increasingly difficult for individuals to adhere to the measures. Although we cannot say whether a more persisting use of technology-based communication would help people to persevere with the measures, officials should be aware that people may need to be persistently encouraged to use alternative communication channels to better cope with the measures.

Limitations and future research

Several limitations of this study must be acknowledged: The generalizability is limited since the sample was predominantly female and highly educated. Moreover, the study was only conducted in Germany, with a specific set of restrictions that differed from other countries. In addition, media usage was self-reported. An experiment employing behavioural measures could provide further insights regarding communication outcomes. It also has to be considered that direct and indirect effects of text-based communication channels were small. However, in a complex situation like the COVID-19 pandemic, in which a large number of factors can have an influence on people’s condition, it is still remarkable that text-based communication yields these effects.

The self-report employed in our study suffers from the additional weakness that participants were asked to remember very specific information about their contacts, which is certainly prone to errors. With regard to accuracy of the report of number of contacts, we were unable to take any additional measures (besides implementing quality checks in other places to filter out participants who were not sufficiently diligent). However, when we received feedback from participants, they reported that they spent a lot of time on these questions to answer them accurately. Therefore, we trust that the answers were more detailed and valuable than would have been the case if we had used a global scale to measure frequency (never—seldom—often).

Moreover, the variance explained regarding self-reported social connectedness and social support was rather low. Although the results did not alter when demographic variables and variables related to participants’ living situation have been added as controls, other variables that were not included in our model might have had important additional explanatory value. For instance, personality characteristics like technology affinity or individuals’ sociability could play an important role for the effects of technological communication channels on individuals’ feelings of social connections and social support. Likewise, future work should examine which factors encourage compliance to distancing measures and make it easier for people to endure them. For example, introverted people and individuals with a high obedience to authority are probably more likely to adhere to the distancing measures over time. The behaviour and the perceived expectations of individuals’ social environment could also be an important predictor for the willingness to comply with the measures. Thus, future research should explore which other factors influence individuals’ compliance to distancing measures.

In terms of major limitations of our approach, we have to acknowledge that based on our data, we cannot make any statements about the actual change of media usage from before to during the pandemic (as retrospective data collection about prior usage would not have yielded reliable results). In order to be prepared for future research during pandemics, we therefore suggest monitoring people’s mediated communication behaviour on a regular basis.

CONCLUSION

This study provides evidence that technology-based communication can help to encourage individuals to comply with physical distancing measures in pandemic situations. However, it is not the high bandwidth that facilitates feelings of belongingness, as one would expect; rather, it is the frequent use of text-based communication that promotes compliance through increased feelings of social support and enhanced life satisfaction. Thus, when proposing interventions that address communication alternatives to physical meetings, policy makers should be aware that technology-based communication channels with more bandwidth do not necessarily better compensate for lack of physical contact. Moreover, not all dimensions of well-being facilitate the adherence to distancing measures. Here, promoting certain dimensions of well-being (e.g., psychological flourishing) might also backfire. However, to foster compliance, mediated communication should be encouraged continuously as citizens are less willing to refrain from physical contact over time.

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