Family e-chat group use was associated with family well-being and personal happiness in Hong Kong adults amidst the COVID-19 pandemic: a population-based cross-sectional study

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Abstract

Background: Family e-chat groups are commonly used, but little is known about its associations with family and individual well-being amidst the COVID-19 pandemic.

Objective: Under the Hong Kong Jockey Club SMART Family-Link project, we examined the associations of family e-chat group use amidst the COVID-19 pandemic with family well-being and personal happiness, and the mediating effects of family communication quality on these associations.

Methods: A territory-wide self-administered online survey was conducted in May 2020 on Chinese adults in Hong Kong. Respondents reported the number of family e-chat groups (0, 1, 2, ?3), the instant messaging (IM) functions used (receiving/sending text messages, photos/pictures, short videos, voice messages, making voice calls and video calls), and the average numbers of IM messages sent and received daily (<1, 1-2, 3-10, 11-20, >20) in family e-chat groups. Prevalence was weighted by sex, age, and education of the general population. Adjusted prevalence ratios (aPRs) for IM function use by demographics were calculated. Adjusted ? for family well-being (health, harmony, and happiness), and personal happiness (all scale 0-10, higher scores indicate better outcomes) by number of family e-chat groups and IM function use were calculated, and the mediation effect of family communication quality on these associations examined.

Results: Of 4890 respondents, 4046 (82.7%) had ?1 family e-chat group. Sending/receiving text messages was most commonly used (weighted prevalence: 78.4%), followed by receiving/sending photos/pictures (76.5%), making voice calls (46.2%), receiving/sending short videos (37.2%) and voice messages (13.8%), and making video calls (8.2%). Women and older age were associated with having more groups (aPRs: 1.04-1.22, all P?.03) and non-text function use (aPRs: 1.10-3.10, P?.02).
Better family well-being was associated with having more groups (?: 0.23-0.77), receiving/sending photos/pictures (?: 0.33), voice calls (?: 0.18), video calls (?: 0.45), more IM functions used (?: 0.43-0.51), and more IM messages received/sent daily (?: 0.38-0.54) (all P?.01). Higher personal happiness was associated with having more groups (?: 0.30-0.72), receiving/sending photos/pictures (?: 0.30), video calls (?: 0.32), more IM functions use (?: 0.36-0.42) and more IM messages received/sent daily (?: 0.42-0.67) (all P?.01).
Family communication quality mediated the associations of more groups and more IM functions used with family well-being (mediated proportions: 75.5% and 69.5%, respectively) and personal happiness (mediated proportions: 66.4% and 46.2%, respectively).

Conclusions: This is the first study showing that, amidst the COVID-19 pandemic, having more family e-chat groups and using more IM functions including sending/receiving photos/pictures and making video calls in family e-chat groups, were associated with better family well-being and personal happiness, and about half to three-quarters of these associations were mediated by family communication quality. Prospective studies are needed to confirm the associations. People without or with low use of family e-chat groups would need more attention and assistance.

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BYMW, MPW, SYH, AYKL, and THL conceived the study. WJG analyzed the data and wrote the first draft. WJG, MPW, ZSZ, and THL interpreted the results. All authors critically revised and approved the final manuscript.

Abstract

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Family communication quality mediated the associations of more groups and more IM functions used with family well-being (mediated proportions: 75.5% and 69.5%, respectively) and personal happiness (mediated proportions: 66.4% and 46.2%, respectively).

Conclusions: This is the first study showing that, amidst the COVID-19 pandemic, having more family e-chat groups and using more IM functions including sending/receiving photos/pictures and making video calls in family e-chat groups, were associated with better family well-being and personal happiness, and about half to three-quarters of these associations were mediated by family communication quality. Prospective studies are needed to confirm the associations. People without or with low use of family e-chat groups would need more attention and assistance.

(Word count: 450/450)

Keywords

Information and communication technology; instant messaging; family e-chat group; family communication; family well-being; personal happiness

Introduction

Family is rated the most important among six aspects of life, surpassing friends, leisure time, politics, work, and religion [1]. Family well-being, usually conceptualized as family functioning, family life satisfaction, or family quality of life [2, 3], not only enhances the physical and mental health of individuals across the lifespan but also fosters stable and cohesive societies [4]. We found that, in Hong Kong Chinese, family health, harmony, and happiness (3Hs) are crucial for good family well-being [5]. Family well-being is affected by external and internal factors irrespective of the cultural context. External factors include the availability of social and community resources, such as income, social networks, and medical services, which build the material and social foundation of family life [6]. Internally, family communication is central to sustaining family relationship and family well-being regardless of family structure [7]. Quality family communication through verbal and nonverbal interactions enables members to share attitudes and beliefs, be related, act with cohesion and flexibility, achieve satisfaction and share information inside and outside the family boundaries [7].

