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Full length article

The dynamics of social support and affective well-being before and during COVID: An experience sampling study

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ABSTRACT

Based on the dynamic motivational activation (DMA) theoretical framework, this study examines the dynamic, reciprocal relationship between social support and affective well-being in both face-to-face (F2F) and online channels before and during the COVID-19 pandemic. Using experience sampling method, 2002 surveys on F2F and online interactions were collected from 64 participants. Dynamic panel modeling results showed that emotional support was associated with lower emotional discomfort toward F2F and online social interactions. Then, the emotional discomfort toward the F2F interactions drove the subsequent pursuit of emotional support, practical support, and informational support on the online channels. Additionally, findings suggested that individuals were more likely to obtain informational support via F2F communication after experiencing stronger emotional discomfort online during the pandemic.

1. Introduction

The stay-at-home order due to the COVID-19 outbreak has drastically altered Americans' day-to-day social interactions and affected their psychological well-being (Kirzinger, Hamel, Muñana, Kearney, & Brodie, 2020). A poll conducted by the Kaiser Family Foundation in April 2020 found that over half of Americans reported the pandemic was harming their mental well-being (Kirzinger et al., 2020); and a federal emergency hotline witnessed a 1000% increase in people reporting emotional distress in April 2020 compared with the same time in 2019 (Wan, 2020). Indeed, the daily dose of social isolation, increasing number of the confirmed cases, and economic hardship related to COVID-19 have been generating a mental health crisis in the U.S. In the face of this unprecedented crisis, social support has probably never been this important for buffering stress, anxiety, and fear.

Social support, the perceived available resources and benefit from social interactions, has a positive impact on affective well-being (Cohen & Hoberman, 1983; Frison & Eggermont, 2015; MacGeorge, Feng, & Burleson, 2011; Oh, Ozkaya, & LaRose, 2014; Thoits, 1995), especially during personal and societal crises (Cohen & Hoberman, 1983; Dutta-Bergman, 2004). The current study emphasizes the role of social support in buffering emotional discomfort, which is defined as an increase in

negative affect and a decrease of positive affect in daily events. Diener et al. (2010) have included positive and negative feelings as one dimension of well-being, which is also termed affective well-being in later research (e.g., Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2014). Therefore, emotional discomfort is considered to be one facet of affective well-being. How social support can buffer emotional discomfort is particularly relevant given the timing of this study during the COVID-19 pandemic (Wan, 2020), and the emotional discomfort caused by the pandemic can lead to long-term depression and anxiety (Van Hal, 2015).

Emotional discomfort, in turn, may motivate the subsequent pursuit of social support. For example, if one experiences emotional distress from face-to-face (F2F) social interactions, they then may switch to social activities in the online settings to acquire social support. This dynamic relationship between social support and emotional discomfort forms a mutual, reciprocal influence: social support may reduce or aggravate emotional discomfort, and emotional discomfort toward one communication channel may influence subsequent choice on the alternative channel to acquire social support. Examining this reciprocal relationship has important theoretical and practical implications as it reveals what motivates the pursuit of social supports on F2F and online channels. However, research to date has rarely tested the reciprocal

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relationship between social support and emotional discomfort.

To address this gap, we investigate the reciprocal relationship between social support and emotional discomfort on F2F and online channels, based on the theoretical framework of dynamic motivational activation (DMA; Wang & Tchernev, 2012; Xu, Wang, & Woods, 2019). The dynamic system perspective originated in mathematics and engineering, and has been introduced into communication studies by Wang and colleagues to explain the dynamics of media processes (Wang, Lang, & Busemeyer, 2011; Wang & Tchernev, 2012). This study is among the first attempts to capture and test the dynamic, reciprocal influence between social support and emotional discomfort in the F2F and online channels, before and during the COVID-19 pandemic.

2. Social support and emotional discomfort

Social support has been conceptualized and defined in a variety of overlapping yet distinctive ways (Cohen & Hoberman, 1983; Killilea & Caplan, 1976). Based on the psychosocial perspective of social support, we define social support as individuals' perceived available resources from their social interactions (MacGeorge et al., 2011). Social interaction broadly refers to activities that involved a certain degree of interactivity between individuals (Brabham, 2015; Jensen, 2015), as users can provide feedback to the mediated content via the affordances of platforms; such as reading posts on social media or discussion board, watching a video posted by a YouTuber, chatting with a person via phone/video chat or text messages.

A long line of research has demonstrated that social support has a powerful impact on individuals' well-being (e.g., Bloom, Stewart, Johnston, Banks, & Fobair, 2001; Cutrona & Russell, 1990; Greenglass, Fiksenbaum, & Burke, 1996; Morelli, Lee, Arnn, & Zaki, 2015). For example, cross-sectional survey studies found that an increase in social support for Facebook users was associated with a lower level of stress (Nabi, Prestin, & So, 2013); a longitudinal study suggests that perceived social support is negatively associated with depression (Pierce, Frone, Russell, Cooper, & Mudar, 2000). Researchers have sketched a few mechanisms: social support provides a sense of life predictability as well as a sense of self-worth (Cohen & Wills, 1985) and also promotes social identity and social belonging (Whiteman-Sandland, Hawkins, & Clayton, 2018), thus increases well-being.

The current study emphasizes the complementarity between F2F and online social support in buffering emotional discomfort. In a media-saturated society, individuals alternate between online and F2F channels to obtain social support (Dutta-Bergman, 2004; Kim, 2017) and manage their affect (Parks, 2017). This resonates with social support research that often emphasizes both online and F2F social support and their supplementing rather than supplanting relationship (Williams, 2006). This complementarity between F2F and online social support highlights the interdependence of both communication channels. For example, the disadvantaged groups used online communication to broaden their social support (Gonzales, 2017), and online channels were found to reinforce and extend offline social interactions (Williams, 2006). More importantly, the complementarity of social support from online and F2F communication channels is especially relevant during the pandemic, as the lockdown policy and social distancing may drastically change daily social interaction patterns, such as a decrease of F2F social interactions (Williams, Armitage, Tampe, & Dienes, 2020) and an increase in online communication (King, Delfabbro, Billieux, & Potenza, 2020).

