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Communication Networks and Individual Resilience for Individual Well-Being During a Time of Crisis

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ABSTRACT

The deprivation of offline communication necessitated by the COVID-19 pandemic raises questions about whether and how external social resources and internal ability lead individuals to maintain their well-being. However, most research on the two factors, especially during the COVID-19 pandemic, has been based on cross-sectional survey data during the early lockdowns and focused on each factor separately. Combining the two lines of research, this study investigates how individuals' communication networks and resilience interacted with each other and influenced individual well-being at two time points during the COVID-19 pandemic. Based on the two-wave online panel survey data gathered from 708 Korean adults, this study suggests that individual well-being depends on strong ties and emotional support, and that their offline support influences their well-being differently depending on their level of resilience. Implications for understanding the transformed roles of communication networks and the complex dynamics of offline support together with individual resilience on individual well-being are discussed.

The Greek philosopher Aristotle said that humans are by nature social animals (Reeve, 1998); humans cannot live alone but must always interact and communicate with each other. The deprivation of offline communication (i.e., direct, face-to-face communication resulting from being in the same physical space) necessitated by the COVID-19 pandemic raises questions about human nature. During challenging circumstances, what leads individuals to maintain their well-being? Can we, as social animals, still depend on our communication networks as a source of social support to maintain our well-being, or do we, as autonomous individuals, have to overcome the situation by ourselves only with our internal strengths and coping abilities?

Previous research on communication networks (Bonanno, 2004) and resilience (Zhang & Fu, 2021) has shown both to be positively correlated to individual well-being. For instance, strong ties in communication networks can provide emotional support, and large networks can diversify sources of help to enhance individual well-being (Zhang & Fu, 2021). Studies conducted during the pandemic have also credited these factors for individual well-being (Ihm & Lee, 2021; Killgore et al., 2020). However, most research on the two factors, especially during the COVID-19 pandemic, has been based on cross-sectional survey data and conducted during the early lockdowns. The role of each of these factors in individual well-being may have changed over the course of the pandemic in that many individuals may have become used to limited offline communication, and a great portion of their communication networks have been lost or reduced to core network members (Long et al., 2022). Online communication (i.e., communication mediated by online media such as cell/phone, e-mail, and social media, as opposed to offline communication) may have increasingly compensated or

substituted for offline communication. Additionally, individuals may have restructured their communication networks to include those that they mostly depend on for their well-being. Thus, it is worthwhile to examine how these factors *causally predict* individual well-being during *later periods* in the pandemic.

Based on the data from a two-wave panel survey, this paper combines two lines of research that separately focus on communication networks and individual resilience and examines whether and how the two factors and their interactions predict individual well-being during the COVID-19 pandemic. Specifically, this study focuses on two components of individuals' subjective well-being: affective well-being (i.e., the frequency and intensity of positive and negative emotions and mood), and cognitive well-being (i.e., global evaluations of life, Diener, 2009). In this way, this study contributes to the understanding of human nature on how individuals maintain their well-being when offline communication is restricted. This study also captures the role of offline support in individual well-being depending on the level of resilience during times of crisis.

Communication networks and individual well-being

Consistent with what Aristotle said, many recent studies on individual well-being have suggested that humans are social animals who need to interact and communicate with each other to maintain their well-being (Smith & Christakis, 2008; Zhang & Fu, 2021). Further, these studies found that individuals' intense communication with their social contacts and the resources they gain from those relationships are positively associated with individual well-being. We refer to such social contacts and the resources people gain from those relationships

as “communication networks¹.” Scholars have taken two distinct approaches to examining communication networks that are relevant to individual well-being (Smith & Christakis, 2008). The structural approach focuses on the relational position of the ego (i.e., the focal individual of the network) in comparison to alters (i.e., all other individuals connected to the ego in the network) in the communication networks. We refer to the structural aspects of communication networks, such as tie strength and density (Borgatti et al., 1998), as individuals’ *social networks*. Tie strength is defined as the combination of the amount of time devoted to a relationship (e.g., communication frequency) and the depth, or the emotional intensity, of the relationship (e.g., feeling of closeness, Marsden & Campbell, 1984). Density is defined as “the extensiveness or completeness” of the relationships among individuals in the network (Monge & Contractor, 2003, p. 44). The functional approach concerns the qualitative aspects of communication networks individuals perceive or receive, such as informational, emotional, or network support (Cohen, 2004). We refer to the functional aspects of support from communication networks as *social support*. Previous studies have addressed the close correlation between individual well-being, and both the structural and functional aspects of communication networks (Smith & Christakis, 2008). For instance, structural aspects of networks may create the basis of social integration, social interaction, and access to health-related resources (Kim et al., 2015), and influence individual well-being, including feelings of belonging and stability (Lin, 1999). Functional aspects of networks involve providing information, companionship, and tangible assistance; such support help individuals cope with their problems and promote their well-being (Lee et al., 2018; Meng et al., 2016; Priem & Solomon, 2015; Smith & Christakis, 2008; Zhu et al., 2013).

Given the cross-sectional nature of prior studies, less is known about the influence of communication networks on individual well-being over time. During the pandemic, both structural and functional aspects of communication networks may play different roles in individual well-being, and their roles may have changed as the pandemic has lasted for an extended period (Jones et al., 2021; Overall et al., 2022). For instance, during the pandemic, family members were in the same physical space longer and had more opportunities for communication than they did before the pandemic. They gradually adjusted to this change and maintained their well-being in two ways. They either set boundaries and communicated only when necessary or had intense communication to address relationship issues they had not recognized prior to the pandemic (Jones et al., 2021). In other words, communication networks may play different roles during the pandemic than before the pandemic.

Further, over the course of the pandemic, the role of each type of support may have changed. For instance, as offline communication remained limited over time (Long et al., 2022), individuals may have required more emotional support to empathize with each other and get assurance that their relationships are still strong to compensate for the limited communication opportunities (Overall et al., 2022). Individuals whose incomes decreased during the pandemic (Overall et al., 2022) may have increasingly needed network

support to find new jobs. In light of these possible changes, this paper examines how the structural and functional aspects of communication networks causally predict individual well-being over the course of the pandemic.

Social networks and individual well-being

Previous research has suggested varied structural factors of social networks that may predict individual well-being. First, *tie strength* between the ego and alters may affect the ego’s well-being. Tie strength is defined as the combination of the amount of time devoted to a relationship (e.g., communication frequency) and the depth, or the emotional intensity, of the relationship (e.g., feeling of closeness, Marsden & Campbell, 1984). Previous research has suggested that different strengths of ties have different roles in supporting the ego. Weak ties can shorten the search time for useful knowledge and provide nonredundant information that goes beyond the ego’s own social circles (Granovetter, 1983). By contrast, strong ties provide emotional help, such as mutual trust and comfort in uncertain times, and are more motivated and speedier about providing such help than weak ties (Krackhardt, 1992). For instance, Burke (2011) found that egos’ communication with their close friends provided emotional support to them and improved their well-being. Lee et al. (2018) consistently found that egos’ networks with strong ties provided trust and intimacy to them and ultimately contributed to their cognitive well-being. A recent study on COVID-19 also showed that strong ties based on the feeling of closeness with their alters (Ihm & Lee, 2021) or with their neighborhoods (Jaspal & Breakwell, 2020) were positively related to individual well-being. These studies suggest that individuals who have stronger ties may receive more of the urgent support and psychological stability needed to survive during a pandemic. Specifically, over the course of the pandemic, individuals may depend more on strong ties with emotional intensity, because they may need more emotional stability to endure the long period of uncertainty and confinement (Long et al., 2022). Further, research is needed to determine whether strong ties provide necessary support to promote individual well-being or if individual well-being facilitates managing and strengthening ties during this specific period of time. Therefore, we focus on the feeling of closeness as an indicator of tie strength and hypothesize its causal relationship to individual well-being:

RQ1: How does tie strength in Time 1 predict the ego’s cognitive well-being (RQ1-a) and affective well-being (RQ1-b) in Time 2 during the pandemic?