We had reported that face-to-face and phone calls are dominant ways of family communication, while information communication technologies (ICTs), such as instant messaging (IM) messages, video calls, and voice messages [8], are increasingly popular in Hong Kong, the most westernized city of China. ICT applications allow family members to connect and share information in real-time [9-11]. We reported that better family well-being was associated with more communication using IM messages and video calls [12, 13], but not with social media and email communication [8]. E-chat groups in IM applications, such as WhatsApp or WeChat, allow 3 or more users to share texts, images, short videos and even make video calls at low or no costs. The use of e-chat groups facilitates the rapid exchange of information among multiple users and has becoming increasingly popular among family members.

The coronavirus disease 2019 (COVID-19) pandemic poses a grave threat to individuals and families. Individual mental health and family well-being are affected by the interruption of daily routines, financial insecurity, lockdown, physical distancing, and social disruptions [14, 15]. Over 75.0% Chinese reported concerns about family members' health during the initial outbreak in China [16]. A subsequent report in Canada also showed that 32.0% of respondents were very or extremely concerned about family stress from confinement [17]. In Hong Kong, we found that 33.3% respondents reported increased family negative emotion, 18.9% reported decreased family happiness [18], and the prevalence of individual unhappiness doubled that in 2016 and 2017 [19]. Using ICTs to communicate with family members may be a way to improve family well-being and individual happiness in response to the COVID-19 pandemic.

In Hong Kong, 98.4% Internet users took online social activities as a major purpose for getting online in 2018 [20] and the smartphone penetration rate increased to 91.5% in 2019 [21]. We searched PubMed and Web of Science using keywords of "2019 nCoV", "Covid-19", "SARS-CoV-2", "instant messages", "e-chat group", "family", and "happiness" up to 25 January 2021 and found no survey reports on how people make use of family e-chat groups and its association with family well-being and personal happiness amidst the COVID-19 pandemic. Only one of our previous study reported that, in 2017, 73.3% of Hong Kong adults had family e-chat groups, and both receiving and sending more IM messages in family e-chat groups were associated with higher family well-being [13]. The present study examined the use of family e-chat groups,

especially different IM functions, amidst the COVID-19 pandemic and examined its associations with family well-being and personal happiness, and the mediating effects of family communication on these associations.

Methods

Study Design and Participants

Under the Hong Kong Jockey Club SMART Family-Link Project, the online Family amidst COVID-19 (FamCov) survey was rapidly conducted to include as large a sample as possible within 6 days and budget constraint during 26-31 May 2020, the easing period after the second COVID-19 wave. Details of the methods have been reported elsewhere [18]. In brief, a well-known survey agency, namely Hong Kong Public Opinion Research Institute, sent email invitations to its probability- and non-probability-based online panels of Hong Kong residents aged 18 years or above to complete an online anonymous self-administrated questionnaire [22]. 20,103 invitation emails were opened and 4944 respondents completed the survey (24.5% response rate). After excluding respondents having no family members (n=30) and those having over 30% missing values (n=24), 4890 respondents (98.9%) were included in the present study. Ethics approval has been granted by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (Reference number: UW 20-238).

Measurement

Exposure Measures

Definitions of family (“family members who are related through biological, marital, cohabitation, and/or emotional bonding”), and IM e-chat group (“a group of 3 or more people in IM communication applications such as WhatsApp or WeChat, etc.”) were provided before the questions. The use of family e-chat groups was asked by the question “Do you have family e-chat groups?” with responses of “Yes” and “No”. Those who selected “Yes” were asked further details when the COVID-19 outbreak was severe: (1) the number of family e-chat groups they had; (2) the IM functions they usually used in family e-chat groups with responses of “Receive/Send text messages”, “Receive/Send photos/pictures”, “Receive/Send short videos”, “Voice messages”, “Video chat”, and “Real-time conversation”; and (3) the average numbers of IM messages received and sent daily in family e-chat groups separately with responses categorized into “<1 message”, “1-2 messages”, “3-10 messages”, “11-20 messages”, and “over 20 messages”.