Further, scholars have made an important differentiation on dimensions of social support and identified three types of social support: emotional, practical, and informational support (e.g., Cohen, 2004; Cutrona & Russel, 1990; Morelli et al., 2015). Emotional support refers to companionship, comfort, empathy, or listening, making someone feel valued, loved, and cared for (Morelli et al., 2015). Practical support refers to more tangible support, such as money, transportation, helped with housework, chores, and shopping (Morelli et al., 2015).

Informational support includes providing knowledge, advice, resources, which can serve as a diverse source of information to broaden social horizons or open up opportunities for the recipients (Williams, 2006).

Among these three dimensions, emotional support has received consistent empirical support regarding its role in reducing negative feelings and improve psychological well-being. For example, Morelli et al. (2015) observed that emotional support was strongly correlated with a lower level of negative emotions such as loneliness, stress and anxiety, and a higher level of positive emotions such as happiness. In other studies, emotional support has been proven to be the most important type of social support for buffering the effects of stress and improving mental well-being (Bloom et al., 2001; Helgeson, 2003). Indeed, with more significant emotional support, individuals are likely to experience lower negative feelings and higher positive feelings toward daily events.

Taken together, emotional support people received may help reduce emotional discomfort across F2F and online settings.

H1: F2F emotional support is negatively associated with emotional discomfort toward F2F social activities (*H1a*), and online emotional support is negatively associated with emotional discomfort toward online social activities (*H1b*).

Evidence regarding practical and informational supports' associations with psychological well-being has been inconclusive. While some research has found a significant correlation between informational support and emotional well-being (Greenglass et al., 1996), other studies failed to detect significant relationships between practical support and psychological well-being (Morelli et al., 2015). Some even found negative relations of practical support (Reinhardt, Boerner, & Horowitz, 2006) and informational support (Bloom et al., 2001) with psychological well-being. It is likely that the receipt of practical support (i.e., money, transportation, help with chores) may imply the inability to accomplish daily tasks or the feelings of dependence, or becoming a burden, and thus may increase stress (Reinhardt et al., 2006). Informational support (i.e., novel, diverse knowledge, and information) may not directly translate into buffering emotional discomfort because managing and digesting the information and knowledge take cognitive resources from the limited capacity pool, which may increase some negative emotions, such as fatigue, stress or boredom (Lang, 2006; Xu et al., 2019). However, there could be another possibility when a pandemic or crisis disrupts individuals' social lives, the information exchanged, or the practical support received from F2F, and online social interactions may help reduce emotional discomfort induced by the pandemic. Given these possibilities, research questions are proposed to investigate the relationships between practical support, informational support, and emotional discomfort.

RQ1: What is the relationship between practical support and emotional discomfort toward F2F (*RQ1a*) and online (*RQ1b*) social activities, respectively?

RQ2: What is the relationship between informational support and emotional discomfort toward F2F (*RQ2a*) and online (*RQ2b*) social activities, respectively?

3. The dynamics between social support and emotional discomfort

The relationship between social support and emotional discomfort is more complex than a unidirectional process. That is, different types of social support may increase or decrease the level of emotional discomfort toward social activities, and emotional discomfort, in turn, will influence subsequent social activities to pursue different social support. To understand such a dynamic relationship, we need to consider them in a dynamic context that is constantly changing and updated by their mutual, reciprocal influences. The dynamic motivational activation (DMA; Wang & Tchernev, 2012) provides a framework for theorizing and testing such dynamic reciprocal influences between communication activities and its outcomes. Specifically, DMA proposes two key

components: the feedback effects and the reciprocal causality (Wang & Tchernev, 2012). The feedback effects, or the self-sustaining property, accumulate a behavior, emotion, or perception's earlier responses and integrate them into the current state (Wang & Tchernev, 2012; Xu et al., 2019). Reciprocal causality refers to the mutual influence between a predictor and its outcome: the predictor influences and is also influenced by its outcome (Buzsáki, 2006). For example, Xu et al. (2019) conducted a two-week experience sampling study. They found that daily media multitasking choices led to a mix of positive and negative feelings at the moment, which in turn reduced subsequent media multitasking behavior. This dynamic reciprocity viewpoint also resonates with the reinforcing spirals model, which posits a dynamic transactional relationship between communication activity and its impacts (Slater, 2007).

The current study will test the reciprocal influences of social support and emotional discomfort, with a focus on specifying the complementarity between F2F and online communication channels. This study, based on DMA, conceptualizes the complementarity between F2F and online interaction as the dynamic switch from one channel to another to buffer the emotional discomfort experienced in one channel, especially during anxiety- or stress-provoking situations (Parks, 2017). For instance, if one experiences emotional distress from F2F social interactions, they then may switch to social activities in the online settings to acquire social support. Theories and empirical evidence have supported this argument that people switch from one communication channel to the alternative to regulate stress and anxiety (e.g., Parks, 2017) and manage their relationship (e.g., Caughlin & Sharabi, 2013). However, the complementarity between F2F and online interaction in previous literature has been estimated using cross-sectional data (Dutta-Bergman, 2004, 2006). This study uses experience sampling data to provide longitudinal evidence for making causal estimations and using statistical predictions to describe channel switching behaviors over time.

