COVID-19 and Family Distancing Efforts: Contextual Demographic and Family Conflict Correlates

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Abstract
Since the COVID-19 outbreak, family members have spent more time together at home. This study introduces the concept of “family distancing”—the efforts to prevent the spread of the coronavirus to family members. We explore which demographic characteristics are associated with family distancing efforts and how the family distancing efforts are associated with family conflicts. Survey data were collected from adults (N = 324, M = 37 years; SD = 10.5 years; 65.1% female) in Korea. We found that gender, education, marital status, physical health status, and number of family members who live together were significantly associated with family distancing efforts. In addition, lower compliance with the request for family distancing was significantly associated with a higher degree of negative emotions (i.e., anger), which in turn was associated with more family conflict. The findings highlight the

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potential importance of family distancing efforts to maintain health but also their potential to increase family conflict.

**Keywords**
family distancing, COVID-19, anger, family conflict, demographic characteristics

The coronavirus pandemic and COVID-19–related disease has devastated the health of millions and killed over a million individuals worldwide as of October 20. To curb the spread of the virus and its associated death, many countries worldwide implemented several public health policies. For example, the U.S. or Korean governments asked people to stay at home or forced many schools and restaurants to shut down their business for a certain period of time. For people who inevitably go outside of the house due to on-site work or essential personal business (e.g., grocery shopping), the governments asked their people to keep social distancing (i.e., 6 feet away between people) or wear facial masks not to spread or get an infection from the virus (Griffiths, 2020b; Lyu & Webby, 2020). “Social distancing” refers to maintaining a safe distance and space from each other by limiting close face-to-face contact with others and is also called “physical distancing” (Centers for Disease Control and Prevention, 2020). To follow governmental guidelines of social distancing, people try to keep a physical distance when outside but also make several efforts to reduce the spread of the virus, such as avoiding any non-essential travel, refraining from religious events or social gathering, wearing a mask, washing hands, and trying to work from home. By keeping social distancing, people try to avoid potentially spreading the coronavirus to people in their community or society.

As a result of stay-home orders and social distancing movement, family members spend significantly more time at home. After the outbreak of the coronavirus, many companies asked their employees to work from home or implemented more flexible work time. For example, the U.S. Bureau of Labor Statistics estimated that about 37% of jobs (out of 144,295,000 workers in total, 15 years and over) were performed entirely at home (Dingel & Neiman, 2020), which is 1.5 times higher than the numbers of telecommuting workers in 2017–2018 (24.8% which is 35,724, 000 workers) (Bureau of Labor Statistics, 2019). In particular, fathers were more engaged in housework and childcare compared to before the COVID-19 outbreak (Shafer, Scheibling, & Milkie, 2020).

In addition, due to school-close, many students are taking online classes at home. The UNICEF monitored the number of school closures due to the pandemic, including universities and colleges, that 186 countries implement nationwide closures, and eight countries currently implement the local closures.
as of April 27, 2020. The school closures impact approximately 1.725 billion students worldwide. In the U.S., as of May 15, 2020, schools in 49 states were closed or districted for the academic year in response to COVID-19 (Duffin, 2020). Similarly, as of April 20, 2020, a total of 8.4 million students in Korea, including 5.4 million elementary, middle, and high school students and three million university and graduate students, are taking remote classes after online-based starting school (Lee, 2020). All these situations make parents and children spend more time together at home.

However, it is hard to keep the physical distance with family members because family members have a high contact frequency and share a living space without wearing a mask. Thus, they have vulnerable environments with a high possibility of transmission (Parasa et al., 2020) and persistence of coronavirus (Kampf, Todt, Pfaender, & Steinmann, 2020). As such, spouses, family members, and close relatives are reported to have a higher risk of secondary infection of COVID-19 (Madewell, Yang, Longini, Halloran, & Dean, 2020). Indeed, in New Jersey, four family members have died, and three relatives were hospitalized due to the coronavirus because they had a family banquet with friends and relatives rather than keeping social distancing (Cervenka, 2020). According to one recent study (Choe, 2020), the infection rate of getting the virus from family member-to-family member contacts was 7.56%, 40 times higher than 0.19% from non-family member contacts in Korea.

Given a high infection rate of the coronavirus among family members, our study introduces the concept of “family distancing” (i.e., the efforts to prevent the spread of the coronavirus to family members, such as reducing social or religious gatherings, wearing masks, or washing hands frequently at home). We also try to identify the correlates of these actions. We consider family distancing as social-distancing–type efforts made for family members at home. That is, family distancing is all the efforts that family members try to make to minimize the spread of the virus to their family members. Theoretically, there are two components (self and other focused). The first involves when an individual family member makes efforts to keep individual hygiene. For example, washing hands or taking a shower immediately when you come back home after going out, avoid non-essential travel (e.g., reduce religious or social gathering), and minimize direct contact with family members (e.g., using individual towels). The second involves asking other family members to engage in similar efforts. The family distancing and social distancing have the same ultimate purpose of reducing the risk of coronavirus spread to other people, but different aspects to some degree. Social distancing emphasizes to keep physical distance to reduce the spread of the virus to other people in a society. On the other hand, family distancing refers to all types of efforts to minimize the spread of coronavirus to family members at home.
Present Study

The purpose of this study was to provide the initial empirical examination of the concept of “family distancing” and explore how family distancing efforts at home after the outbreak of COVID-19 are associated with family conflicts. In other words, specific data on 1) what demographic characteristics are associated with different degrees of family distancing, and 2) how different degrees of compliance with family distancing are associated with conflicts among family members is needed. To examine family distancing and family conflicts, we focused on the following three points.