Outcome Measures

The Family Well-being Scale was developed and validated in our previous studies under the FAMILY project [5, 23]. It consists of three separate items of family health, harmony, and happiness (3Hs), each measured on an 11-point scale ranging from 0 to 10. A composite score of family well-being (range 0-10) was calculated as the total score of family 3Hs divided by 3, with higher scores indicating better family well-being. Family communication quality was assessed using a single item of “How do you find the quality of communication between you and your family members?” on an 11-point scale (0=very poor, 10=very good), which has been used in our previous study [24]. Personal happiness was assessed using a single item of “How happy do you think you are?” on an 11-point scale (0=very unhappy, 10=very happy), which was found to be reliable and valid in surveys [25].

Covariates

Face-to-face communication was examined by "How many days did you have face-to-face communication with family members on average per week when COVID-19 outbreak was severe?", with responses ranging from 0 to 7 days. Information of demographic and socioeconomic characteristics was also collected, including sex, age group (18-24 years, 25-34 years, 45-64 years and 65 years or above), education (primary or below, secondary, post-secondary, and college degree or above), monthly household income (no income, less than HK$4000, HK$4000-9999, HK$10,000-19,999, HK$20,000-29,999, HK$30,000-39,999, and HK$40,000 or higher) (US$1=HK$7.8), household size (number of people living together, including the respondent), and housing type (rented and owned).

Statistical Analysis

Monthly household income was dichotomized into lower and higher according to the household size and the median household income from the 2019 census data in Hong Kong [26]. Socioeconomic status was a composite score of education (0=secondary or below, 1=tertiary), income (0=lower, 1=higher), and housing (0=rented, 1=owned), and analyzed as low (0-1), medium (2) and high (3) [18].

Data were weighted by sex, age and education attainment according to the 2019 Hong Kong census data [27, 28]. Chi-square test was used to compare the characteristics of people with and without family e-chat groups. Poisson regression models with robust variance estimators yielded adjusted prevalence ratio (aPR) and 95% confidence intervals (CIs) for different IM functions used in family e-chat groups in relation to sex, age group, socioeconomic status, and number of days having face-to-face communication with family /week [29], with mutual adjustments of different functions, since some respondents used several functions. Regression coefficient (β) and 95% CI were calculated using multivariable linear regressions to examine the associations of family e-chat group use with family communication, family well-being and personal happiness, adjusted for sex, age, socioeconomic status, and number of days having face-to-face communication with family /week. Sobel-Goodman mediation test was used to examine the mediating (indirect) effect of family communication in the associations of family e-chat group use with family well-being and personal happiness. Bias-corrected bootstrapping with 1,000 replications was used to calculate the 95% CIs of indirect and direct effects, adjusted for sex, age, socioeconomic status, and number of days having face-to-face communication with family / week. All analyses were conducted using STATA version 15.0 (StataCorp LP, College Station, TX, USA). A 2-sided P <.05 was considered statistically significant.

Results

Table 1 shows that, after weighting, 52.9% of respondents were female, 37.7% aged 45-64 years and 21.3% aged ≥65 years, 65.7% had secondary or below education, 52.6% had lower monthly household income, 63.4% lived in owned housing, and 33.3% and 14.4% had medium and high socioeconomic status, respectively. For respondents having family e-chat groups, 55.9% were female, 38.5% aged 45-64 years and 22.1% aged ≥65 years, 66.1% had secondary or below education, 52.1% had lower monthly household income, 65.4% lived in owned housing, and 33.8% and 14.5% had medium and high socioeconomic status, respectively.

Table 1. Prevalence of having family e-chat groups by sociodemographic characteristics of

respondents

Demographics	Total, n (%) (n=4890)		Effect size[c]	Having family e-chat groups, n (%) (n=4046)		Effect size[c]
	Unweighted[a]	Weighted[b]		Unweighted[a]	Weighted[b]	
Sex			0.03			0.02
Male	2138 (43.7)	2295 (47.1)		1721 (42.5)	1806 (44.2)	
Female	2752 (56.3)	2583 (52.9)		2325 (57.5)	2285 (55.9)	
Age group (years)			0.29			0.29
18-24	219 (4.5)	416 (8.5)		158 (3.9)	302 (7.4)	
25-44	2449 (50.1)	1581 (32.4)		1990 (49.2)	1307 (32.0)	
45-64	2013 (41.2)	1839 (37.7)		1714 (42.4)	1577 (38.5)	
≥65	210 (4.3)	1041 (21.3)		184 (4.6)	905 (22.1)	
Education			0.53			0.47
Secondary or below	659 (13.6)	3183 (65.7)		561 (14.0)	2688 (66.1)	
Tertiary	4199 (86.4)	1662 (34.3)		3457 (86.0)	1376 (33.9)	
Monthly household income			0.23			0.24
Lower	1270 (29.8)	2201 (52.6)		1014 (28.7)	1832 (52.1)	
Higher	2986 (70.2)	1986 (47.4)		2524 (71.3)	1685 (47.9)	
Housing type			0.14			0.02
Rented	1603 (33.9)	1744 (36.6)		1265 (32.3)	1388 (34.6)	
Owned	3120 (66.1)	3025 (63.4)		2653 (67.7)	2628 (65.4)	
Socioeconomic status[d]			0.40			0.41
Low	790 (18.9)	2160 (52.3)		636 (18.3)	1802 (51.7)	
Medium	1497 (35.8)	1375 (33.3)		1215 (34.9)	1177 (33.8)	
High	1891 (45.3)	595 (14.4)		1632 (46.9)	505 (14.5)	