Evidence has shown that individuals who have experienced psychological problems in F2F communication may resort to online communication for social and psychological support (Bargh & McKenna, 2004), because online communication, compared to face-to-face communication, represents a form of low-risk (Campbell, Cumming, & Hughes, 2006) and low-cost social interaction (Walther, 1996). Online social interaction is low-risk thanks to affordances like anonymity, asynchronicity, and edibility. For example, anonymity allows individuals to express and experiment with their self-concepts that are suppressed or hidden in offline settings without immediate or substantial consequences (McKenna & Bargh, 1998). Asynchronicity provided by the online channel can save individuals' time and cognitive resources to obtain social support, which otherwise demands more effort and time to acquire in F2F settings (O'Sullivan & Carr, 2018). Edibility allows users to revise messages before sharing, and this provides greater control over conversations online (Fox & McEwan, 2017). Taken together, these online affordances facilitate the switch from F2F interactions to online communication.

Emotional discomfort toward the F2F interaction may drive the subsequent pursuit of emotional support rather than practical or informational support via the online channel because emotional support can directly improve emotions (Morelli et al., 2015). In contrast, practical support or informational support may not directly reduce emotional discomfort (Burke & Kraut, 2016). However, the pursuit of practical and informational support online can divert attention from emotional discomfort experienced offline, and thus can serve as an emotional release and/or as an escape (Kayany & Yelsma, 2000; Ruggiero, 2000). Therefore, emotional discomfort experienced at the earlier time point via the F2F channel may drive the pursuit of social support via an online channel at the subsequent time point. We propose:

H2: The F2F emotional discomfort should increase online emotional support (H2a), online practical support (H2b), and online informational support (H2c) at the subsequent time point.

On the other side of the coin, the interdependence of online and F2F

interaction also suggests the possibility of switching from online platforms to F2F settings for attaining social support. In all likelihood, it seems reasonable to switch to F2F channels for social support when the previous online interaction is emotionally unsatisfactory, and the F2F mode provides richer verbal and non-verbal information, immediate feedback, and greater accuracy in emotional expression. However, shifting to F2F social support requires greater investment in cognitive resources and time, and F2F social interactions may introduce more relational concerns and uncertainties (Ramirez & Zhang, 2007). Thus, the high-cost and high-risk nature of F2F interactions, compared with online social activities, may dampen the motivation to switch to F2F channels for social support. To the authors' knowledge, few studies have examined the shift from online to F2F social interactions in daily events, and extant research documenting channel shifting from online to F2F mainly focuses on the context of online dating or group collaboration (Ramirez, Sumner, Fleuriet, & Cole, 2015; Ramirez & Zhang, 2007). In the absence of scholarly evidence on whether emotional discomfort experienced online may or may not drive the subsequent pursuit of F2F social support, we propose the following:

RQ3: Would the online emotional discomfort increase the F2F emotional support (RQ3a), F2F practical support (RQ3b), and F2F informational support (RQ3c) at the subsequent time point?

Examining the above relationships at present is hard to imagine without considering the nationwide lockdown due to COVID-19. The pandemic has likely drastically changed the way individuals interact with others in both online and F2F contexts, which may have reconfigured their access to and attainment of social support and thus psychological well-being. Given the pandemic's unprecedented nature, we include the pandemic as a moderating variable when examining the above-mentioned dynamic relationships proposed in this study. Specifically, we ask whether the pandemic moderates the relationship between social support and emotional discomfort at the current time point, and whether the pandemic moderates the relationship between emotional discomfort toward one channel and the subsequent pursuit of social support in the alternative channel.

RQ4: How does the pandemic influence the dynamic relationships between social support and emotional discomfort in both online and F2F channels?

4. Method

4.1. Participants

A total of 72 college student participants were recruited at a university in the United States and completed the experience sampling study for monetary compensation. Among the 72 participants, eight dropped out of the study, and the remaining 64 participants completed the one-week experience sampling study. Among the 64 participants, the average age was 20.65 (SD = 3.44, mode = 19), 52 (81.3%) were identified as female, and the majority were Caucasian (57.8%), Hispanic (28.1%), or African American (9.4%), and the rest self-identified as multiple ethnicities (3.1%) or Asian (1.6%). In total, the 64 participants completed a total 2002 surveys regarding their daily F2F and online interactions over a one-week period. The final sample size is comparable with samples used in other reputable experience sampling studies (e.g., Gonzales, 2017; Rafaeli, Cranford, Green, Shrout, & Bolger, 2008; Wang & Tchernev, 2012). The study was approved by the Institutional Review Board at the first author's institution prior to the start of the data collection.

4.2. The experience sampling method

The experience sampling data collection was performed on March 4 - March 11 and April 1 - April 15 in the year 2020. WHO declared the COVID-19 pandemic on March 11, and the university of the participants declared campus closure and moved classes online on March 13.

Therefore, this study consists of data collected before the pandemic and during the pandemic. This data collection also avoided the extended Spring break from March 14 to 30 to mitigate variations in social activities between regular school days and vacation.

Participants were required to attend a 1-h training for this study: F2F training before the pandemic and online live video training during the pandemic. During the training, definitions of terms used in the questionnaire were explained, and real-life examples were given for illustration. Participants were asked to report their F2F and online social activities via their phone four times a day for one week. The four time-windows to submit the social activity reports are: morning reports to be completed between 10 a.m. to noon, afternoon reports to be completed between 2–4 p.m., evening reports to be completed between 6–8 p.m., and night reports to be submitted between 9 p.m.–1 a.m.

4.3. Measures

We included two control variables: trait introversion and household income, as introverts were found to have a more extensive online social network (e.g., Amichai-Hamburger & Vinitzky, 2010), and people of different socio-economic status may be impacted differently by the pandemic (Williams et al., 2020). At the endpoint sessions, participants completed a survey on their personality *introversion*, measured with items from the Big Five personality measure (Rammstedt & John, 2007), “I see myself as someone who is reserved” and “I see myself as someone who is outgoing, sociable (reversed coded)” on a five-point scale (1 = “Strongly disagree,” 5 = “Strongly agree”) ($M = 2.75, SD = 1.02; Alpha = .74$). *Income* was measured with one question asking participants to choose the option that best described their household income on a 12-point scale: (1) less than 10,000 to (12) 150,000 and more ($M = 7.56, SD = 3.90$).