First, we focus on the gender difference in efforts to reduce the spread of the coronavirus at home. Many existing studies on gender behavior found that men and younger people exert higher risk behavior than do women and older people (Baker et al., 2020; Barber & Kim, 2021; Ebor et al., 2020; Ewig, 2020; McCarthy, 2020; Smith et al., 2020; Thelwall & Thelwall, 2020). For example, Barber and Kim (2021) found older adults had a higher degree in risk perception about COVID-19 than did younger adults. Women perceived the risk of the coronavirus more seriously (Ewig, 2020) and thus engaged in less-risk behaviors than men (Baker et al., 2020; Smith et al., 2020; Thelwall & Thelwall, 2020). According to Litton (2020), women were more likely to take public health precautions: 90% of women avoiding public places and 76% of men 5% of women attending gatherings of 10 or more people, while 11% of men reported doing so. In addition, women have higher rates of wearing masks, washing hands, and seeking medical help than men (Garcia et al., 2020; Vandello, Bosson, & Lawler, 2019). The recent empirical studies suggest that age and gender aspects are closely related to family distancing.

Second, we focus on the relationship between family distancing efforts and family conflicts. In an online survey with adults age 18 over in the U.S., the highest stress source was “A family member getting coronavirus” (American Psychological Association, 2020), which implies that different degrees of family member’s efforts to reduce coronavirus at home can cause family conflicts. Existing theory and research suggest that the different degree of habits and beliefs between family members are linked with family conflicts. Prior studies show that difference in trivial habits in daily life causes conflicts between family members, which in turn increases relational dissatisfaction (Clarke, Preston, Raksin, & Bengtson, 1999; Putney, 2017). For example, washing a bowl and not putting it in place or chewing gum with an open mouth can cause a conflict with other family members who do not do that because they feel angry or annoying with those habits (Papp, 2018). The difference in money spending habits between family members (e.g., cheapskate vs. reckless spender) can also lead to decreased relational quality (Rick, Small, & Finkel, 2011). Couples tend to marry due to each other’s complementary attraction,
but different consumption habits increase emotional distress and eventually reduce marriage well-being.

In addition, family members often need to coordinate their opinions in resolving the tasks of their own lives or in solving problems that apply to everyone in the family. In this process, the difference in values among family members can cause conflicts (Ogolsky, Dennison, & Monk, 2014; Sverdlik, 2012). For example, family members have different beliefs in a religious ceremony (e.g., attendance, religious involvement) can cause family conflict (Spilka, Hood, Hansberger, & Gorsuch, 2003). As such, during COVID-19, a conflict can arise between family members who believe going to church for worship is still very crucial and other family members who think doing religious ceremonies online is acceptable (Wilson et al., 2020).

Third, we focus on examining the emotions linked with family conflicts. To exert family distancing efforts, family members often have a lack of individual space (Behar-Zusman, Chavez, & Gattamorta, 2020) and may sometimes invade their privacy. In this process, someone may feel thankful or feel angry due to a family member’s request for efforts to reduce the spread of the coronavirus. The recent empirical studies regarding family conflicts during COVID-19 mainly focus on parental stress, child abuse, and intimate partner violence. Parents experienced much more stress used harsh parenting and led to child abuse (Brown et al., 2020; Bullinger et al., 2020; Griffith, 2020a; Lee et al., 2021; Phelps & Sperry, 2020; Spinelli et al., 2020). In addition, women were exposed to the danger of domestic violence during COVID-19 quarantine (Jetelina et al., 2021; Mazza et al., 2020; Sediri et al., 2020). As a negative family relationship between parents and children, recent studies (Morgül, Kallitsoglou, & Essau, 2020; Saurabh, & Ranjan, 2020; Whittle, Bray, Lin, & Schwartz, 2020) reported their poor psychological well-being, such as depression of parents and children during COVID-19. Yet, these existing studies pay little attention to how family members’ emotions play a role in the association between family distancing efforts and family conflict.

Based on these three points, we hypothesized that 1) family distancing efforts (efforts for keeping individual hygiene, reducing indirect contacts with family members, reducing direct contacts with family members, and minimizing going outside) would be associated with age and gender 2) family conflicts would be associated with family distancing efforts, and 3) family members’ compliance with the respondents’ hygiene request would be associated with negative emotions, which in turn relates to conflicts in hygiene.

To examine these hypotheses, we measure 1) demographic characteristics (age, gender, education, marital status, physical health status, mental stress status, number of family members living together, and living in an outbreak region), 2) family members’ compliance with the request of keeping hygiene at home, 3) emotions (anger and thankfulness from family members’
compliance with family distancing requests), and 4) conflicts (hygiene, social gathering, and eating habit).

**Method**

**Participants and Procedures**

The survey began with informed consent procedures (survey purpose, data storage and use, expected time to finish the survey, etc.). The survey respondents did not receive any compensation. All the procedures related to this study were approved by the University’s Institutional Review Board (IRB) on April 6. The survey data covered the calendar months from April 15 to June 15 in 2020.

We designed the survey using “SurveyMonkey,” the online survey software. We recruited the survey participants by randomly distributing the survey link through “KakaoTalk,” the popular messenger application in Korea. Anyone who is (1) a resident in South Korea, (2) aged over 20 years old, and (3) able to access the online survey was eligible for taking the survey. The respondents voluntarily had a log-in to the messenger with their social security and phone numbers to take the survey. Thus, it is not possible for a bot to take a survey. In addition, it is less likely that the survey was heavily distributed to a certain group of people. According to the 2018 data from the Ministry of Science and ICT and the Korea Internet & Agency, 95.9% of people aged 6 years or older communicate through messaging applications of their smartphones, and among them, 99.2% use the KakaoTalk messenger (Oh et al., 2020). In addition, the average rates of using the KakaoTalk app do not vary much by the age groups: 95.5% for teens, 98.7% for 20s, 99% for 30s, 99.1% for 40s, and 99.1% for 50s and older Statista Research Department (2021). After collecting the survey, we de-identified the personal information and stored the data on a secure server.