[a]Respondents with missing data were excluded.

[b]Weighted by sex, age, and education of the 2019 Hong Kong census data.

[c]Cramer's V: 0.10-0.30, small; 0.30-0.50, medium; ≥0.50, large.

[d]Socioeconomic status: a composite score of education (0=secondary or below, 1=tertiary), income (0= lower, 1=higher), and housing (0=rented, 1=owned), analyzed as low (0-1), medium (2) and high (3).

Table 2 shows that, after weighting, 16.1% of respondents had no family e-chat group, and 34.4% had three or more groups. The most common function used in family e-chat group was receiving/sending text messages (78.4%), followed by receiving/sending photos/pictures (76.5%), making voice calls (46.2%), receiving/sending short videos (37.2%) and voice messages (13.8%), and making video calls (8.2%). 48.3% of respondents used three or more functions in family e-chat groups, and 93.0% and 89.6% received and sent at least one IM daily, respectively.

Table 2. Number of family e-chat groups (n=4890) and use (n=4046) when COVID-19 outbreak was severe, n (%)

Use of family e-chat groups	Unweighted prevalence[a] n (%)	Weighted prevalence[b] n (%)	Effect size[c]
Number of family e-chat groups			0.02
0	844 (17.3)	786 (16.1)	
1	1162 (23.8)	1112 (22.8)	
2	1287 (26.3)	1301 (26.7)	
≥3	1597 (32.7)	1678 (34.4)	
Receiving/sending text messages			0.02
Yes	3224 (82.3)	3110 (78.4)	
No	693 (17.7)	855 (21.6)	
Receiving/sending photos/ pictures			<0.001
Yes	3054 (78.0)	3032 (76.5)	
No	863 (22.0)	934 (23.5)	
Making voice calls			0.08
Yes	1520 (38.8)	1833 (46.2)	
No	2397 (61.2)	2133 (53.8)	
Receiving/sending short videos			0.02
Yes	1391 (35.5)	1474 (37.2)	
No	2526 (64.5)	2491 (62.8)	
Receiving/sending voice messages			0.001
Yes	541 (13.8)	549 (13.8)	
No	3376 (86.2)	3417 (86.2)	
Making video calls			0.008
Yes	346 (8.8)	324 (8.2)	
No	3571 (91.2)	3641 (91.8)	
Number of IM functions used[f]			0.03
0-1	908 (22.5)	933 (22.8)	
2	1255 (31.0)	1178 (28.8)	
≥3	1880 (46.5)	1975 (48.3)	
Number of IM messages received daily[d]			0.05
<1	273 (7.0)	275 (7.0)	
1-2	963 (24.8)	1007 (25.6)	
3-10	1826 (47.0)	1818 (46.2)	
11-20	481 (12.4)	500 (12.7)	
>20	345 (8.9)	339 (8.6)	
Number of IM messages sent daily[d]			0.04
<1	424 (11.3)	398 (10.4)	
1-2	1313 (35.1)	1331 (34.7)	
3-10	1552 (41.5)	1611 (42.0)	
11-20	276 (7.4)	259 (6.8)	
>20	174 (4.7)	239 (6.2)	

[a]Respondents with missing data were excluded.

[b]Weighted by sex, age, and education of the 2019 Hong Kong census data.
[c]Cramer's V: 0.10-0.30, small; 0.30-0.50, medium; ≥0.50, large.
[d]IM: instant messaging.