Second, *density* has been an important aspect of social networks for individual well-being. Participants in a dense network are well connected with one another and share a great number of resources among themselves (Lin, 1999). As a result, dense networks may increase the exchange of information and supplies among the participants during the pandemic (e.g., sources for the COVID-19 vaccines, masks and groceries), which may enhance participants’ well-being (Glanville & Bienenstock, 2009). Dense networks also provide intimate connections among the participants, and increase participants’

mutual trust and sense of belongingness (Borgatti et al., 1998). Such psychological aspects of dense networks may be crucial to maintaining well-being during this unpredictable time (Long et al., 2022). Correspondingly, previous research including a study conducted during the COVID-19 pandemic (Ihm & Lee, 2021) reported a positive correlation between network density and well-being (Lee et al., 2018; Walker, 2015). However, more research is necessary to sort out the causal order by investigating whether dense networks provide practical and psychological resources for individual well-being or if individual well-being helps maintain dense networks during the pandemic. Therefore, we ask how network density causally influences individual well-being during the pandemic:

RQ2: How does network density in Time 1 predict the ego's cognitive well-being (RQ2-a) and affective well-being (RQ2-b) in Time 2 during the pandemic?

Functions and types of social support in individual well-being

Previous research on social support has centered on its functional aspects and defined social support as individuals' social relationships communicating sympathy, confidence, or access to new contacts and information to cope with individuals' problems and increase individual well-being (Cohen, 2004). Prior studies found that different functions of social support, that is, informational, emotional, and network support, play different roles in individual well-being. Regarding informational and emotional support, previous research suggests that they have different impacts on individual well-being, but studies are inconsistent as to the role of each type of support. For example, Meng et al. (2021) found that informational support to cancer patients such as advice on coping with their problems was negatively related to their well-being; informational support may have involved unwanted advice and an excessive amount of information, which may have increased patients' anxiety and threatened their sense of autonomy, and ultimately harmed their well-being (Thoits, 2011). Emotional support, on the other hand, was positively related to patients' well-being, because it communicates sympathy and encouragement (Meng et al., 2021). In contrast to Meng et al. (2021), Ihm and Lee (2021) found that informational support was positively related to affective well-being during the early period of the pandemic as it provides crucial information related to the disease, while emotional support was not associated with individual well-being. Such inconsistencies call for further investigation.

In comparison to informational and emotional support, relatively little research has been conducted to reveal the effect of network support on individual well-being (Rains et al., 2015). Network support refers to the support of communicating access to new contacts and companions (Meng et al., 2016). Rains et al. (2015) reviewed previous studies which described the content of network support in health-related interpersonal communication such as introducing people to support those who are breastfeeding, are pregnant, or have cancer. High and Steuber (2014) also found that network support is important for infertile women who perceived a discrepancy between the

network support they desired and what they received. The women reported they wanted more network support to establish connections with new people to participate in social activities and soothe their distress. Robinson et al. (2011) correspondingly found that network support of strengthening connections with health resources was positively correlated to health behaviors, such as logging into a Web-based diabetes monitoring system and uploading blood glucose monitoring. However, these studies have not investigated whether network support improves individual well-being. Specifically, as social interactions have become limited to an individual's core network members during the pandemic (Long et al., 2022), the role of network support in individual well-being may vary. Individuals may prefer either to be introduced to new contacts or to keep in touch selectively only with old ties. Thus, research needs to explore how network support may influence individual well-being during the pandemic.

Previous research has suggested the mixed roles of emotional and informational support, and there is a lack of findings to predict the role of network support in individual well-being. Specifically, these studies dealt with cross-sectional data; research needs to examine whether social support causally predicts individual well-being during the pandemic. Therefore, we investigate how different types of social support have influenced individual well-being during the COVID-19 pandemic:

RQ3: How does receiving informational, emotional, and network support in Time 1 predict individual well-being in Time 2 during the pandemic?

In addition to the functions of social support, we distinguished online and offline support based on prior research. Because online and offline communication are deeply connected to each other (Rainie & Wellman, 2012), much communication research has examined whether online and offline support compensate or substitute for each other in individual well-being (Cohen, 2004; Lee et al., 2018; Meng et al., 2021). During the COVID-19 pandemic, each type of support has gained more attention from researchers investigating whether online support may substitute for offline support when offline interactions become limited for individuals, including college students, LGBTQ youths, people with intellectual disabilities, or patients with psychiatric problems (Fish et al., 2020; Ng et al., 2020; Zaagsma et al., 2020; Zhai & Du, 2020).

Prior research has suggested online and offline support have different, yet inconsistent roles in individual well-being (Cohen, 2004). For instance, Lee et al. (2018) found that when individuals had support from the offline and/or online environment, offline support had greater influence on life satisfaction than online support. Lee et al. (2018) attributed this result to the fact that support, interactions, or networks "built in online contexts do not transfer to offline worlds" (p. 29) and do not affect individuals' actual lives as much as offline support. Additionally, Shakya and Christakis (2017) found offline and online networks have different impacts on individual well-being. When individuals had networks in both the offline and online environment, offline networks positively predicted individual well-being, whereas online networks

negatively predicted individual well-being. Alternatively, other research has found a negative association between offline support and individual well-being and a positive association between online support and individual well-being (Ihm & Lee, 2021; Zhang & Fu, 2021). According to Ihm and Lee (2021), when individuals' networks are more concentrated on offline support than online support, individual well-being may decrease during the pandemic, because individuals have fewer opportunities to receive support in the offline environment than the online environment. Zhang and Fu (2021) also reviewed scholarship on online support communities and found that they play positive roles in individual well-being. These studies suggest the roles of offline and online support are mixed. Further, they are based on cross-sectional data, so research has not explored whether each type of support contributes to individual well-being or if individual well-being increases the possibility for receiving social support. Therefore, we ask how offline and online support may causally predict individual well-being during the pandemic:

RQ4: How do offline and online support in Time 1 predict individual well-being in Time2 during the pandemic?

So far, prior studies have suggested how communication networks may predict individual well-being during the COVID-19 pandemic. However, as the pandemic continues, individual well-being may also depend on internal strengths and coping abilities in maintaining stability and composure during this period, and in adjusting to the new norms of interaction, work, and family lives (Long et al., 2022; Prime et al., 2020). Further, many studies on communication networks and individual well-being have focused on individuals who were experiencing specific hardships, who may ask others for help (e.g., cancer patients; Meng et al., 2021); the COVID-19 pandemic has affected every individual in the world, which may make it more difficult to ask others for help. Individual ability such as resilience may substantially differentiate individual well-being when everyone must survive facing the same challenges. The next section focuses on the influence of individual resilience on individual well-being during the pandemic and attempts to examine the roles of what individuals have internally (i.e., resilience) together with what individuals have externally (i.e., communication networks) in relation to individual well-being.