To find the existence of family conflicts with family members, we excluded 95 respondents who live temporarily alone. Table 1 presents the summary statistics of the sample (N = 324) with no missing demographic information used in the analysis. We estimated the model using the listwise deletion when the variable information in the analysis is missing. To identify the types of missingness in the data, we performed Little’s test to check whether the data is missing completely at random (MCAR) (Little, 1988). The null hypothesis is that the data is MCAR. The test results indicated that we failed to reject the null hypothesis because the significance value was higher than 0.05 in the data (Chi-square = 402.318, Degrees of Freedom = 462, and Statistical significance = 0.979). At this point, it is safe to do listwise deletion of cases with missing values because missingness is ignorable (Janz, 2014). As a robustness check, we also estimate the model using the full information max likelihood (FIML)
Table 1. Summary Statistics.

|                          | N   | Mean (%) | Min | Max | SD  |
|--------------------------|-----|----------|-----|-----|-----|
| Age                      | 324 | 37.06    | 20.00 | 70.00 | 10.52 |
| Gender (male = 1, female = 0) | 324 | 34.9%    | 0.00 | 1.00 | 0.48 |
| Years of education       | 324 | 15.38    | 6.00 | 22.00 | 2.28 |
| Marital status (married = 1, unmarried = 0) | 324 | 56.8%    | 0.00 | 1.00 | 0.50 |
| Physical health status (1 = very weak; 5 = very strong) | 324 | 3.66     | 1.00 | 5.00 | 0.86 |
| Mental stress status (1 = rarely stressed; 10 = extremely stressed) | 324 | 5.77     | 1.00 | 10.00 | 2.28 |
| Total number of family members living together | 324 | 2.11     | 1.00 | 5.00 | 1.05 |
| I (Outbreak region: Daegu and Kyungpook) | 324 | 0.57     | 0.00 | 1.00 | 0.50 |
| Frequency of hand wash (per day) before COVID | 322 | 5.22     | 2.00 | 6.00 | 1.16 |
| Frequency of hand wash (per day) after COVID | 322 | 5.69     | 1.00 | 6.00 | 0.78 |
| △ Frequency of hand wash | 320 | 0.47***  |       |      |     |
| Use of individual towel before COVID | 265 | 0.26     | 0.00 | 1.00 | 0.44 |
| Use of individual towel after COVID | 263 | 0.40     | 0.00 | 1.00 | 0.49 |
| △ Use of individual towel | 262 | 0.14**** |       |      |     |
| Frequency of physical affection with family (per day) before COVID | 263 | 2.78     | 0.00 | 5.00 | 1.98 |
| Frequency of physical affection with family (per day) after COVID | 263 | 2.46     | 0.00 | 5.00 | 2.03 |
| △ Frequency of physical affection with family (per day) | 263 | -0.32*** |       |      |     |
| Having social gathering at least one time (per week) before COVID | 299 | 0.66     | 0.00 | 1.00 | 0.47 |
| Having social gathering at least one time (per week) after COVID | 296 | 0.21     | 0.00 | 1.00 | 0.41 |
| △ Having social gathering at least one time (per week) | 291 | -0.45*** |       |      |     |
| Degree of anger from family members’ compliance | 255 | 1.86     | 1.00 | 5.00 | 0.99 |
| Degree of thankfulness from family members’ compliance | 257 | 3.91     | 1.00 | 5.00 | 0.92 |
| Family members’ compliance with the respondent’s hygiene request | 256 | 4.33     | 2.00 | 5.00 | 0.69 |
| Conflict in hygiene attitude | 261 | 1.67     | 1.00 | 5.00 | 0.83 |
| Conflict in social gatherings | 262 | 2.07     | 1.00 | 5.00 | 1.11 |
| Conflict in eating habits | 263 | 1.65     | 1.00 | 5.00 | 0.83 |

Note. Asterisks denote a statistical significance in a two-tailed test. *p < 0.10 ** p < 0.05 *** p < 0.01. The results of mean difference and significance level (△ Frequency of hand wash; △ Use of individual towel; △ Frequency of physical affection with family (per day); △ Having social gathering at least one time (per week) are added in Table 1.

*a34.9% presents males and 65.1% means females in this study.
b56.8% of participants married and 43.2% of participants unmarried.
method. We confirm that the estimation results with FIML in the appendix (Tables A1–A3) are consistent with the main estimates.

**Measures**

*Demographic characteristics.* To explore how demographic characteristics are associated with family distancing efforts, emotions, and conflicts, we included eight variables (age, gender, education, marital status, physical health status, mental stress status, number of family members who live together, and outbreak region). Physical health status was asked, “How did/does your physical health status before/after the outbreak of COVID-19?” ranging from 1 (Very weak) to 5 (Very good). Mental stress status was asked, “Before/After the COVID-19 outbreak, what was/is the level of mental stress you are on? (Please select a number between 1 and 10)” ranging from 1 (Not at all likely stressed) to 10 (Extremely likely stressed). Except for the analysis for regression of family distancing efforts (Table 2), the physical health status and mental stress status “after” outbreak of COVID-19 were used (Table 3 and Table 4). In the case of the outbreak region, we asked, “Where do you currently live?” (Among 18 districts in Korea, the outbreak region is Daegu and Kyungpook).