Table 3 shows that more female and older respondents used three or more IM functions in family e-chat groups (aPR 1.04 to 1.22, all *P* ≤.001). More women reported making voice calls (aPR 1.11, 95% CI 1.02-1.21, *P* =.02), receiving/sending short videos (aPR 1.10, 95% CIs 1.00-1.20, *P* =.047), receiving/sending voice messages (aPR 1.27, 95% CIs 1.07-1.52, *P* =.007), and making video calls (aPR 1.31, 95% CIs 1.05-1.65, *P* =0.02). Older respondents, especially those aged ≥65 years, used more non-text functions, including receiving/sending photos/pictures, voice calls, receiving/sending short videos and video calls (aPR 1.17 to 3.10, all *P* for trend ≤.03). Fewer female and respondents aged ≥65 years reported receiving/sending text messages (aPR 0.97 and 0.86, respectively, both *P* ≤.02). More respondents having higher socioeconomic status received /sent text messages (aPR: medium 1.06 and high 1.08) and fewer received/sent voice messages (aPR: medium 0.78 and high 0.72) (both *P* for trend ≤.004).

Table 3. Associations of sociodemographic characteristics with number of IM functions and their use in family e-chat groups (n=4046), aPR (95% CI)[a]

Characteristics	Using ≥3 IM functions[b]	Receiving/ sending text messages	Receiving/ sending photos/pictures	Making voice calls	Receiving/ sending short videos	Receiving/ sending voice messages	Making video calls
Sex							
Male	1	1	1	1	1	1	1
Female	1.04 (1.01, 1.06)[e]	0.97 (0.94, 1.00)[d]	1.04 (1.00, 1.07)	1.11 (1.02, 1.21)[d]	1.10 (1.00, 1.20)[d]	1.27 (1.07, 1.52)[e]	1.31 (1.05, 1.65)[d]
Age group (year)							
18-24	1	1	1	1	1	1	1
25-44	1.07 (1.00, 1.14)	0.97 (0.90, 1.05)	1.11 (0.98, 1.26)	1.17 (0.87, 1.57)	1.62 (1.07, 2.46)[d]	1.31 (0.79, 2.16)	2.22 (0.93, 5.32)
45-64	1.18 (1.10, 1.26)[f]	0.93 (0.86, 1.00)	1.17 (1.03, 1.33)[d]	1.50 (1.12, 2.01)[e]	2.71 (1.79, 4.11)[f]	1.11 (0.67, 1.85)	1.83 (0.76, 4.39)
65+	1.22 (1.12, 1.32)[f]	0.86 (0.77, 0.97)[d]	1.19 (1.03, 1.37)[d]	2.24 (1.64, 3.05)[f]	2.90 (1.86, 4.51)[f]	1.28 (0.69, 2.38)	3.10 (1.20, 8.00)[d]
P for trend	<.001	.007	.01	<.001	<.001	.53	.03
Socioeconomic status[c]							
Low	1	1	1	1	1	1	1
Medium	1 (0.97, 1.03)	1.06 (1.01, 1.12)[d]	1.01 (0.96, 1.07)	0.90 (0.80, 1.01)	1.03 (0.91, 1.18)	0.78 (0.62, 0.98)[d]	0.90 (0.66, 1.23)
High	1 (0.97, 1.04)	1.08 (1.03,	1.01 (0.96, 1.06)	0.90 (0.81, 1.01)	1.05 (0.93, 1.19)	0.72 (0.58,	0.89 (0.66, 1.20)

	1.13)[e]				0.90)[e]		
P for trend	.002	.73	.07	.44	.004	.45	.82

[a]aPR (95% CI): adjusted prevalence ratio (95% confidence intervals), sex, age group, and socioeconomic status were mutually adjusted.

[b]IM: instant messaging.

[c]Socioeconomic status: a composite score of education (0=secondary or below, 1=tertiary), income (0= lower, 1=higher), and housing (0=rented, 1=owned), analyzed as low (0-1), medium (2) and high (3).

[d]*P* <.05; [e]*P* <.01; [f]*P* <.001.

Table 4 shows that receiving/sending photos/pictures (adjusted β 0.39), making voice calls (adjusted β 0.25), receiving/sending voice messages (adjusted β 0.23), and making video calls (adjusted β 0.50) were associated with better family communication (all $P \leq .03$). Receiving/sending photos/pictures, making voice calls, and making video calls were associated with better family well-being (adjusted β 0.18 to 0.45, all $P \leq .003$). Only making voice calls and video calls were associated with higher scores of personal happiness (adjusted β 0.30 and 0.32, respectively, both $P \leq .009$).