Resilience and individual well-being

Based on resilience theory, resilience refers to individuals' ability to bounce back and maintain stable levels of psychological and physical functioning when exposed to unfavorable or adverse life circumstances, and individuals gain resilience from disruptive experiences; it is not an innate trait (Bonanno, 2004; Richardson, 2002). This understanding corresponds with definition of resilience in other communication research (e.g., Carr & Kellas, 2018).

Previous studies have reported that resilience is highly correlated to individual well-being (Smith et al., 2008). Because more resilient individuals can better maintain stability in the face of negative life events, they are more likely than their less-

resilient counterparts to maintain higher levels of well-being. Indeed, many studies have found that resilience is negatively related to negative features of well-being (e.g., anxiety, depression, perceived stress, and negative affect) and positively related to positive features of well-being (e.g., life satisfaction and positive affect) among varied demographic groups, including Nigerian undergraduate students, U.S. older adults, and U. K. social workers (Cosco et al., 2017; Grant & Kinman, 2012; Ifeagwazi et al., 2015; Smith et al., 2008). Furthermore, resilience has been found to lessen the risk of mental illness and disruption, and contribute to increased appreciation of life (Herrman et al., 2011).

Resilience is also relevant to individual well-being during a pandemic. Prior research on resilience has focused on situations affecting individuals and generating adjustment difficulties or mental disorders, ranging from common, yet challenging experiences such as physical illness and deaths of close ties, to rare circumstances such as natural disasters, violence, and war (Bonanno, 2004; Herrman et al., 2011). The COVID-19 pandemic has threatened individuals through social disruptions such as financial insecurity, caregiving burdens, and confinement-related stress, all of which previous resilience research has addressed. Resilience is vital to coping effectively with such difficulties (Herrman et al., 2011). Indeed, a study undertaken during the pandemic reported that individuals with low levels of resilience were prone to mental health problems, including severe depression, suicidal ideation, and anxiety disorders (Killgore et al., 2020). Another study found a negative correlation between resilience, and COVID-19 burnout and stress (Yildirim & Solmaz, 2022). Based on cross-sectional data, these studies revealed how individuals with varied levels of resilience responded differently to the urgent circumstances at the beginning of COVID-19.

However, over the course of the pandemic, individuals faced the additional challenges of adjusting to and living in new ways during the pandemic, including changes to their daily routines or interactions at work and home. Further, because individuals may gain or improve resilience after adversity (Richardson, 2002), research needs to examine whether individual resilience increases their well-being over the course of the pandemic. Extending the recent studies that focused on individuals' resilience and their immediate responses to the COVID-19 pandemic based on cross-sectional data (e.g., Killgore et al., 2020; Yıldırım & Solmaz, 2022), this study examines how individual resilience positively and causally predicts well-being over the course of the pandemic:

H1: Resilience in Time 1 positively predicts the ego's cognitive well-being (H1-a) and affective well-being (H1-b) in Time 2 during the pandemic

Resilience may also interact with individuals' communication networks and jointly influence individual well-being. On the one hand, when individuals have higher levels of resilience, their process of resilience may be more strategic and active. For instance, previous research found a positive correlation between resilience and family communication (Carr & Kellas, 2018). Those with higher levels of resilience had higher levels of efficacy in talking about stressful events with their marital

partners, and had more supportive and empathetic communication with them. In other words, individuals with higher levels of resilience may be more effective in accessing and mobilizing communication networks to maintain their well-being during the pandemic. Thus, communication networks may positively interact with resilience to produce individual well-being.

On the other hand, communication networks may negatively interact with resilience to influence individual well-being. Resilience is an individual's ability that the individual may gain and improve from disruptive experiences (Richardson, 2002). Individuals with a high level of resilience possess the ability to bounce back and keep the psychological and physical balance when exposed to unfavorable or adverse life circumstances (Smith et al., 2008). For instance, highly resilient individuals showed their own ability to cope with adversity such as having "positive biases in favor of the self" (Bonanno, 2004, p. 25), expressing positive emotions regardless of the situation, or exhibiting "genuine laughs and smiles when speaking about a recent loss" (p. 26). Such ability does not necessarily involve interaction with others. Individuals with a high level of resilience already have the ability to maintain psychological and physical stability in their own ways, and thus their communication networks with others may not greatly affect their well-being. For individuals with a low level of resilience, on the other hand, having stronger communication networks may drastically increase their well-being. Considering that the two opposite patterns of interactions are equally plausible, we generate the following research questions rather than directional hypotheses on the interaction between resilience and communication networks on individual well-being:

RQ5: How do tie strength and resilience in Time 1 interact with each other and influence individual well-being in Time 2 during the pandemic?

RQ6: How do network density and resilience in Time 1 interact with each other and influence individual well-being in Time 2 during the pandemic?

RQ7: How do three functions of support (i.e., informational, emotional, and network) and resilience in Time 1 interact with each other and influence individual well-being in Time 2 during the pandemic?

RQ8: How do offline/online support and resilience in Time 1 interact with each other and influence individual well-being in Time 2 during the pandemic?

Methods

Sample and procedure

The sample for this study was based on the general online panel data available from Embrain, an online survey company in South Korea (www.embrain.com). The same participants were surveyed longitudinally at two time points (see

Appendix A for demographics). For Time 1, we asked Korean adults in May 2020 about their individual characteristics, including resilience as well as well-being and social networks. The survey company randomly chose and sent invitation e-mails to 14,407 Koreans among the company's 1,148,766 opt-in online panels. The chosen individuals participated in the anonymous survey by voluntarily clicking the link in the e-mail. Among those who received the link, 2,043 clicked on the survey, and 1,498 of them completed the survey. Based on the formula for opt-in online panels (Callegaro & DiSogra, 2008), the completion rate was 10.40%, which is within the range of the response rate of online surveys (Sauermann & Roach, 2013, 10%–25%). This 20-minute-long survey consisted of 54 questions. The survey company paid participants approximately \$3 (translated in dollars) in both Time 1 and Time 2, which is a comparable compensation fee for samples from survey companies (Zhang & Gearhart, 2020). The survey was anonymous as the survey company gave ID numbers to participants who clicked the survey link in Time 1 and re-contacted the same participants in Time 2 using their IDs. Thirty-two of the completed responses from Time 1 were excluded from the analysis because of invalid data (e.g., missing data, and completion time not within the range of three standard deviations from the average completion time, Leiner, 2019). Time 2 took place nine months later. In February 2021, we asked the same participants to answer questions about their well-being and social networks by re-contacting them using their ID numbers. Of the 1,466 participants who participated in Time 1, 760 of them completed the survey in Time 2. Fifty-two of the completed responses were excluded from the analysis because of invalid data, as indicated above (Leiner, 2019), leaving 708 valid responses in Time 2 (retention rate: 48.29%). All procedures were submitted for approval by the host university's Institutional Review Board. Participants who chose to participate in the study provided their consent forms online before starting the surveys.

An attrition analysis of *t*-tests indicated that participants who only participated in either Time 1 or Time 2 had similar gender distribution (Time 1 only: 50.40% females; Time 2 only: 46.75% females), marital status (Time 1 only: 61.74% married; Time 2 only: 65.54% married), education level (Time 1 only: $M = 5.59$, $SD = .97$; Time 2 only: $M = 5.60$, $SD = 1.02$), and income level (Time 1 only: $M = 4.86$, $SD = 2.04$; Time 2 only: $M = 4.97$, $SD = 1.98$). Participants who only participated in Time 2 were slightly older ($M = 47.21$, $SD = 13.03$) and more likely to be employed (70.90%) than Time 1-only participants (age: $M = 44.55$, $SD = 13.81$, $t = -3.81$, $p < .001$; employment rate: 63.85%, $t = -2.89$, $p < .01$).