*Family distancing efforts.* To capture family distancing efforts before and after the COVID-19 outbreak, we assessed four categories. First, efforts for keeping individual hygiene which asked the questions “Before the outbreak of COVID-19, how many handwashes did you do in your average daily routine (including both home and outdoor activities)?” and “After the COVID-19 outbreak, how many handwashes have you been doing on average daily (including both home and outdoor activities)?” Responses ranged from 1 (no washing) to 6 (more than five times). Second, efforts for reducing indirect contacts with family members at home which asked the question “Before COVID-19 outbreak, I used an individual towel (not sharing towels with my family members) when I returned home after going out.” and “After COVID-19 outbreak, I have been using towels separately from my family when I return home after going out.” Responses were 0 (No, sharing) and 1 (Yes, no sharing). Third, efforts for reducing direct contacts with family members at home which asked the question “Before the outbreak of COVID-19, how many times did you touch family members a day on average (e.g., hugs, light kisses, all close physical contact, etc.)?” and “After the COVID-19 outbreak, how many times have you touched family members a day on average (e.g., hugs, light kisses, all close physical contact, such as holding hands)??”. Responses ranged from 1 (one time) to 5 (five times or more). Fourth, efforts for minimizing going outside which asked the question “Before the COVID-19 outbreak, I had outside religious activities and social gatherings at least once a week,” and “After the COVID-19 outbreak, I have held outside religious
Table 2. Results of Demographic Characteristics on Family Distancing Efforts under COVID-19.

| Variables                  | Pre          | Post          | Change        |
|----------------------------|--------------|---------------|---------------|
|                            | Linear b (SE) | Non-linear b (SE) | Linear b (SE) | Non-linear b (SE) | Linear b (SE) | Non-linear b (SE) |
| A. Hand wash               |              |               |               |                   |               |                 |
| Age                        | 0.01 (0.01)  | 0.02** (0.01) | 0.01** (0.00) | 0.02** (0.01)     | -0.00 (0.01)  | -0.00 (0.01)    |
| Gender (male)              | -0.36** (0.15)| -0.37** (0.15)| -0.21** (0.09)| -0.42** (0.18)    | 0.17 (0.13)   | 0.20 (0.15)     |
| Education                  | -0.01 (0.03) | 0.01 (0.02)   | 0.04 (0.04)   | 0.04* (0.02)      | 0.04* (0.02)  | 0.06* (0.03)    |
| Married                    | 0.24 (0.17)  | 0.24 (0.18)   | 0.06 (0.22)   | 0.06* (0.03)      | -0.26* (0.14) | -0.35* (0.18)  |
| Physical health            | 0.05 (0.08)  | 0.05 (0.08)   | -0.03 (0.10)  | -0.03 (0.10)      | -0.07 (0.07)  | -0.05 (0.08)    |
| Mental stress              | 0.02 (0.03)  | 0.02 (0.03)   | 0.05 (0.04)   | 0.05 (0.04)       | -0.00 (0.03)  | 0.01 (0.03)     |
| # of family members        | 0.15*** (0.06)| 0.17** (0.07) | 0.14*** (0.04)| 0.29*** (0.09)    | -0.01 (0.05)  | -0.03 (0.07)    |
| I(Outbreak region)         | -0.09 (0.13) | -0.10 (0.14)  | 0.00 (0.09)   | 0.02 (0.18)       | 0.07 (0.11)   | 0.07 (0.14)     |
| Constant                   | 4.37*** (0.66)| 4.59*** (0.43)| 2.12 (0.57)   | 2.01 (0.43)       | 0.21 (0.57)   | 0.03   |
| $R^2$                      | 0.01         | 0.12          | 0.09          | 0.03              | 0.02          |                 |
| Pseudo $R^2$               | 0.05         | 0.09          | 0.09          | 0.02              | 0.02          |                 |
| N                          | 322          | 322           | 322           | 320               | 320           |                 |

(continued)
Table 2. (continued)

| Variables                  | Pre          |          | Post          |          | Change        |          |
|----------------------------|--------------|----------|---------------|----------|--------------|----------|
|                            | Linear       | Non-linear | Linear        | Non-linear | Linear       | Non-linear |
|                            | b (SE)       | b (SE)   | b (SE)        | b (SE)   | b (SE)       | b (SE)   |
| B. Towel use               |              |          |               |          |              |          |
| Age                        | 0.00 (0.00)  | 0.01 (0.01) | 0.01* (0.00) | 0.02* (0.01) | 0.00 (0.00) | 0.01 (0.01) |
| Gender (male)              | -0.06 (0.06) | -0.20 (0.19) | -0.15** (0.07) | -0.40** (0.18) | -0.07 (0.05) | -0.29 (0.21) |
| Education                  | -0.00 (0.01) | -0.02 (0.04) | -0.02 (0.01) | -0.05 (0.04) | -0.01 (0.01) | -0.05 (0.04) |
| Married                    | -0.14* (0.08) | -0.41* (0.23) | -0.11 (0.08) | -0.29 (0.22) | 0.01 (0.07) | -0.03 (0.25) |
| Physical health            | 0.03 (0.03)  | 0.10 (0.11) | -0.00 (0.04) | -0.00 (0.10) | -0.03 (0.03) | -0.10 (0.11) |
| Mental stress              | -0.01 (0.01) | -0.04 (0.04) | 0.01 (0.01)  | 0.02 (0.04)  | 0.02* (0.01) | 0.07 (0.04) |
| # of family members        | -0.05 (0.03) | -0.14 (0.09) | -0.02 (0.03) | -0.04 (0.08) | 0.02 (0.02)  | 0.08 (0.09) |
| I(Outbreak region)         | -0.06 (0.06) | -0.20 (0.18) | -0.02 (0.06) | -0.07 (0.17) | 0.04 (0.05)  | 0.17 (0.19) |
| Constant                   | 0.41 (0.27)  | 0.57* (0.30) | 0.21 (0.25)  | 0.05      | 0.05         |
| $R^2$                      | 0.04         | 0.05      | 0.04         | 0.05      | 0.05         |
| Pseudo $R^2$               | 0.04         | 0.04      | 0.05         | 0.05      |
| N                          | 265          | 265       | 263          | 263       | 262          | 262       |