Table 4. Associations of IM[a] functions used in family e-chat groups with family communication, family well-being and personal happiness (n=4046)

IM functions used in family e-chat groups [a]	Family communication[b]		Family well-being[b]		Personal happiness[b]	
	Mean±SD [c]	Adjusted β (95% CI)[d]	Mean±SD [c]	Adjusted β (95% CI)[d]	Mean±SD [c]	Adjusted β (95% CI)[d]
Receiving/sending text messages						
No	6.6±2.0	0	7.1±1.6	0	6.0±2.1	0
Yes	6.6±1.9	0.04 (-0.14, 0.23)	7.2±1.6	0.03 (-0.13, 0.19)	6.2±2.0	0.11 (-0.10, 0.32)
Receiving/sending photos/pictures						
No	6.2±2.1	0	6.9±1.7	0	5.8±2.2	0
Yes	6.7±1.8	0.39 (0.22, 0.55)[g]	7.3±1.5	0.33 (0.20, 0.47)[g]	6.2±2.0	0.30 (0.12, 0.49)[f]
Making voice calls						
No	6.5±1.9	0	7.1±1.6	0	6.1±2.0	0
Yes	6.9±1.8	0.25 (0.11, 0.39)[g]	7.7±1.3	0.18 (0.06, 0.30)[f]	6.2±2.1	0.03 (-0.13, 0.18)
Receiving/sending short videos						
No	6.5±1.9	0	7.1±1.6	0	6.0±2.0	0
Yes	6.9±1.7	0.04 (-0.10, 0.18)	7.3±1.5	-0.06 (-0.18, 0.05)	6.3±2.0	-0.12 (-0.27, 0.04)
Receiving/sending voice messages						
No	6.6±1.9	0	7.1±1.6	0	6.1±2.0	0
Yes	7.0±1.8	0.23 (0.05, 0.41)[e]	7.4±1.5	0.11 (-0.05, 0.26)	6.2±2.1	-0.01 (-0.21, 0.19)
Making video calls						
No	6.6±1.9	0	7.1±1.6	0	6.1±2.0	0
Yes	7.3±1.5	0.50 (0.28, 0.72)[g]	7.7±1.3	0.45 (0.27, 0.64)[g]	6.5±2.0	0.32 (0.08, 0.57)[f]

[a]IM: instant messaging.

[b]Range 0-10, higher scores indicate better outcomes.

[c]SD: standard deviation.
[d]CI: confidence intervals. Adjusted for sex, age, socioeconomic status, number of days having face-to-face communication with family /week, and mutually adjusted for each other.
[e]*P*<.05; [f]*P*<.01, [g]*P*<.001.

Table 5 shows that, having more family e-chat groups, using more IM functions, and receiving and sending more IM messages daily in family e-chat groups were associated with better family communication (adjusted β 0.32 to 0.83, all $P \leq .01$) and family well-being (adjusted β 0.27 to 0.77, all $P \leq .004$), and higher personal happiness (adjusted β 0.30 to 0.72, all $P \leq 0.03$) (all P for trend ≤.02).

Table 5. Associations of number of family e-chat groups (n=4890) and use (n=4046) with family communication, family well-being and personal happiness

Use of family e-chat groups	Family communication[a]		Family well-being[a]		Personal happiness[a]	
	Mean±SD[b]	Adjusted β (95% CI)[c]	Mean±SD[b]	Adjusted β (95% CI)[c]	Mean±SD[b]	Adjusted β (95% CI)[c]
Number of family e-chat groups		<.001		<.001		<.001
0	6.1±2.2	0	6.7±1.8	0	5.7±2.2	0
1		0.15 (-0.03, 0.34)		0.23 (0.07, 0.38)[f]		0.30 (0.10, 0.50)[f]
2	6.6±1.9	0.52 (0.34, 0.70)[g]	7.1±1.6	0.51 (0.35, 0.66)[g]	6.1±2.0	0.56 (0.37, 0.76)[g]
≥3	6.9±1.7	0.83 (0.65, 1.00)[g]	7.4±1.4	0.77 (0.63, 0.92)[g]	6.3±1.9	0.72 (0.53, 0.90)[g]
P for trend		<.001		<.001		<.001
Number of IM functions used		<.001		<.001		<.001
≤1	6.0±2.3	0	6.7±1.8	0	5.7±2.2	0
2	6.5±1.8	0.48 (0.31, 0.64)[g]	7.1±1.5	0.43 (0.29, 0.57)[g]	6.1±2.0	0.42 (0.24, 0.60)[g]
3	6.9±1.7	0.72 (0.56, 0.88)[g]	7.3±1.5	0.51 (0.38, 0.64)[g]	6.3±2.0	0.36 (0.18, 0.53)[g]
P for trend		<.001		<.001		<.001
Number of IM messages received daily		<.001		<.001		.01
<1	6.1±2.2	0	6.8±1.8	0	5.9±2.1	0
1-2	6.4±2.0	0.15 (-0.12, 0.42)	7.0±1.6	0.09 (-0.14, 0.31)	6.0±2.0	0.05 (-0.25, 0.34)
3-10	6.7±1.8	0.32 (0.07, 0.57)[e]	7.2±1.5	0.21 (0, 0.43)	6.2±2.0	0.14 (-0.14, 0.42)
11-20	7.0±1.7	0.61 (0.32, 0.90)[g]	7.5±1.5	0.46 (0.21, 0.71)[g]	6.4±2.0	0.42 (0.10, 0.74)[e]
>20	7.0±1.8	0.64 (0.33, 0.95)[g]	7.4±1.5	0.38 (0.11, 0.64)[f]	6.1±2.1	0.25 (-0.09, 0.60)