Measures

Communication networks

To measure participants' communication networks at Time 1, we adapted Marsden and Campbell's (1984) standard name generator question to fit the COVID-19 pandemic: "From time to time, most people discuss important personal matters with other people. Who are the people with whom you discussed important personal matters over the last month since the

Table 1. Pairwise correlations and descriptives.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1)	-																	
(2)	.66*	-																
(3)	.67*	.53*	-															
(4)	.47*	.63*	.66*	-														
(5)	.26*	.23*	.23*	.21*	-													
(6)	.02	.02	.01	-.01	.03	-												
(7)	.17*	.15*	.15*	.12*	.17*	-.11*	-											
(8)	.18*	.15*	.19*	.16*	.19*	-.07	.59*	-										
(9)	.16*	.14*	.07	.10*	.35*	-.05	.38*	.39*	-									
(10)	.07	.08*	.09*	.13*	.33*	.03	.18*	.34*	.30*	-								
(11)	.07	.02	.11*	.09*	.26*	-.02	.23*	.33*	.29*	.37*	-							
(12)	.31*	.39*	.35*	.27*	.20*	-.02	.16*	.14*	.13*	.07	.06	-						
(13)	.01	.01	-.04	-.05	.06	.03	-.02	.03	.05	.01	.01	-.05	-					
(14)	.16*	.09*	.06	-.05	-.09*	.15*	-.10*	-.05	-.03	-.06	-.04	.05	.00	-				
(15)	.09*	.08*	.13*	.11*	.07	-.07	.03	.09*	.06	.11*	.07*	.12*	-.16*	-.09*	-			
(16)	.12*	.14*	.19*	.18*	.21*	.05	.23*	.17*	.21*	.05	.12*	.13*	-.02	-.05	.16*	-		
(17)	-.01	.00	.01	.00	.10*	-.14*	.20*	.07	.13*	.01	.11*	.06	-.16*	-.16*	.15*	.18*	-	
(18)	.11*	.08*	.14*	.07	.03	.10*	.09*	.05	.07	-.04	.03	.05	-.05	.31*	.01	.16	.03	-
<i>M</i>	3.23	3.23	3.47	3.40	18.59	0.42	21.31	40.40	2.49	1.31	0.73	3.14	.50	44.55	5.59	4.86	.64	.62
<i>SD</i>	0.67	0.66	1.27	1.27	6.34	0.35	8.28	18.42	2.03	1.56	1.28	.69	.50	13.81	.97	2.04	.45	.48

(1) Affective Well-Being (T1), (2) Affective Well-Being (T2), (3) Cognitive Well-Being (T1), (4) Cognitive Well-Being (T2), (5) Tie Strength, (6) Density, (7) Offline Support, (8) Online Support, (9) Informational Support, (10) Emotional Support, (11) Network Support, (12) Resilience, (13) Gender, (14) Age, (15) Education, (16) Income, (17) Employment, (18) Marital Status.

COVID-19 outbreak? Just tell us the first names or initials of up to six people” (see Table 1 for pairwise correlations and descriptives of every variable).

To capture the attributes of participants’ social networks, we asked questions regarding the social networks they described in response to the name generator question. For *tie strength*, we asked participants about their feelings of closeness with each of their alters, using 5-point Likert scales to elicit their level of agreement with 5 statements (e.g., “We have a close relationship,” and “I feel close to this person,” Ihm & Kim, 2018, $\alpha = .90$; see Table 2 for full items). The average values of feeling of closeness with every alter were summed and used as an

independent variable (i.e., tie strength) in the regression model ($M = 18.59$, $SD = 6.34$, $Min = 2$, $Max = 30$). For instance, if an ego indicated two alters with whom they discussed important matters, the ego also indicated their feeling of closeness with each person from 1 to 5 on the 5 statements. We averaged the values for 5 statements for each person and summed the two people’s values to measure the ego’s tie strength.

For *network density*, we first asked participants about the relationships among every pair of their alters that they indicated in response to the name generator question based on Lee’s et al. (2018) research: “Think about the relationship between (Person 1) and (Person 2). Would you say that they

Table 2. Full items and definitions of tie strength, resilience, and functional support.

	Items	Cronbach’s Alpha (<i>a</i>)
Tie strength	This person is a very close friend. We have a close relationship. I would categorize this person as one of my strong ties. I feel close to this person. I feel good when I talk with this person.	.90
Resilience	I tend to bounce back quickly after hard times. I have a hard time making it through stressful events (R). It does not take me long to recover from a stressful event. It is hard for me to snap back when something bad happens (R). I usually come through difficult times with little trouble. I tend to take a long time to get over set-backs in my life (R).	.88
Affective Well-Being	Please think about what you have been doing and experiencing during the past four weeks. Then report how much you experienced each of the following feelings, using the scale below. For each item, select a number from 1 to 5, and indicate that number on your response sheet. (1: <i>Never</i> , 2: <i>Rarely</i> , 3: <i>Sometimes</i> , 4: <i>Often</i> , 5: <i>Always</i>) Positive; Negative; Good; Bad; Pleasant; Unpleasant; Happy; Sad; Afraid; Joyful; Angry; Contented	Time 1: $\alpha = .83$ Time 2: $\alpha = .91$
Cognitive Well-Being	In most ways my life is close to my ideal. The conditions of my life are excellent. I am satisfied with my life. So far, I have gotten the important things I want in life. If I could live my life over, I would change almost nothing.	Time 1: $\alpha = .92$ Time 2: $\alpha = .92$
Informational Support	Providing information about the problem, how to appraise the problem, or how to cope with the problem	
Emotional Support	Communicating sympathy, understanding, empathy, encouragement, and/or caring	
Network support	Communicating access to new contacts and companions, emphasize the presence of listeners, or emphasize the availability of companions who share similar interests	

Table 3. Effects of communication networks and resilience on affective well-being (T2).

	Model 1		Model 2		Final Model	
	β	(SE)	β	(SE)	β	(SE)
Affective Well-Being (T1)	.65***	(.03)	.61***	(.03)	.61***	(.03)
Gender	.01	(.04)	.01	(.04)	.01	(.04)
Age	-.01	(.00)	.00	(.00)	-.01	(.00)
Education	.03	(.02)	.02	(.02)	.02	(.02)
Income	.06	(.01)	.05	(.01)	.06	(.01)
Employment	-.01	(.04)	-.01	(.04)	-.02	(.04)
Marital	.00	(.05)	.01	(.05)	.01	(.05)
Tie Strength			.05	(.01)	.06	(.01)
Density			.00	(.06)	.00	(.06)
Offline Support			-.01	(.00)	-.01	(.00)
Online Support			-.02	(.00)	-.03	(.00)
Informational Support			.02	(.01)	.01	(.01)
Emotional Support			.04	(.01)	.04	(.01)
Network Support			-.06*	(.02)	-.07*	(.02)
Resilience			.06*	(.03)	.07*	(.03)
Resilience * Tie Strength					-.12*	(.01)
Resilience * Density					-.02	(.08)
Resilience * Offline Support					.10*	(.00)
Resilience * Online Support					.00	(.00)
Resilience * Informational Support					.02	(.02)
Resilience * Emotional Support					.00	(.02)
Resilience * Network Support					.05	(.02)
<i>AdjR</i> ²	.43		.45		.46	
<i>R</i> ²	.43		.45		.46	
ΔR^2	-		.02		.01	
<i>F</i> -test in Model	79.96***		38.20***		25.89***	
<i>F</i> -test in ΔR^2	-		3.79*		1.88*	

* $p < .05$, ** $p < .01$, *** $p < .001$.**Table 4.** Effects of communication networks and resilience on cognitive well-being (T2).