With each experience sampling report, participants were asked to select as many social interactions they had completed during the past several hours. The definitions of social interaction and examples of social interactions were given to the participants during the 1-h training. The list of 14 activities was separated into two general categories: F2F

social activities and online social activities: F2F social activities were: F2F class, F2F hanging out, F2F chatting/talking, F2F working/volunteering, F2F public events, F2F group activities, and other F2F activities; and online social activities were: online class, phone/video chat, using social media, texting/emailing, using discussion website, watching videos on Youtube/TikTok, role-playing gaming. The most often selected activity category was social media (23.47%); followed by F2F chatting/talking (16.15%), F2F hanging out (13.82%), texting/emailing (11.52%), and watching videos (9.65%). *Duration* for each activity was measured (F2F: $M = 54.72\text{ m}, SD = 73.35$; Online: $M = 41.65\text{ m}, SD = 46.93$). Fig. 1 presents the differences in social activities reported before and during the pandemic.

Three dimensions of social support were used for measuring social support, and the questions were adapted from Williams’ (2006) study. Participants were asked, “during the [chosen social activity], the person/people you interacted with has/have provided you emotional support, such as companionship, comfort, intimacy, caring, empathy, or listening, etc.,” to measure emotional support (F2F: $M = 3.07, SD = 1.27$; Online: $M = 2.32, SD = 1.17$). Practical support was measured by “the person/people you interacted with has/have provided you practical support, meaning more tangible support, such as money, transportation, helped with housework, chores, shopping, etc.” (F2F: $M = 2.11, SD = 1.25$; Online: $M = 1.22, SD = 0.65$), and informational support was measured by “informational support, such as providing knowledge, advice, resources, etc.” (F2F: $M = 2.50, SD = 1.17$; Online: $M = 2.50, SD = 1.20$). Each question was measured using a five-point scale (1 = “None”, 5 = “A great deal”)

In the absence of past research on measuring *emotional discomfort* at the state level, we chose to capture different aspects of emotions for a composite measure of *emotional discomfort*. We adapted items from the Scale of Positive and Negative Experience (Diener et al., 2010) to measure state-level affect, asking participants “To what extent did [this activity] make you feel (1) relaxed (reversed), (2) happy (reversed), (3) excited (reversed) (4) tired, (5) bored, (6) stressed, (7) sad?” on a five-point scale (1 = “None”, 5 = “A great deal”). Then we averaged the scores to create a composite measure ($\alpha = .78$; F2F: $M = 2.05, SD = 0.68$;

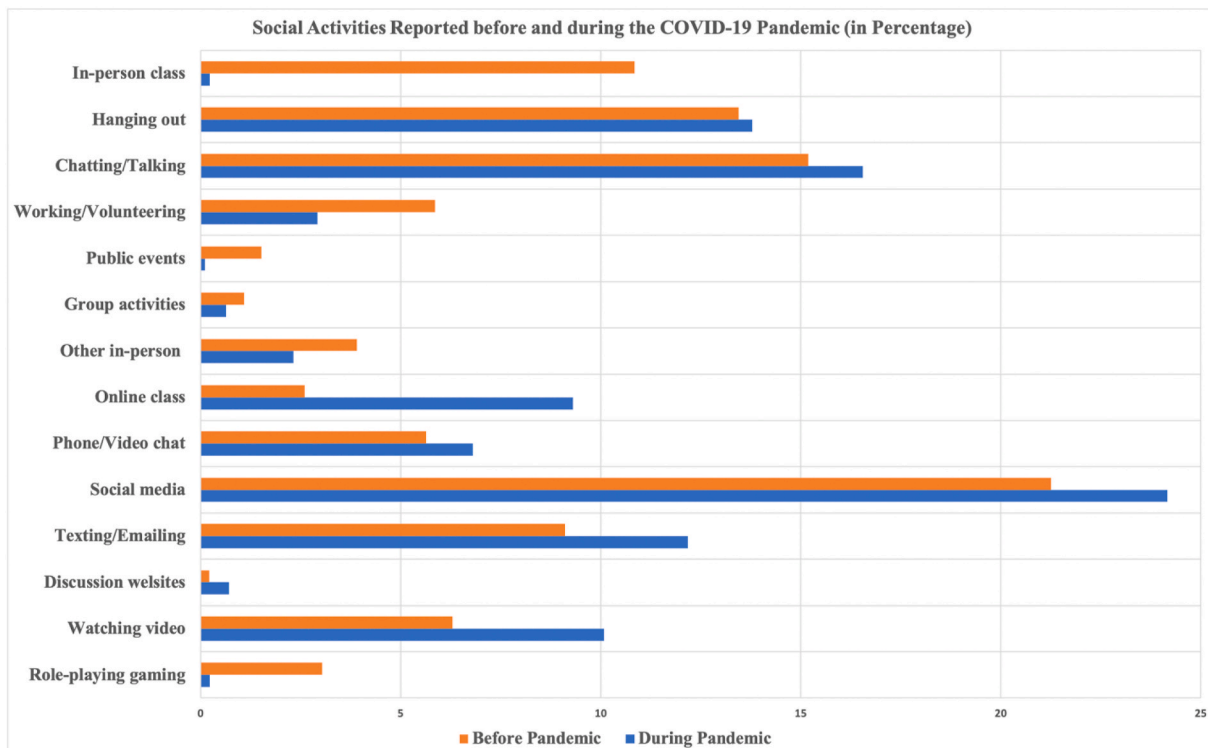


Fig. 1. Descriptive comparison of the percentage of social activities reported before and during the COVID-19 pandemic.