(continued)
Table 2. (continued)

| Variables                  | Pre          | Post         | Change        |
|----------------------------|--------------|--------------|---------------|
|                            | Linear (b (SE)) | Non-linear (b (SE)) | Linear (b (SE)) | Non-linear (b (SE)) | Linear (b (SE)) | Non-linear (b (SE)) |
| C. Physical affection      |              |              |               |               |               |               |
| Age                        | -0.08*** (0.01) | -0.06*** (0.01) | -0.07*** (0.01) | -0.06*** (0.01) | 0.00 (0.01) | 0.00 (0.01) |
| Gender (male)              | -0.66*** (0.21) | -0.54*** (0.16) | -0.38* (0.22) | -0.33** (0.16) | 0.28** (0.13) | 0.33* (0.17) |
| Education                  | 0.06 (0.05) | 0.04 (0.03) | 0.10** (0.05) | 0.07** (0.03) | 0.04 (0.03) | 0.04 (0.03) |
| Married                    | 3.02*** (0.28) | 2.35*** (0.23) | 2.94*** (0.29) | 2.26*** (0.23) | -0.08 (0.14) | -0.02 (0.21) |
| Physical health            | 0.22* (0.12) | 0.19** (0.09) | 0.27** (0.13) | 0.21** (0.09) | 0.05 (0.09) | -0.01 (0.09) |
| Mental stress              | 0.03 (0.05) | 0.03 (0.03) | 0.00 (0.05) | 0.01 (0.03) | -0.03 (0.03) | -0.04 (0.03) |
| # of family members        | 0.22* (0.11) | 0.16** (0.07) | 0.20* (0.11) | 0.17** (0.07) | -0.02 (0.06) | 0.02 (0.08) |
| I(Outbreak region)         | -0.37* (0.21) | -0.28* (0.15) | -0.46** (0.22) | -0.34** (0.15) | -0.08 (0.14) | -0.14 (0.16) |
| Constant                   | 1.62 (1.01) |              | 0.58 (1.06) |              | -1.03 (0.71) |              |
| $R^2$                      | 0.45         |              | 0.42         |              | 0.03         |              |
| Pseudo $R^2$               |              | 0.19         |              | 0.18         |              | 0.02         |
| N                          | 263          | 263          | 263          | 263          | 263          | 263          |
Note: Asterisks denote a statistical significance in a two-tailed test. *p < 0.10  **p < 0.05 ***p < 0.01.
For example, the estimate for age (−0.08***<10> in the first column of Panel C shows that age is negatively correlated with physical affection, and thus, the null hypothesis (no correlation between age and physical affection) can be rejected with the 1% significance level. That is, the probability of making the type-I error given the null hypothesis is true, is less than 1%.
Table 3. Results of Demographic Characteristics on Conflicts in Social Gathering and Eating Habit.

|                          | Hygiene |               | Social Gathering |               | Eating Habit |               |
|--------------------------|---------|---------------|------------------|---------------|--------------|---------------|
|                          | Linear  | Non-linear    | Linear           | Non-linear    | Linear       | Non-linear    |
|                          | b (SE)  | b (SE)        | b (SE)           | b (SE)        | b (SE)       | b (SE)        |
| Age                      | 0.01 (0.01) | 0.01 (0.01)  | 0.01 (0.01)      | 0.01 (0.01)   | 0.01**(0.01) | 0.02**(0.01)  |
| Gender                   | 0.03 (0.10) | 0.08 (0.16)  | -0.05 (0.14)     | -0.04 (0.15)   | 0.09 (0.11)  | 0.17 (0.16)   |
| Education                | 0.00 (0.02) | 0.01 (0.03)  | -0.00 (0.03)     | -0.01 (0.03)   | -0.03 (0.02) | -0.04 (0.03)  |
| Marital status           | 0.16 (0.13) | 0.24 (0.21)  | -0.20 (0.19)     | -0.22 (0.20)   | -0.08 (0.14) | -0.09 (0.21)  |
| Physical health status   | -0.25*** (0.06) | -0.38*** (0.09) | -0.24*** (0.08) | -0.26*** (0.09) | -0.19*** (0.06) | -0.30*** (0.09) |
| Mental stress status     | 0.01 (0.02) | 0.00 (0.03)  | 0.09*** (0.03)   | 0.09*** (0.03) | 0.06*** (0.02) | 0.08*** (0.03) |
| # of family number       | 0.03 (0.05) | 0.07 (0.07)  | 0.14*** (0.07)   | 0.17*** (0.07) | 0.07 (0.05)  | 0.14*** (0.07) |
| I(Outbreak region)       | 0.06 (0.11) | 0.11 (0.15)  | 0.03 (0.14)      | 0.04 (0.14)    | -0.06 (0.10) | -0.03 (0.15)  |
| Constant                 | 2.00*** (0.52) | 2.06*** (0.75) | 1.71*** (0.48)   |               |               |               |
| $R^2$                    | 0.10     | 0.11          | 0.11             |               |               |               |
| Pseudo $R^2$             | 0.05     | 0.04          | 0.06             |               |               |               |
| N                        | 261      | 261           | 262              | 262           | 263          | 263           |

Note. Asterisks denote a statistical significance in a two-tailed test. *p < 0.10 ** p < 0.05 *** p < 0.01.
activities and social gatherings at least once a week.” Responses were 0 (No) and 1 (Yes).

Family members’ compliance. We created a single item which asked the question, “After the COVID-19 outbreak, what is the level of family members’ compliance with your request for keeping hygiene efforts (e.g., asking family members to wash their hands, taking a shower immediately after returning home)?”. Responses ranged from 1 (Not at all complied) to 5 (Extremely complied).