	Model 1		Model 2		Final Model	
	β	(SE)	β	(SE)	β	(SE)
Cognitive Well-Being (T1)	.65***	(.03)	.63***	(.03)	.63***	(.03)
Gender	-.03	(.07)	-.03	(.07)	-.04	(.07)
Age	-.10**	(.00)	-.10**	(.00)	-.11**	(.00)
Education	.02	(.04)	.01	(.04)	.01	(.04)
Income	.04	(.02)	.04	(.02)	.04	(.02)
Employment	-.04	(.08)	-.04	(.09)	-.06	(.09)
Marital	.02	(.09)	.02	(.09)	.03	(.09)
Tie Strength			.08*	(.01)	.09*	(.01)
Density			-.03	(.11)	-.03	(.11)
Offline Support			-.05	(.01)	-.05	(.01)
Online Support			-.03	(.00)	-.04	(.00)
Informational Support			.02	(.02)	.02	(.02)
Emotional Support			.06*	(.03)	.05*	(.03)
Network Support			-.01	(.03)	-.01	(.03)
Resilience			.03	(.06)	.04	(.06)
Resilience * Tie Strength					-.06	(.01)
Resilience * Density					-.01	(.15)
Resilience * Offline Support					.12**	(.01)
Resilience * Online Support					-.03	(.00)
Resilience * Informational Support					-.03	(.03)
Resilience * Emotional Support					.00	(.04)
Resilience * Network Support					.03	(.05)
<i>AdjR</i> ²	.44		.45		.46	
<i>R</i> ²	.45		.46		.47	
ΔR^2	-		.01		.01	
<i>F</i> -test in Model	82.00***		39.15***		27.35***	
<i>F</i> -test in ΔR^2	-		1.97*		2.58*	

* $p < .05$, ** $p < .01$, *** $p < .001$.

are strangers (1), just friends (2), or especially close (3)? Please choose the number that best describes the relationship between the pairs.” We then calculated the proportion of ties who are “especially close” out of all possible connections among every pair of their alters. For instance, if a participant indicated three

people with whom they discussed important personal matters, we first counted the number of existing ties perceived by the participants as “especially close (3)” among every pair of their alters. We then calculated all possible pairs of ties that may exist among the alters, which is 3, in this case (i.e., Person 1 &

Person 2, Person 2 & Person 3, and Person 1 & Person 3). Next, we calculated the proportion of the number of existing ties divided by the number of all possible ties and used the proportion as the network density in the regression ($M = .42$, $SD = .35$, $Min = 0$, $Max = 1$).

For *functions of social support*, participants were asked to choose the type of social support they received over the past month from each person in their networks from three types (i.e., informational, emotional, and network; Meng et al., 2016, 2021). We also provided the definition of each functional support from previous research (see Table 2 for definition, Meng et al., 2016). We then counted the number of people each participant indicated for the three types of social support. Let's say a participant indicated three people with whom they discussed important personal matters. If the participant indicated that one person provided informational support to the participant, the participant's informational support is 1. If the participant indicated that all three people provided emotional support, the participant's emotional support will be 3. If the participant indicated that none of the three provided network support, the participant's network support will be 0 (Informational: $M = 2.49$, $SD = 2.03$, $Min = 0$, $Max = 6$; Emotional: $M = 1.31$, $SD = 1.56$, $Min = 0$, $Max = 6$; Network: $M = .73$, $SD = 1.28$, $Min = 0$, $Max = 6$).

We operationalized the offline and online supports by assessing the communication frequency between the ego and alters in the offline and online environments, respectively (see Table 1 for descriptives of the variables, Offline: $M = 21.31$, $SD = 8.28$, $Min = 2$, $Max = 31$; Online: $M = 40.40$, $SD = 18.42$, $Min = 6$, $Max = 93$). We first asked participants the number of times they communicated with each alter over the past month by using four types of channels (i.e., face-to-face, cell/phone, e-mail, and social media; Lee et al., 2018). For offline support, we averaged the values of the frequency of face-to-face communication with every alter; for online support, we summed the total frequency of communication via all other channels with every alter and then averaged them (Ihm & Lee, 2021; Lee et al., 2018).

Resilience

In Time 1, we measured participants' resilience by using all six items and averaging the values of 5-point Likert Brief Resilience Scale from previous research Brief Resilience Scale (1: *strongly disagree*, 5: *strongly agree*, $\alpha = .88$; Smith et al., 2008; see Table 2 for full items). This scale consisted of six items and directly measured the participants' ability to bounce back, adapt to stress, and thrive in the face of adversity ($M = 3.14$, $SD = .69$, $Min = 1$, $Max = 5$).

Subjective well-being during the pandemic

We measured individual well-being by using Diener's Subjective Well-Being Measure, which consists of "affective well-being" and "cognitive well-being" (Diener, 2009, see Table 2 for full items). Items for affective well-being are 12 items regarding participants' experience of positive and negative feelings over the past month with 5-point Likert scales (1: *not at all*, 5: *always*, Time 1: $\alpha = .83$, $M = 3.23$, $SD = .67$, $Min = 1$, $Max = 5$; Time 2: $\alpha = .91$, $M = 3.23$, $SD = .66$, $Min = 1$, $Max = 5$). Experiences of negative feelings were

reverse-coded, and then the average responses of the 12 items were used to assess affective well-being. The cognitive well-being measure are made up of 5 items with 7-point Likert scales (1: *not at all true*, 7: *very true*, Time 1: $\alpha = .92$, $M = 3.47$, $SD = 1.27$, $Min = 1$, $Max = 7$; Time 2: $\alpha = .92$, $M = 3.40$, $SD = 1.27$, $Min = 1$, $Max = 7$) which asked about participants' satisfaction with their lives. Average responses to the 5 items were used in the analysis.

Analysis

We conducted two linear regressions to examine the effect of communication networks and resilience on participants' subjective well-being by using a longitudinal panel design with lagged dependent variable modeling (see Table 3 and 4), using Stata 14 (StataCorp, 2015). In the regression models, subjective well-being in Time 2 was regressed on subjective well-being in Time 1, network variables, resilience, their interaction terms, and control variables. The inclusion of subjective well-being in Time 1 formed lagged dependent variable models, capturing the effects of Time 1 independent variables on the changes in the dependent variable between Time 1 and Time 2. All variables except subjective well-being in Time 2 were measured in Time 1.

Model 1 was a baseline model where subjective well-being in Time 2 was regressed on subjective well-being in Time 1 and control variables. In Model 2, variables of communication network and resilience in Time 1 were added to examine their effects on participants' subjective well-being in Time 2. The final model added the interaction terms between network variables and resilience in Time 1. Independent variables were centered to examine the effects of their interaction terms. The variance inflation factors of all variables were lower than 2.5. Previous research suggests the effect of six demographics on individual well-being (i.e., gender, age, education, employment status, and marital status, Ihm & Lee, 2021; Lee et al., 2018; Meng et al., 2021), and we controlled them in this study.