Online: $M = 2.08$, $SD = 0.68$). The larger value indicates higher negative emotions and lower positive emotions, thus greater emotional discomfort.

Pandemic refers to the timing of participants' reporting—whether it was before or during the COVID-19 pandemic: 0 = before the pandemic, 1 = during the pandemic. The participants had F2F classes on campus before the WHO declared the COVID-19 pandemic on March 11 in 2020 (WHO, 2020), and there were zero confirmed COVID cases in the state where the university locates. After March 11, the campus was closed, and the lockdown policy was enforced in the states they lived in. A total of 273 reports by nine participants were completed before the pandemic, and 1729 reports by 55 participants during the pandemic, thus the *pandemic* is a between-subject variable.

5. Analysis and results

5.1. Dynamic panel models

To test hypotheses and research questions, dynamic panel models were applied. Dynamic panel modeling estimates both within-individual dynamics over time and variations across individuals in the multi-level time series data, and also considers serial autocorrelation and heteroscedasticity in time series data (Baltagi, 2008). In addition, dynamic panel modeling includes the lagged dependent variables in the models, which is consistent with the feedback effects proposed by DMA, as DMA suggests that a variable's current state is contingent on and entangled with its past states (Wang & Tchernev, 2012). Further, the lagged terms included can allow for a more accurate estimation of the effect of predictor variables on the dependent variable (Bhargava & Sargan, 1983; Xu et al., 2019). Further, controlling for the lagged value of the outcome variable allows us to make causal inferences based on Granger causality (Granger, 1980, 2001), in that the value of predictor improves the prediction of the current value of the outcome variable in controlling for the effect of the past value of the outcome variable.

The models were fitted using the `xtabond2` command of Stata/SE 16.0 (Blundell & Bond, 1998). Model comparison and coefficient estimation are separately conducted for the competing models. Models were compared using Wald χ^2 (Engle, 1984), and the final selected models passed the Hansen's (1982) test of overidentifying restrictions.

5.2. The influence of social support on emotional discomfort

To test *H1a*, *RQ1a*, *RQ2a*, and *RQ4*, two competing models, Model 1 without an interaction effect of the pandemic and Model 2 with the interaction effect, were compared. Model coefficients and model fit statistics are summarized in Table 1. Model 2 performs significantly better than Model 1 according to Wald χ^2 , though the interaction effect was not significant (*RQ4*). Wald χ^2 values were used for model comparison and selection in dynamic panel models (Wang & Tchernev, 2012). Therefore, Model 2 is preferred over Model 1. To test *H1a*, the coefficients in Model 2 illustrated that when the F2F emotional support increased one unit on the five-point scale, the F2F emotional discomfort decreased 0.25 units on the five-point scale, as the coefficient for *F2F ES* $i_{i,t}$ was $-.25$. To test *RQ1a* on the association between F2F practical support and emotional discomfort, the coefficient for *F2F PS* $i_{i,t}$ did not reach the 0.05 statistical significant level ($\beta = .05$, $SE = .03$), and to test *RQ2a* regarding the association between F2F informational support and emotional discomfort, the coefficient for *F2F IS* $i_{i,t}$ did not reach the 0.05 statistical significant level ($\beta = .01$, $SE = .02$).

To test *H1b*, *RQ1b*, *RQ2b*, and *RQ4* in the context of online social activities, Two models, with and without the interaction effect, were compared in Table 2. Model 2 with the interaction effect performs better than Model 1 according to Wald χ^2 test, though the interaction effect of the pandemic was not significant (*RQ4*). To test *H1b*, the coefficients in Model 2 showed that when the online emotional support increased one unit on the five-point scale, the online emotional discomfort decreased

Table 1
Estimated coefficients of emotional discomfort in F2F social activities.

	F2F Emotional Discomfort $i_{i,t}$			
	Model 1		Model 2	
	Coef.	SE	Coef.	SE
Intercept	2.34***	.16	2.24***	.15
Emotional Discomfort $i_{i,t-1}$	.01	.03	.01	.03
Duration $i_{i,t}$	-.00001	.0004	-.0000	.0004
F2F ES $i_{i,t}$	-.29***	.03	-.25***	.03
F2F PS $i_{i,t}$	.05	.03	-.05	.13
F2F IS $i_{i,t}$	.01	.02	.04	.04
Introversion i_i	.03	.03	.03	.02
Income i_i	-.005	.006	-.004	.01
Pandemic i_i	.08	.09	.08	.10
F2F ES $i_{i,t}$ * Pandemic i_i	...	...	-.04	.04
F2F PS $i_{i,t}$ * Pandemic i_i	...	...	.11	.13
F2F IS $i_{i,t}$ * Pandemic i_i	...	...	-.04	.05
Wald χ^2 (df)	543.68 (8)		1092.69 (11) ^a	

Note: $i_{i,t}$ = for individual i at time point t . ES: Emotional Support; PS: Practical Support; IS: Informational Support;^aThe model is preferred. Selection is based upon the Wald χ^2 value difference between the two competing models. The difference is significant for the two models and, thus, the model with the higher Wald χ^2 value is preferred. *** $p < .001$. ** $p < .01$. * $p < .05$.

Table 2
Estimated coefficients of emotional discomfort in online social activities.

	Online Emotional Discomfort $i_{i,t}$			
	Model 1		Model 2	
	Coef.	SE	Coef.	SE
Intercept	2.29***	.21	2.36***	.17
Emotional Discomfort $i_{i,t-1}$	.02	.03	.02	.03
Duration $i_{i,t}$	.0004	.001	-.0004	.001
Online ES $i_{i,t}$	-.30***	.03	-.31***	.05
Online PS $i_{i,t}$	.02	.06	-.01	.11
Online IS $i_{i,t}$	.04	.03	.03	.09
Introversion i_i	.04	.04	.04	.04
Income i_i	-.01	.01	-.01	.01
Pandemic i_i	.10	.13	.01	.10
Online ES $i_{i,t}$ * Pandemic i_i	...	...	.01	.06
Online PS $i_{i,t}$ * Pandemic i_i	...	...	.06	.13
Online IS $i_{i,t}$ * Pandemic i_i	...	...	.01	.09
Wald χ^2 (df)	280.35 (8)		442.10 (9) ^a	

Note: ^aThe model is preferred. The difference is significant for the two models and, thus, the model with the higher Wald χ^2 value is preferred. *** $p < .001$. ** $p < .01$. * $p < .05$.