Emotions. To explore how people feel when their family members comply with their requests on hygiene efforts at home (e.g., wash hands, take a shower right away after returning home), we assessed two emotions (anger and thankfulness) associated with family distancing efforts. Anger was asked the question, “After the outbreak of COVID-19, despite my requests for keeping hygiene efforts at home (e.g., asking family members to wash their hands), I am angry because my family members did not follow me well.” Thankfulness was asked the question, “After the outbreak of COVID-19, I am grateful that my family members have followed my requests for keeping hygiene efforts at home (e.g., asking family members to wash their hands). Responses ranged from 1 (Strongly disagree) to 5 (Strongly agree).

Table 4. Mediating Effects of Negative and Positive Feelings on the Association between Compliance and Conflict in Hygiene.

| Variables | Path | B (SE) | 95% Indirect Boot LLCI | Cl for Effect Boot ULCI |
|-----------|------|--------|------------------------|------------------------|
| X = Degree of family members’ compliance | X → M1 | -0.31**(0.10) | | |
| | M1 → Y | 0.43*** (0.05) | | |
| M1 = Feeling angry from family members’ compliance | X → M1 | -0.14** (0.05) | -0.24 | -0.05 |
| | Y | | | |
| M2 = Feeling thankful for family members’ compliance | X → M2 | 0.62*** (0.09) | | |
| | M2 → Y | -0.06 (0.05) | | |
| Y = Conflicts in hygiene | X → Y | -0.04 (0.03) | -0.11 | 0.02 |
| | Y | | | |
| X → Y | -0.08 (0.07) | | | |

Note. Asterisks denote a statistical significance in a two-tailed test. *p < 0.10 **p < 0.05 ***p < 0.01.

Nine control variables (age, gender, education, marital status, physical health status, mental stress status, number of family living together, and outbreak region) are included in the current investigation.

Note. B = unstandardized regression coefficients; SE = standard error; Bootstrapped resample is 5000; LLCI = lower level of confidence interval; ULCI = upper level of confidence interval; The confidence intervals reflect a significant indirect effect through not containing zero.
Conflicts. To capture COVID-related conflicts with family members, we assessed three possible causes of conflicts. The survey asked respondents whether family members experience conflicts or quarrels after COVID-19 due to 1) different hygiene attitudes which asked the question “After the outbreak of COVID-19, conflicts or quarrels arise between my family members and me due to different hygiene attitudes,” 2) different opinions on a social gathering which asked the question “After the outbreak of COVID-19, conflicts or quarrels arise between my family members and me because we have different ideas on going outside,” and 3) different eating habits which asked the question “After the outbreak of COVID-19, conflicts or quarrels arise between my family members and me because we have different eating habits (e.g., preference for sharing soup and side dishes without individual bowls or plates).” All these conflicts are also measured as five Likert-scale scores (1 = Strongly disagree; 5 = Strongly agree).

Data Analysis

To examine the relationship between socio-demographic factors and COVID-related efforts, emotions, and conflicts, we estimate the following model

\[ y_i = X'_i \beta + I(D) + \epsilon_i, \]

where \( y_i \) is the individual efforts or conflicts related to family distancing by the respondent \( i \); \( X'_i \) indicates the vector of the respondent’s demographic characteristics, including age, gender, education, marital status, physical health status, mental stress status from COVID, and the number of family members at home; \( I(D) \) is the indicator for the outbreak region if the respondent lives in Daegu or Kyungpook; and standard errors are robust to heteroskedasticity. For easy interpretation of the estimates, our baseline model is a linear regression. In addition, since the dependent variables are categorical values, we also estimate equation (1) by the ordered Probit model. The ordered Probit model preserves the ordering of response but makes no assumptions of the interval distances between options. Thus, the signs of the estimates (\( \beta \)), rather than their magnitudes, will be informative for understanding its relationship.

Furthermore, we investigate whether the negative or positive emotions about family members’ hygiene compliance mediates the association between family members’ compliance with the respondent’s hygiene request and conflicts in hygiene. Figure 1 illustrates that the degree of family members’ compliance with the respondent’s hygiene request (X) affects the respondent’s anger (M1) or thankfulness (M2) to family members about their hygiene compliance, which consequentially affects conflicts in hygiene habits at home (Y).
For the mediation analysis, we take a two-step estimation process based on the auxiliary equation (Hayes, 2017). First, the direct effect of the compliance on conflict is as follows

\[
\text{Conflict}_i = \beta_1 \text{Compliance}_i + \beta_2 \text{Emotion}_i + X'\beta_3 + \epsilon_{i,\text{med.dir}}.
\] (2)

Second, the following auxiliary equation captures the mediation mechanisms of the compliance effects on conflict through feelings related to family distancing

\[
\text{Emotion}_i = \gamma_1 \text{Compliance}_i + X'\gamma_2 + \epsilon_{i,\text{med.feel}}.
\] (3)

Using the auxiliary equation, equation (2) becomes

\[
\text{Conflict}_i = \theta_1 \text{Compliance}_i + X'\zeta_1 + \epsilon_{i,\text{med}}
\]

where \(\theta_1 = \beta_1 + \beta_2\gamma_1\) and \(\zeta_1 = \beta_3 + \beta_2\gamma_2\). The parameter of interest is \(\theta_1\), the total effect of compliance on family conflict. The total effect consists of the direct compliance effect on conflict, \(\beta_1\), and the mediating effect through feelings, \(\beta_2\gamma_1\). We simultaneously estimate Equations (2) and (3) by using Hayes’ PROCESS macro Model 4 (Hayes, 2017) using SPSS 25.0 (Armonk, NY, USA). The macro model estimates the 95% confidence intervals for the indirect effect with 5000 bootstrapped samples.