Results

RQ1 asked the effect of tie strength on participants' well-being. The results suggest that tie strength at Time 1 was positively related to cognitive well-being at Time 2 ($\beta = .08$, $p < .05$), but not to affective well-being at Time 2. RQ2 asked the effect of network density on participants' well-being. The results suggest the density at Time 1 was not correlated to individual well-being at Time 2.

RQ3 investigated the effects of informational, emotional, and network support on participants' subjective well-being. Informational support at Time 1 was not related to participants' well-being at Time 2. Emotional support at Time 1 was positively related to participants' cognitive well-being at Time 2 ($\beta = .06$, $p < .05$). Network support at Time 1 was related to participants' affective well-being at Time 2, but in a negative direction ($\beta = -.06$, $p < .05$). RQ4 asked about the role of offline and online support on participants' well-being. The results suggest that online and offline supports at Time 1 were not associated with participants' well-being at Time 2.

H1 hypothesized the positive effect of resilience on participants' cognitive (H1-a) and affective well-being (H1-b). The

results suggest that resilience at Time 1 was positively related to affective well-being at Time 2 ($\beta = .06, p < .05$), but not to cognitive well-being at Time 2. Therefore, H1-a was not supported. H1-b was supported.

RQ5 asked the effect of the interaction between tie strength and resilience on individual well-being. There was no interaction effect between resilience and tie strength at Time 1 on cognitive well-being at Time 2. The interaction term between tie strength and resilience at Time 1 in the Final Model was correlated to affective well-being at Time 2 ($\beta = -.12, p < .05$). **Figure 1** shows that the effect of tie strength differed depending on levels of resilience. Among participants with resilience lower than the average (labeled as “low resilience” in the figure), their tie strength at Time 1 contributed to their affective well-being at Time 2. Among participants with resilience higher than the average (labeled as “high resilience” in the figure), their tie strength at Time 1 did not predict their affective well-being at Time 2.

RQ6 asked the interaction effect between density and resilience on individual well-being. There was no significant interaction between the two variables at Time 1 on individual well-being at Time 2. RQ7 investigated the interaction effect between three functions of support and resilience on individual well-being. There was no significant interaction between the variables.

RQ8 asked the interaction effect between offline/online support and resilience on individual well-being. The interaction terms between offline support and resilience at Time 1 in the Final Model were positively related to participants’ well-being at Time 2 (affective: $\beta = .10, p < .05$; cognitive: $\beta = .12, p < .01$). **Figures 2 and Figure 3** show that among participants with resilience lower than the average, their offline support decreases both their affective and cognitive well-being; among participants with resilience higher than the average, their offline support did not affect their well-being. There was no

interaction between online support and resilience on individual well-being.

Discussion and conclusion

The results from this study exhibit the interesting roles of both communication networks and resilience in individual well-being during the pandemic. First, in terms of structural aspects of communication networks, the tie strength of feeling of closeness positively influenced cognitive well-being. Consistent with previous research (Burke, 2011; Ihm & Lee, 2021; Krackhardt, 1992), individuals may maintain their well-being by receiving the support of comfort and stability from ties whom they feel close to during the uncertain circumstances of the pandemic. Network density, on the other hand, did not have any significant effect on individual well-being. During the pandemic, social interactions have been reduced to core network members (Long et al., 2022), and individuals may be more affected by strong ties than a connected network consisting of a broader range of ties.

In comparison to the positive main effect of tie strength, its interaction term with resilience negatively predicted affective well-being. **Figure 1** shows that participants with lower resilience are more vulnerable to and affected by external influences; when their tie strength increases, it affects these participants considerably and increases their affective well-being dramatically. Among participants with higher resilience, their tie strength did not influence their affective well-being as much. Highly resilient people possess their own ability internally to overcome life challenges by themselves, such as having “positive biases in favor of the self” (Bonanno, 2004, p. 25), expressing positive emotions regardless of the situation, or exhibiting “genuine laughs and smiles when speaking about a recent loss” (p. 26).

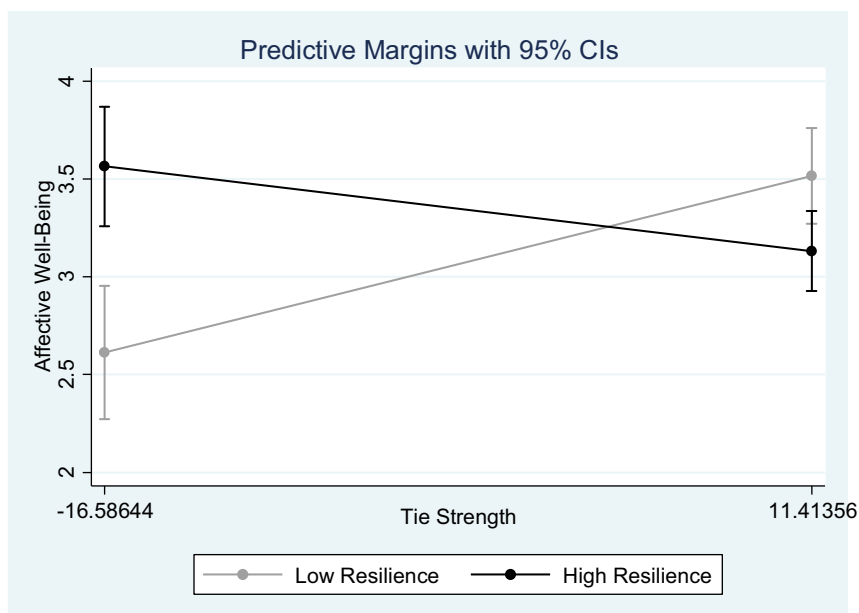


Figure 1. Interaction between tie strength and resilience on affective well-being. The x-axis reports from the minimum to the maximum values of the centered independent variable of tie strength at Time 1. The y-axis reports from the minimum to the maximum values of the dependent variable of affective well-being at Time 2. Values of the moderator higher than the average are identified as “high resilience” and lower than the average as “low resilience.”

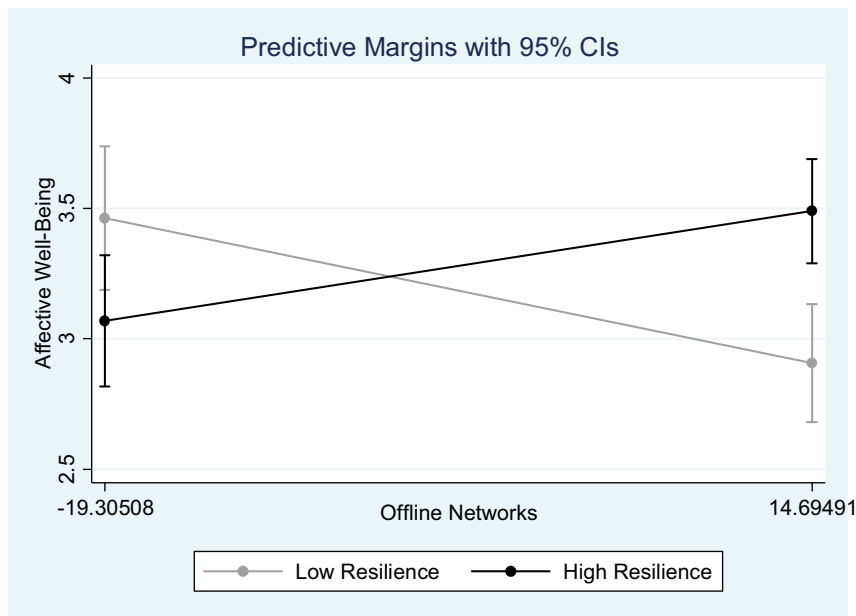


Figure 2. Interaction between offline support and resilience on affective well-being. The x-axis reports from the minimum to the maximum values of the centered independent variable of offline networks at Time 1. The y-axis reports from the minimum to the maximum values of the dependent variable of affective well-being at Time 2. Values of the moderator higher than the average are identified as “high resilience” and lower than the average as “low resilience.”