0.31 units on the five-point scale, as the coefficient for *Online ES* $i_{i,t}$ was $-.31$ in Model 2, Table 2. To test *RQ1b*, the coefficient for *Online PS* $i_{i,t}$ did not reach the 0.05 statistical significant level ($\beta = -.01$, $SE = .11$). To test *RQ2b*, the coefficient for *Online IS* $i_{i,t}$ did not reach the 0.05 statistical significant level ($\beta = .03$, $SE = .09$). Thus online practical support and information support did not have a significant influence on online emotional discomfort.

5.3. The influence of emotional discomfort on the subsequent social support

To test *RQ3a*, *RQ4* of predicting the F2F emotional support, Model 1 and Model 2 were compared on the left size in Table 3. Model 1 without the interaction effect performs better than Model 2 according to Wald χ^2 test, as the increase of Wald χ^2 model fit does not exceed 3.841 ($df = 1$) at the 0.05 threshold, and the interaction effect of the pandemic was not significant (*RQ4*). To test *H2a*, the coefficient for *Online ED* $i_{i,t-1}$ in Model 1 did not reach the statistical significant level ($\beta = .14$, $SE = .11$), indicating that online emotional discomfort did not significant predict the subsequent pursuit of emotional support in the F2F channel.

To test *RQ3b* and *RQ4* of predicting the F2F practical support, Model

Table 3
Estimated coefficients of social support in F2F social activities.

	F2F Emotional Support i_t				F2F Practical Support i_t				F2F Informational Support i_t			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Intercept	2.69***	.67	2.72***	.80	.95*	.45	1.42**	.49	1.47**	.51	2.14***	.58
F2F Social Support i_{t-1}	-.15	.08	-.15	.08	.01	.05	.02	.05	-.02	.06	-.02	.06
F2F ED i_{t-1}	-.80***	.21	-.80***	.20	-.17	.10	-.16	.10	-.27*	.12	-.26*	.12
Online ED i_{t-1}	.14	.11	-.11	.19	.11	.08	-.13	.12	.12	.09	-.15	.12
Introversion i_t	-.03	.10	-.03	.10	-.01	.08	-.02	.08	.02	.09	.01	.09
Income i_t	.11***	.02	.11***	.02	.04*	.02	.04**	.02	.06**	.02	.06**	.02
Pandemic	-.25	.25	-.30	.56	-.10	.25	-.69	.37	-.52*	.26	-.121*	.40
Online ED i_{t-1} * Pandemic i_t	...	...	.03	.22	...	...	.28	.15	...	...	.34*	.15
Wald $\chi^2(df)$	92.06(6) ^a				25.68 (6) ^a				29.10 (6)			
	93.81 (7)				26.79 (7)				35.60 (7) a			

Note: i, t = for individual i at time point t . ED: Emotional Discomfort. F2F Social support refers to each type of social support in its own model, for example, in the F2F Emotional Support model, F2F Social Support i_{t-1} refers to F2F emotional support i_{t-1} . *** $p < .001$. ** $p < .01$. * $p < .05$.

1 and Model 2 were compared in the middle of Table 3. Model 1 without the interaction effect performs better than Model 2 according to Wald χ^2 test, and the interaction effect of the pandemic was not significant (RQ4). To test RQ3b, the coefficient for Online ED i_{t-1} in Model 1 did not reach the statistically significant level ($\beta = .11, SE = .08$), indicating that online emotional discomfort did not significantly predict the subsequent pursuit of practical support in the F2F channel.

To test RQ3c and RQ4 of predicting the F2F informational support, Model 1 and Model 2 were compared on the right side of Table 3. Model 2 performs better than Model 1 according to Wald χ^2 test, as the increase of Wald χ^2 exceeds 3.841 ($df = 1$) at the 0.05 threshold, and the interaction effect between online emotional discomfort at the previous time point and the pandemic was significant (RQ3). Thus, online emotional discomfort did not have a significant main effect on the subsequent pursuit of informational support in the F2F channel, but its interaction effect with the pandemic was significant. Specifically, according to the interaction plot in Fig. 2, before the pandemic, when people experienced higher online emotional discomfort at the previous time point, they were

less likely to seek F2F informational. However, the opposite pattern was observed during the pandemic: when people experienced a higher level of emotional discomfort from online social activities, they were more likely to seek informational support from F2F social activities.

To test H2a and RQ4 in predicting online emotional support, Model 1 and Model 2 were compared on the left side of Table 4. Model 1 (without the interaction term) performs better than Model 2 according to Wald χ^2 test, and the interaction effect of the pandemic was not significant (RQ4). To test H2a, the coefficients in Model 1 showed that when the F2F emotional discomfort increased one unit on the five-point scale, the online emotional support increased 0.09 units on the five-point scale, as the coefficient for F2F ED i_{t-1} was 0.09 in Model 1, Table 4.