**Results**

Table 1 shows the means and SD of all the used variables in the analysis. The average age of respondents is 37.06 years old (SD = 10.52), and more than half

![Proposed research model](image-url)
of them (65.1%) are female. Their years of education are 15.38 years on average ($SD = 2.28$), and 57% of participants are married and the average number of family members who live together is 2.11 ($SD = 1.05$). Approximately 57% of participants live in Daegu or Kyunpook, which is the major COVID-outbreak region in Korea. The average self-rated physical health status is 3.66 ($SD = 0.86$) and the average mental stress-level after COVID is 5.77 ($SD = 2.28$).

Regarding family distancing efforts, the average number of washing hands per day significantly increased from 5.22 to 5.69 after COVID-19 ($\Delta = 0.47, p < 0.01$). The use of individual towels also significantly increased from 0.26 to 0.40 ($\Delta = 0.14, p < 0.01$). The average number of physical affection with family members per day is significantly reduced from 2.78 to 2.46 ($\Delta = -0.32, p < 0.01$). In addition, having a social or religious gathering at least once per week significantly decreased from 0.66 to 0.21 ($\Delta = -0.45, p < 0.01$). In short, respondents overall changed their lifestyles, trying to reduce the spread of the virus. Second, regarding the emotion associated with family distancing, the average and $SD$ of feeling angry ($M = 1.86, SD = 0.99$) or thankful ($M = 3.91, SD = 0.92$) from family members’ compliance with the respondent’s request on hygiene efforts at home. For reference, the average family members’ compliance with the respondent’s hygiene request is 4.33 ($SD = 0.69$). Third, regarding the COVID-related conflicts with family members, the averages, and $SD$s of each variable are as follows: conflict due to different degrees of hygiene efforts ($M = 1.67, SD = 0.83$); conflict due to different degrees of social gatherings ($M = 2.07, SD = 1.11$); and conflict due to different eating habits ($M = 1.65, SD = 0.83$).

Table 2 shows the estimation results of how family distancing efforts at home are related to demographic characteristics. The estimates for the relationship before the coronavirus outbreak are Columns (1) and (2), those after the break are in Columns (3) and (4), and those for the changes are in Columns (5) and (6). Specifically, the estimates in Columns (5) and (6) in Panel A show that more educated people significantly increased their hand wash per day after COVID-19 to a greater extent ($\hat{\beta} = 0.04, p < 0.10; \hat{\beta} = 0.06, p < 0.10$). In addition, non-married people increased hand wash significantly more than married people after COVID-19 ($\hat{\beta} = -0.26, p < 0.10; \hat{\beta} = -0.35, p < 0.10$). Regarding the separate towel use in Panel B of Table 2, the estimates show that there are no heterogeneous family distancing efforts across people with different demographic characteristics. For the physical affection with family members in Panel C of Table 2, the estimates for gender show that males reduced the number of physical affection significantly less than females after COVID-19 ($\hat{\beta} = 0.28, p < 0.05; \hat{\beta} = 0.33, p < 0.10$). This estimate implies that males are less risk-averse than females (Croson & Gneezy, 2009). For social gathering in Panel D of Table 2, the estimates for gender show that females reduced social gathering significantly more than males ($\hat{\beta} = 0.29, p < 0.01; \hat{\beta} = 0.75, p < 0.01$).
In addition, more educated people reduced social gathering significantly more than less educated people ($\beta = -0.03, p < 0.05; \hat{\beta} = -0.09, p < 0.05$). Furthermore, physically more healthy people reduced social gathering significantly more than weak people after COVID-19 ($\beta = -0.06, p < 0.10; \hat{\beta} = -0.16, p < 0.10$). People who live with more family members are more likely to reduce social gathering than people who live with fewer family members ($\beta = -0.06, p < 0.05; \hat{\beta} = -0.17, p < 0.05$).

Table 3 shows whether respondents experience conflicts with family members after pandemics. The estimates show that family members have conflicts in hygiene in Panel A, a social gathering in Panel B, and different eating habits with family members in Panel C. First, the estimates in Panel A of Table 3 show that people have more conflicts in hygiene with family members when they have worse health conditions ($\beta = -0.25, p < 0.01; \hat{\beta} = -0.38, p < 0.01$). Second, the estimates in Panel B of Table 3 show that people have more conflicts in having social gatherings with family members when they have worse physical health conditions ($\beta = -0.24, p < 0.01; \hat{\beta} = -0.26, p < 0.01$), have more mental stress after COVID ($\beta = 0.09, p < 0.01; \hat{\beta} = 0.09, p < 0.01$), and have more family members who live together ($\beta = 0.14, p < 0.05; \hat{\beta} = 0.17, p < 0.05$). Third, the estimates in Panel C show that people have more conflicts in having different eating habits (e.g., sharing the same plates vs. using individual plates) when they are older ($\beta = 0.01, p < 0.05; \hat{\beta} = 0.02, p < 0.05$), have weaker physical health status ($\beta = -0.19, p < 0.01; \hat{\beta} = -0.30, p < 0.01$), have more stress after COVID ($\beta = 0.06, p < 0.05; \hat{\beta} = 0.08, p < 0.05$), and have more family members who live together ($\beta = 0.07, n.s.; \hat{\beta} = 0.14, p < 0.10$).