P for trend			<.001		<.001			.02
Number of IM messages sent daily			<.001		<.001			<.001
<1	6.3±2.0		0	6.9±1.7	0	6.0±2.1		0
1-2	6.5±1.9	0.16	(-0.05, 0.37)	7.1±1.6	0.13 (-0.05, 0.30)	6.0±2.0	0 (-0.23, 0.24)	
3-10	6.8±1.8	0.45	(0.25, 0.66)[g]	7.3±1.5	0.27 (0.09, 0.44)[f]	6.2±2.0	0.13	(-0.10, 0.35)
11-20	7.2±1.7	0.82	(0.54, 1.11)[g]	7.5±1.5	0.54 (0.30, 0.79)[g]	6.6±2.0	0.67	(0.35, 0.99)[g]
>20	7.2±1.7	0.79	(0.46, 1.12)[g]	7.5±1.5	0.48 (0.20, 0.76)[f]	6.1±2.1	0.14	(-0.23, 0.51)
P for trend			<.001		<.001			.02

[a]Range 0-10, higher scores indicate better outcomes.
[b]SD: standard deviation.
[c]CI: confidence intervals. Adjusted for sex, age, socioeconomic status, and number of days having face-to-face communication with family /week.
[d]IM: instant messaging.
[e]*P*<.05; [f]*P*<.01; [g]*P*<.001.

Family communication partially mediated the associations of having more family e-chat groups, and more IM functions used in family e-chat groups with family well-being (proportion of total effects mediated: 75.5% and 66.4%, respectively) and personal happiness (proportion mediated: 69.5% and 46.2%, respectively) (Sobel-Goodman test: P <.001) (Table 6).

Table 6. Adjusted indirect, direct and total effect of number (n=4890) of family e-chat groups and IM[a] functions used (n=4046) on family well-being and personal happiness mediated by family communication

	Family well-being[b] Adjusted β (95% CI)[c]	Personal happiness[b] Adjusted β (95% CI)[c]
Number of family e-chat groups		
Total effect	0.26 (0.22, 0.31)[f]	0.23 (0.17, 0.29)[f]
Indirect effect (via mediation)	0.20 (0.16, 0.24)[f]	0.16 (0.13, 0.19)[f]
Direct effect (without mediation)	0.06 (0.04, 0.09)[f]	0.07 (0.02, 0.12)[f]
Proportion of total effect mediated	75.5%	69.5%
Number of IM functions used		
Total effect	0.32 (0.17, 0.47)[f]	0.38 (0.18, 0.60)[f]
Indirect effect (via mediation)	0.21 (0.09, 0.34)[f]	0.18 (0.07, 0.29)[f]
Direct effect (without mediation)	0.11 (0.02, 0.20)[e]	0.21 (0.02, 0.37)[d]
Proportion of total effect mediated	66.4%	46.2%

[a]IM: instant messaging.
[b]Range 0-10, higher scores indicate better outcomes.
[c]CI: confidence intervals. Adjusted for sex, age, socioeconomic status, and number of days having face-to-face communication with family /week.
[d]P<.05; [e]P<.01; [f]P<.001.

Discussion

This is the first report that shows, amidst the COVID-19 pandemic, having more family e-chat groups and more IM functions used in family e-chat groups, had dose-response associations with better family well-being and higher personal happiness. These associations were partially mediated by family communication quality.

We also first reported that receiving/sending photos/pictures and making video calls in family e-chat groups, the second and least commonly used IM functions, respectively, was independently associated with family communication, family well-being and personal happiness. Both photo/picture messaging and video calls are methods of visual interpersonal communication. Enriched communication channels can facilitate social interaction to create closer interpersonal social relationships [30]. Emoji and pictures in IM are widely popular, which incorporate playful elements into a plain message to attract receivers' attention, vividly express personal emotion, and thus facilitate communication effect [30, 31]. Photo messaging enables users to timely share memorable moments in daily life to all family members, especially to those being geographically separated or across generation, which has been shown to enhance intimate family communication [32].