To test H2b and RQ4 in predicting the online practical support, two competing models were compared in the middle of Table 4. Model 1 (without the interaction term) performs better than Model 2 according to Wald χ^2 test, and the interaction effect between the F2F emotional discomfort and the pandemic was not significant (RQ4). To test H2a, the coefficients in Model 1 showed that when the F2F emotional discomfort

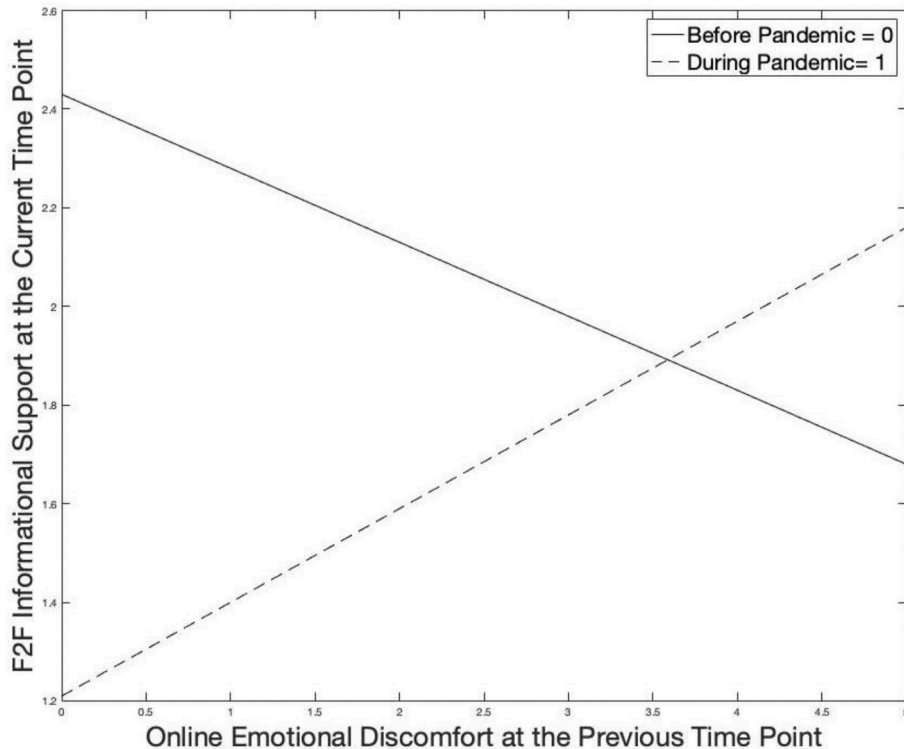


Fig. 2. The significant interaction effect between online emotional discomfort at the previous time point and pandemic on F2F informational support at the current time point.

Table 4
Estimated coefficients of social support in online social activities.

	Online Emotional Support i,t				Online Practical Support i,t				Online Informational Support i,t			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Intercept	.65*	.25	1.99***	.49	.69**	.24	.86**	.26	.48	.5	.62	.55
Online Social Support $i,t-1$	.05	.05	-.09	.05	.05	.04	.05	.04	-.005	.06	-.004	.06
Online ED $i,t-1$	-.01	.10	-.43**	.15	-.03	.06	-.03	.05	-.09	.15	-.08	.15
F2F ED $i,t-1$	.09*	.04	.10	.10	.09**	.03	.01	.04	.34**	.10	.27*	.12
Introversion i_t	.02	.04	-.005	.10	.02	.04	.02	.04	.14	.10	.14	.10
Income i	-.02	.01	.02	.03	-.02	.01	-.02	.01	-.02	.02	-.02	.02
Pandemic i	.06	.11	-.15	.34	.07	.11	-.12	.17	.64**	.22	.46	.36
F2F ED $i,t-1$ * Pandemic i	...	...	.19	.15	...	...	.09	.06	...	...	.09	.16
Wald $\chi^2(df)$	18.90 (6) ^a		19.87 (7)		19.00 (6) ^a		18.89 (7)		35.31 (6) ^a		38.83 (7)	

Note:

^a The models are preferred. The differences are not significant for the two models and, thus, the simpler models are preferred.

increased one unit on the five-point scale, the online practical support increased 0.09 units on the five-point scale, as the coefficient for F2F ED $i,t-1$ was 0.09 in Model 1, Table 4.

To test H2c and RQ4 in predicting online informational support, two competing models were compared on the right side of Table 4. Model 1 (without the interaction term) performs better than Model 2 according to Wald χ^2 test, and the interaction effect between the F2F emotional discomfort and the pandemic was not significant (RQ4). To test H2c, the coefficients in Model 1 showed that when the F2F emotional discomfort increased one unit on the five-point scale, online informational support increased 0.34 units on the five-point scale, as the coefficient for F2F ED $i,t-1$ was 0.34 in Model 1, Table 4.

6. Discussion

6.1. Theoretical and methodological contribution

This study examines the dynamics of social support and emotional discomfort before and during the COVID pandemic. It has identified the reciprocal causality over time between social support and emotional discomfort in F2F and online channels. Based on the reciprocal causality proposed by DMA, our results illustrate the role of emotional support in buffering emotional discomfort toward F2F and online social interactions in daily life. Then, emotional discomfort toward F2F interactions drives the subsequent pursuit of emotional, practical, and informational support on online channels at the subsequent time point, and the pandemic did not change the pattern of this relationship. However, the emotional discomfort toward online interactions does not predict the subsequent pursuit of social support via F2F communication. This can be explained with the theoretical predictions from the affordance literature (e.g., O’Sullivan & Carr, 2018; Walther, 1996). Specifically, online communication, compared with F2F communication, represents a form of low-risk and low-cost social interaction, and thus individuals are likely to switch to online channels when experiencing emotional discomfort toward F2F interactions. Pursuing social support via F2F interactions, however, is a more resource- and time-demanding endeavor, and thus dampens the motivation to switch from online to F2F channels to offset emotional discomfort.