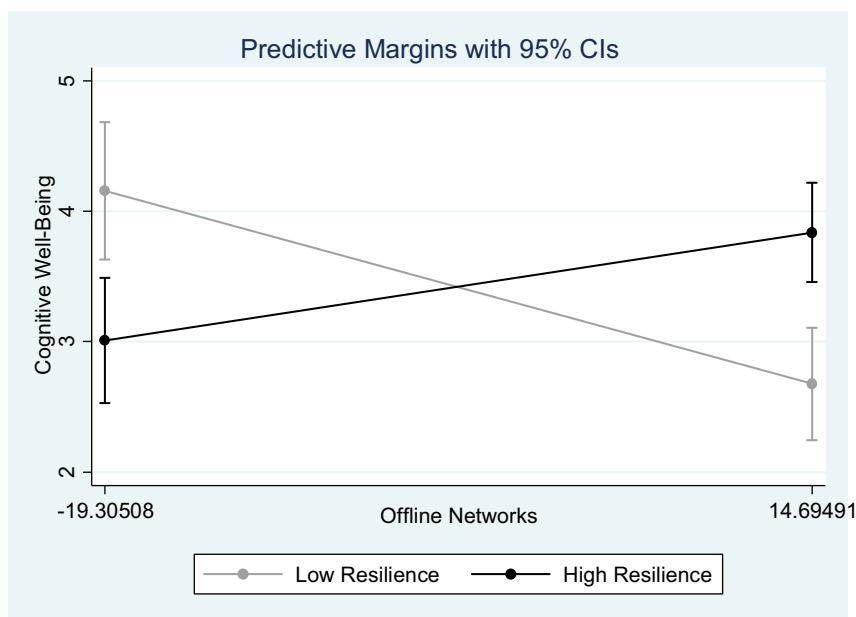


Figure 3. Interaction between offline support and resilience on cognitive well-being. The x-axis reports from the minimum to the maximum values of the centered independent variable of offline networks at Time 1. The y-axis reports from the minimum to the maximum values of the dependent variable of cognitive well-being at Time 2. Values of the moderator higher than the average are identified as “high resilience” and lower than the average as “low resilience.”

Regarding the functional aspects of communication networks, only emotional support positively predicted cognitive well-being. This result conflicts with a previous study that found a positive correlation between informational support and individual well-being, but no significant association of emotional support with individual well-being in the beginning of the pandemic (Ihm & Lee, 2021). Over the course of the pandemic, individuals may need emotional support to maintain their mental stability and endure the time of limited interactions more than other types of support for their well-being. Just as cancer patients’ well-being increased when they

received more emotional support consisting of sympathy and encouragement (Meng et al., 2021), every individual seems to have an increasing need for emotional support to endure this challenging time (Overall et al., 2022).

Neither informational nor network support positively predicted individual well-being. Informational support did not have any significant influence on individual well-being. Previous research suggests that informational support does not always have a positive influence on individual well-being, because it may include unwanted, repetitive, or an overwhelming amount of information (Meng et al., 2021). As the pandemic continued

over a long period, this may have been increasingly true of informational support (Thoits, 2011), which may have negated the positive effect of informational support on individual well-being in the beginning of the pandemic (Ihm & Lee, 2021).

Regarding the negative effect of network support on affective well-being, during the pandemic, individuals may want to stay uninfected, safe, and mentally stable within a close boundary such as family members (Jones et al., 2021; Prime et al., 2020) instead of taking the risk of reaching out to new people or trying new things; network support of introducing new contacts or new situations (Meng et al., 2016) may generate infection, mental instability, or discomfort to individuals, ultimately decreasing their well-being. Further, both informational and network support represent resources for “problem-focused coping,” in comparison to resources for “emotion-focused coping” (Meng et al., 2016, p. 987). That is, both informational and network support provide new information and contacts needed to reassess and *solve* the problem (Dunkel-Schetter et al., 1987). As offline communication remains limited during the pandemic (Long et al., 2022), individuals seem to require more emotional support to empathize with each other and feel socially integrated (Overall et al., 2022); support to solve the problem may not be something individuals need to maintain their well-being during the pandemic.

The results of communication networks suggest that as the pandemic has continued over time, individuals have depended on those whom they feel close to and those who provide comfort rather than reaching out to new people or new information. It may be not only that communication has become limited to core networks because of the quarantine and social distancing policies (Long et al., 2022), but also that individuals may *choose* to communicate with and maintain a small social circle with comfort and trust for their emotional stability. This result represents the changes in the structure and function of communication networks during the pandemic, which are concentrated on strong, emotional ties.

This result contributes to communication research by prompting a reconsideration of the meaning of communication networks for individual well-being and society. The result suggests that individuals, as social animals, gained support from their social networks during the pandemic. However, the way they have come to depend only on limited communication networks of strong and emotional ties may prevent them from staying social and communicative in the future, because such ties let them stay connected among themselves but may not lead them to encounter new people and extend their social networks (Burt, 1992). This phenomenon may be problematic for both individual well-being and society, because communicating with the broadened network members produces creative ideas and diverse worldviews, and ultimately increases diversity and tolerance in a society (Meng et al., 2016). Therefore, understanding how the structure and function of communication networks change during the pandemic will require continuous societal and scholarly attention.

Regarding the role of offline and online support, offline support did not predict individual well-being by itself, but their interaction with resilience had a significant influence on both aspects of individual well-being. Individuals who had

a high level of offline support at the beginning of the pandemic seem to have varying levels of well-being depending on their resilience level. Individuals with higher resilience seem to maintain their well-being regardless of how much offline support they have. This is likely because they possess the ability to bounce back and keep the psychological and physical balance by themselves, such as by having positive biases in favor of themselves, or expressing positive emotions and smiles when exposed to adverse life circumstances (Bonanno, 2004; Smith et al., 2008). Those with lower resilience, on the other hand, seem to be affected more by a greater difference between the many offline interactions they had before the pandemic and the limited offline contact they now have, because they have less ability to maintain stable levels of psychological and physical functioning by themselves (Bonanno, 2004; Smith et al., 2008), which in turn decreases their well-being.

Unlike offline support, online support did not have a significant influence on individual well-being. Prior research showed that individuals gain more support from their online networks that provide useful advice or information (Meng et al., 2021), specifically at the beginning of the pandemic (Ihm & Lee, 2021). As the pandemic has continued over time, however, individuals seem to either miss the offline interactions they had before the pandemic or use offline support to maintain their well-being. Online support does not seem to have a part in this process.