Despite the overlapping 95% CI with other IM functions, video calls appeared to be most strongly associated with better family well-being. This is consistent with our previous study in 2016 which showed sharing family life information through video calls was associated with much better family well-being [12]. The present study further reported its strong associations with better family communication and personal happiness. Amidst the COVID-19 pandemic, almost all face-to-face social activities are regarded as high risk. Family members of all generations faced elevated social isolation due to the physical distancing and lockdown policy. Instead of one-on-one communication, group settings allow more effective and simultaneous information exchange and interactions among separated family members, which can evoke warm feelings of family gathering and close connection when face-to-face gatherings are impossible. Family video calls can partly overcome the barrier to traditional family reunion, such as birthday parties or other celebrations. Even the inactive family members and those who live far away can participate in and enjoy the online gathering time. The physical distancing due to COVID-19 could have motivated more people to use video calls to reduce emotional distancing within family.

Although fewer women and older people had access to smartphones and Internet in Hong Kong [21], they had more family e-chat groups and used more non-text IM functions. Together with our previous findings, we have shown that women are more likely to share family life information by ICTs than men [12]. In traditional Chinese culture, women are expected to take more responsibilities of the family [33]. Older people also show more care to family affairs and viewed family communication as being worthy of time and dedication [34]. Elderly family members, such as grandparents, are believed to have more barriers in accessing digital functions [35]. However, they attach great importance to digital communication and use smartphones increasingly [21, 36]. To fit into younger family members' schedules, they have shown willingness to adopt new communication media [37]. Compared with text messaging, non-text functions in family e-chat groups are more receptive as being easier to use and highly visible, especially for older people [37]. In the face of global aging and COVID-19 raging, involving

older people in family communication via ICTs is especially vital to maintain intergenerational connection and solidarity, but the younger generations need to be more responsive to their seniors and appreciate the latter's needs and affairs.

We also found more family e-chat group use associated with personal happiness and the mediating effects of family communication. Family members have interconnections and influence each other's functioning [38]. Better family communication can provide support for individuals to manage stress [15, 39] and maintain personal well-being [40]. Our results suggested that more e-chat group use improve family communication and promote personal happiness and mental health.

While we have discussed the positive aspects of the above associations, our results also suggest that those without or with low use of family e-chat groups could be vulnerable. Policymakers and social health care professionals need to pay special attention to these risk factors and provide interventions and assistance.

Our study had some limitations. Firstly, recall errors were inevitable but random error of self-reported family e-chat group use would have led to under-estimated effect size. Secondly, better family relationship could also promote more use of family e-chat groups to keep connected. Reverse causality was possible due to the cross-sectional survey design. However, to provide clearer temporal sequence, we asked the respondents to report their ICTs use when COVID-19 outbreak was severe and their perceived family communication, well-being and personal happiness during the easing period. Prospective studies are needed to confirm such associations. Thirdly, considering the dynamic and unpredictable changes of the COVID-19 pandemic, we tried to collect the largest sample possible within a short period and a constrained budget. The included respondents were younger and better educated than the general population in Hong Kong. The prevalence, even after weighting, might not be generalizable to the general population. However, because only small differences were found between the unweighted and weighted prevalence of use of family e-chat groups, selection bias would not have substantial influences on the observed associations. We also reported the dose-response associations between IM messages received /sent in family e-chat groups per day and family well-being, being consistent with our previous study having a representative sample [13], which would support our results. Lastly, although family members may tend to share family, health, and epidemic-related information in family e-chat groups, we did not ask the delivered or shared contents as the questionnaire was already quite long. Future studies are warranted.

Conclusions

We have first reported that, amidst the COVID-19 pandemic, having more family e-chat groups, using more IM functions such as sending/receiving photos/pictures and making video calls in family e-chat groups, were associated with better family well-being and personal happiness, and about half to three-quarters of the associations were mediated by family communication quality. Prospective studies are needed to confirm the associations. People without or with low use of family e-chat groups would need more attention and assistance.

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BYMW, MPW, SYH, AYKL, and THL conceived the study. WJG analyzed the data and wrote

the first draft. WJG, MPW, ZSZ, and THL interpreted the results. All authors critically revised and approved the final manuscript. We would like to thank the Hong Kong Jockey Club Charities Trust for funding this project, the Hong Kong Public Opinion Research Institute for the fieldwork, and Ms. Alison Ip for administrative support.

Conflicts of Interest

None declared.

Abbreviations

3Hs: family health, harmony, and happiness
ICT: information communication technology
IM: instant messaging
aPR: adjusted prevalence ratio
CI: confidence interval
SD: standard deviation

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