Results from this study thus expand our understanding of the societal mechanisms of how societal crises impact the public through shaping their F2F and online communicative activities and psychological well-being (e.g., Dutta-Bergman, 2006). In this case, the COVID-19 pandemic. Results have shown the pandemic’s effects on the relationship between emotional discomfort and informational support in F2F and online settings. Specifically, the pandemic, along with the stay-at-home policy decreases the level of informational support gained on F2F channels (Table 3) and increases the level of informational support gained via online channels (Table 4). This is expected that because during the pandemic, most F2F social interactions are

restrained to be with strong ties, i.e., people within the same household, who are less likely to provide a diverse source of information and knowledge (Williams, 2006). As classes, work, meetings and conferences are moved online during the pandemic, and online interactions thus replace some of the F2F interactions with weak ties for more informational support.

In addition, emotional discomfort driving the switch from online to F2F channels for informational support is not likely, except during the pandemic. The significant moderating effect of the pandemic suggests that, before the pandemic, individuals are less likely to switch to F2F communication for informational support after experiencing emotional discomfort online. In contrast, during the pandemic, they are more likely to obtain information and knowledge via F2F communication after experiencing stronger emotional discomfort online. The results are especially of theoretical and practical relevance, considering the significant interaction effect of the pandemic on subsequent F2F informational support and the insignificant interaction effect on subsequent F2F emotional support. Emotional support is more powerful than informational support to buffer emotional discomfort. However, when young people experience emotional discomfort toward their online interactions during the pandemic, they turned to F2F communication for more informational support, not emotional support. This suggests a mismatch between individuals’ behavioral choices and their real needs (Sheldon, 2011), meaning that they seek information online to “escape” from but not necessarily to resolve stress or frustration (Vorderer, Klimmt, & Ritterfeld, 2004). The long-term effects of such a mismatch on psychological well-being are worth investigating in future research. For example, if people constantly cope with the dissatisfaction with emotional support by investing in informational support and practical support, how does this mismatch influence their life satisfaction and other well-being indicators in the long-run?

In terms of methodology, the experience sampling method in this study provides a momentary ecological assessment of what people think and feel, and how they obtain social support via F2F and online channels in daily life, which reduces memory bias and permits greater generalizability of the findings (Scollon, Prieto, & Diener, 2009). Moreover, the innovative panel analytic tool tests the dynamic relationships between social support and well-being to transform current research focusing on linear relationships by extending it to investigating the dynamic reciprocity between social support, media use, and psychological well-being. Taken together, this article is among the first to provide longitudinal, empirical evidence for the reciprocal causality between social support and emotional discomfort and the dynamic switch between F2F and online channels.

6.2. Practical implications

Findings from this study further illuminate the nature of different types of social support and suggest targets for interventions at the

individual, community, and policy levels to mitigate the negative impacts of the pandemic on people's mental health. This study shows that F2F and online emotional support, not practical or informational support, is associated with decreasing emotional discomfort. This finding is consistent with previous research that emotional support is more potent in improving affective well-being, compared with the other types of support (Morelli et al., 2015). Therefore, for individuals, providing emotional support to each other, such as showing kindness to neighbors, texting caring messages to friends, and using encouraging words during phone calls, is essential to offset the emotional discomfort amid a personal or societal crisis. At the community level, offering emotional support is as essential as providing health information and practical help for building healthy communities. Schools and communities can offer telephones, websites, or other online platforms to provide emotional support and connectivity for people at risk of mental health problems. At the federal, state, and local levels, modifying insurance law to expand insurances' coverage on telemental health issues, and using emergency order to reduce the barrier to telehealth treatment of psychological well-being problems would help address the mental health needs during the pandemic.

6.3. Limitations, future directions, and conclusion

The study has some limitations. First, online communication is a general term in the study, and a more detailed description of the interdependence of multiple channels and multiple media platforms would be useful for providing more nuanced theorizing. For example, it is likely that not every medium, such as text, email, social media, or video, is used in the same way for obtaining the same type of social support. Future research should investigate how different media platforms or media affordances may provide different types of social support, and which platform may be more effective than others in providing emotional support during the pandemic.

Second, the young college student sample used in the current study limits the generalizability of the findings. For example, results from the current study show that, among college students, social isolation during the pandemic does not lead to a higher level of F2F or online emotional discomfort or change the associations between social support and emotional discomfort on F2F and online channels. However, the psychosocial effect of the pandemic may not be the same for other vulnerable social groups, such as people who have contracted the disease, those at heightened risk for COVID-19, including the elderly and people with compromised immune function and preexisting conditions (Heidinger & Richter, 2020), and health care workers who are vulnerable to emotional distress during the pandemic (Spoorthy, Pratapa, & Mahant, 2020). Future research should identify the different social support patterns and emotional well-being among different social groups.

Lastly, the three types of social support were measured with single items, though single item questions were commonly used in experience sampling studies to consider the time-consuming assessment procedure caused by the frequent measurements (Siewert, Antoniw, Kubiak, & Weber, 2011). Future studies should use multiple items to establish the reliability of the scales.

Despite the limitations, the study presents the first longitudinal investigation of reciprocal effects in terms of social support and affective well-being. Results provide compelling evidence that it is not merely the case that people are acquiring social support both in person and via various media technologies for improving affective well-being. Additionally, emotional discomfort experienced in one channel drives people to switch to the alternative channel to pursue social support. The switch of multiple communication channels illustrated by the dynamic modeling here provides a useful way of conceptualizing the channel complementarity in the media-saturated environment. We believe that future research will benefit from further exploring the reciprocal effects of social interactions and well-being, as well as channel

complementarity, by using a longitudinal study design. Our findings provide valuable insights for practices and interventions to reduce the negative impacts of a public health crisis like the pandemic on mental health and improve psychological well-being under similar situations.

Credit author statement

Shan Xu: Conceptualization, Methodology, Data Collection, Formal analysis, Writing, Writing – original draft, Wenbo Li: Conceptualization, Reviewing and Editing, Weiwu Zhang: Reviewing and Editing, Janice Cho: Data Collection and Editing

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