These results enrich discussions on the roles of offline and online communication networks during the pandemic. Communication research has a long tradition of examining the relationship between online and offline communication networks (Rainie & Wellman, 2012). Previous research during the pandemic has also focused on whether online communication can substitute for offline communication or whether individuals still depend on offline communication despite limited opportunities (Fish et al., 2020; Ihm & Lee, 2021; Ng et al., 2020; Zaagsma et al., 2020; Zhai & Du, 2020). This study, instead, leads us to contend that the discussion should be reshaped. The role of offline support in individual well-being does not seem to lie on the offline support’s relationship to online support during the pandemic; offline support is not simply compensated or substituted for by online support. Offline support increases some individuals’ well-being, the role online support cannot substitute for, while offline support decreases other individuals’ well-being, the role online support does not seem to compensate for. Instead, the role of offline support in individual well-being seems to depend on individual resilience to maintain their stability by taking account of and taking advantage of the offline networks. In this way, this study captures the nuanced dynamics between external resources and internal ability when individuals face challenges and enriches the tradition of communication research (Rainie & Wellman, 2012) by identifying the unique role of offline networks that online networks cannot play and an individual ability that complicates the effect of offline networks.

In addition to the interaction effects of resilience, resilience had its main positive effect on individual well-being. This result reconfirms the fact that humans are not only social but are also autonomously able to overcome challenges. However, the most interesting role of resilience is not the role by itself, but its

interaction with communication networks; what individuals *are internally* may differentiate how individuals take advantage of or become affected by what individuals *have externally* in response to global challenges.

Together, this study illustrates the effects of communication networks and resilience on individual well-being during the pandemic. Consistent with previous research which has separately focused on the two factors, both factors seem to have their own effects on individual well-being. However, they also interact with each other to influence individual well-being, which previous research has not captured. This study demonstrated that individuals' communication networks may not always have a strong influence on their well-being, but may play less of a salient role depending on the individuals' resilience. Individuals with lower resilience are more vulnerable to their communication networks (i.e., tie strength and offline support) when maintaining their well-being, whereas communication networks have less effect on the well-being of those with higher resilience. In this way, this study extends and offers new directions to research on communication networks and individual resilience in relation to individual well-being. In comparison to the positive relationship between communication networks and individual well-being detected in previous research (Cohen, 2004; Lee et al., 2018; Meng et al., 2016; Smith & Christakis, 2008), this study challenges the traditional understanding of individuals' social resources; social "support" may not always support individuals but may decrease or have no influence on individual well-being for some individuals. Beyond looking at individuals' social resources only as "support" networks, this study introduces theoretical directions to investigate how the complex dynamics between individuals' external communication networks and internal ability influence their well-being.

Extending previous research exhibiting a positive relationship between resilience and individual well-being (Bonanno, 2004; Herrman et al., 2011; Killgore et al., 2020; Smith et al., 2008), this study also provides a nuanced finding on resilience scholarships. Consistent with the communication theory of resilience which views resilience as a communicative process (Buzzanell, 2010, 2019), this study also suggests the close relationship between resilience and communication. Individuals with the same level of resilience may end up having different levels of well-being depending on their communication networks, because their levels of communication networks may determine what external resources they may access and mobilize to maintain their well-being. In this way, this study offers a more sophisticated framework to understand how individuals' abilities influence their well-being and enriches the discussions on individual resilience and individual well-being. Combining the two lines of research, this study provides a more comprehensive understanding of human nature on how individuals sustain their well-being when offline communication becomes limited (Long et al., 2022).

The study has several limitations and future suggestions. First, this study only focused on resilience as an individual ability in overcoming the pandemic. While resilience has been one of the core individual factors in maintaining equilibrium during the pandemic, future studies may examine other internal traits, such as self-efficacy, sense of humor, and

Patience (Smith et al., 2008), to account for individual well-being in a more comprehensive manner. Second, this study is based on data from a two-wave panel survey. There may be other confounding factors (e.g., media resources, Ihm & Lee, 2021) which this study has not paid attention to. Further, future studies should gather more data continuously as the severity of the pandemic changes over time, and capture the changes in the roles of communication networks and resilience in individual well-being. Finally, we used self-reported measures on communication networks. Combining actual network measures such as log data of online support networks may provide more implications to this study's findings.

This study examined how communication networks and individual resilience have influenced individual well-being over time during the COVID-19 pandemic. The results suggest that individuals' well-being increases when they have enough close relationships and receive emotional support. However, individuals' communication networks do not affect their well-being in a simplistic manner. More support from their communication networks may not always comfort individuals, as some of them may compare the current situation to the good old days or become unstable when introduced to new contacts or situations (Meng et al., 2016). Less support may not always bother individuals, as some of them can sustain their stability and overcome challenges in their own ways, without much support. Looking at the question of what leads individuals to maintain their well-being in challenging circumstances, this study demonstrates that it is not the one or the other, but the complex combination of external support from others and individuals' internal abilities that induce individuals to endure the hardships.

Note

1. Some studies have used the term "social networks" (Smith & Christakis, 2008) instead of "communication networks," but we use "communication networks" as an umbrella term to include the structure of social contacts (i.e., social networks) and the function of support from the networks (i.e., social support). Here, "social networks" specifically refers to the structural aspects of communication networks.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix A. Measurement and Descriptives of Demographics

Measure		Time 1 only	Time 2 only
		<i>M (SD) or %</i>	<i>M (SD) or %</i>
Gender	1: Male	49.60%	53.25%
	0: Female	50.40%	46.75%
Age	Age	44.55 (13.81)	47.21 (13.03)
Highest educational attainment	1: No education	0.07%	0.14%
	2: Elementary school graduate	0.07%	0.14%
	3: Middle school graduate	0.20%	0.14%
	4: High school graduate	18.96%	18.79%
	5: Associate's degree	15.62%	16.24%
	(degree from a 2 year college program)	53.96%	52.83%
	6: Undergraduate degree	8.32%	8.33%
	7: Master's degree	2.80%	3.39%
Monthly household income (converted from KRW to USD)	8: Doctoral degree		
	1: Less than \$850	3.89%	3.39%
	2: \$850–\$1,700	7.84%	7.06%
	3: \$1,700–\$2,550	15.62%	14.97%
	4: \$2,550–\$3,400	18.01%	18.36%
	5: \$3,400–\$4,250	15.42%	16.24%
	6: \$4,250–\$5,100	14.73%	16.24%
	7: \$5,100–\$5,950	8.59%	7.06%
Employment status	8: More than \$5,950	15.89%	16.67%
	0: unemployed, retired, homemaker, student	63.85% employed	70.90% employed
Marital status	1: employed		
	0: single, separated, divorced, widowed, cohabiting	61.74% married	65.54% married
	1: married		

Note. Their education (*Mdn* = completed an undergraduate degree) and monthly household income (*Mdn* = \$3,400 to \$ 4,250) were similar to those of the Korean national population: 47% of Koreans have an undergraduate degree (Organisation for Economic Co-operation and Development, 2016) and an average monthly household income of \$4,100 (Korean Statistical Information Service, 2020). We transformed the education variable into a dummy variable differentiating between individuals who hold "0: less than undergraduate degree" and those who hold "1: at least an undergraduate degree." We transformed the household income variable into a dummy variable as well, differentiating between individuals who earn "0: less than US\$4,250" and those who earn "1: more than US\$4,250." Variables of employment status and marital status were also dummy coded after participants chose among 5 and 6 categories, respectively.