Table 4 shows whether emotions (anger and thankfulness) from the individual’s request to family members about keeping hygiene efforts at home mediate the association between family members’ compliance with the request and conflicts in hygiene. The estimates in Table 4 indicate that family members’ compliance with the respondent’s requests does not directly affect conflicts in different degrees of hygiene efforts ($\beta_1 = -0.08, n.s.$). Yet, as family members more comply with the respondent’s requests about keeping hygiene efforts at home, the persons who requested significantly feel less angry ($\hat{\gamma}_1 = -0.31, p < 0.05$) but they feel more thankful ($\hat{\gamma}_1 = 0.62, p < 0.01$). In addition, people are more likely to have conflicts in hygiene efforts as they feel angrier ($\beta_2 = 0.43, p < 0.01$) while the thankful feelings do not affect family conflicts in hygiene ($\beta_2 = -0.06, n.s.$). Interestingly, the estimates indicate that people whose family members more comply with the respondent’s requests about keeping family distancing at home feel less angry to family members and, which in turn, they have fewer conflicts on hygiene with family members ($\hat{\beta}_2 \cdot \hat{\gamma}_1 = -0.14, p < 0.05$). However, feeling thankfulness about family members’ compliance with the requests on hygiene and conflicts in hygiene ($\hat{\beta}_2 \cdot \hat{\gamma}_1 = -0.04, n.s.$). In sum, family members’
compliance does not directly affect family conflicts in hygiene. However, negative emotions (anger) affected by family members’ compliance with the requests on keeping hygiene efforts impact conflicts in hygiene within the family.

**Discussion**

First of all, our study has contributed to the literature in identifying what demographic factors are associated with different degrees of family distancing efforts, especially gender and age. Although most of the existing studies did not collect information on hygienic behavior before outbreak of the pandemic and thus only provided those behaviors after the outbreak, our study was able to examine behavioral changes during COVID-19. The findings that women performed more preventive actions than men in three areas (washing hands, using individual towels, and reducing physical affection) “after” COVID-19 are consistent with results from other studies on epidemic or pandemic. In particular, the existence of significant differences in handwashing between men and women were shown in SARS (Lau, Yang, Tsui, & Kim, 2003; Tang & Wong, 2004) or a swine flu pandemic (Jones & Salathe, 2009; Rubin, Amlot, Page, & Wessely, 2009) as well. Women’s preventive behaviors in reducing physical affection and social gathering were still more common before and after the COVID-19 than men.

The findings imply that men have more physical affection and more social gatherings after COVID-19 or women have less physical affection and less social gatherings after COVID-19 compared to before COVID-19. Meanwhile, there was no significant difference in change of behaviors in washing hands and using individual towels between men and women. In addition, the findings from the family distancing efforts “after” COVID-19 (e.g., washing hands and using individual towels) were consistent with the logical assumptions that older adults would take more precautionous actions against COVID-19 due to higher fatality rate (Wu & McGoogan, 2020). However, there was no significant difference in change in family distancing efforts for keeping individual hygiene and reducing indirect contact with family members between younger adults and older adults before and after COVID-19. The findings imply that women and older adults have taken precautions regardless of outbreak of COVID-19, or men and younger adults also have made as much family distancing efforts for keeping individual hygiene and reducing indirect contact with family members as women and older adults did after COVID-19. From our findings, we suggest that the association between gender and preventive behavior would also be linked to more suspicious behaviors of women than men about infectious diseases (Brug et al., 2004).

Second, the findings from our study shed new light on the possibility of applying the stress process model to the family conflict under COVID-19.
Although the stress process model is typically applied to individuals, it was confirmed through the empirical data of this study that it can be extended and applied to family-level stress (Hobfoll & Spielberger, 1992). The stress process model emphasizes that the primary source of stress, such as a stress event, and the secondary source of stress, such as the resulting tension, negatively affects an individual’s mental health. According to the research conducted so far, the spread of COVID-19 is negative for psychological well-being such as stress and depression of individuals (Qiu et al., 2020), but secondary emotions arising from the relational level between families living together have not been shown that it is associated with family conflict. For example, the pandemic affected the quality of the death process within families. Many people with confirmed cases of the coronavirus died alone without their family members in the United States (Burke, 2020, March 29). Remaining family members have often not been allowed or able to attend the funeral, but could only send the decedents off online using Facetime or Zoom without contact (Lozano, 2020). The remaining family members have also suffered from depression and complicated grief because they could not share the decedent’s final moments together as a family (Otani et al., 2017).

The findings from this study suggest that negative emotions derived from how well people follow the request are important for family harmonization. Although the family members’ compliance itself does not affect the conflicts in hygiene, lower compliance with the request is significantly associated with uncomfortable feelings (angry), which in turn also leads to family conflict. According to social psychologists’ point of view, compliance is influenced by construal such as interpretation of social environment and interactions rather than is influenced by personality or characteristics (Aronson, Wilson, & Akert, 2010). Indeed, the different habits among family members are linked to a disagreement between role expectations and role performance, which consequentially causes conflicts among family members (Smetana & Daddis, 2002). If the role expectation by the other family members fits the actual role performance, family relationships can be maintained with consensus. By contrast, if there is a disagreement between role expectation and performance, a conflict between family members occurs (Saxton, 1993). As such, after the outbreak of the COVID-19, people understand and interpret this phenomenon in their way. The negative emotions, which is anger, from family distancing requests between compliance with the request and family conflicts in hygiene imply behaviors between families do not occur in isolation, and the conflict they experience occurs within the context of the family. Some news implies that negative feelings from different levels of compliances can be a trigger conflict or rage. For example, Michigan stores force customers to wear mask rules; however, a disobedient customer shot after an argument with a clerk (Ware, 2020). As such, the emotions from compliance with family distancing requests can be the stepping stone for family harmonization under the COVID-19 pandemic.
Theoretically, conflicts between family members may occur due to different degrees of family distancing. A family is a group of members with different habits and values. Some family members want to keep social distancing at home, while others may deny it because they were already exhausted from social distancing outside. For example, some family members may want to use a separate room at home and ask family members to avoid coming into the room. Other family members may wash hands many times per day and do not share towels in the bathroom, and wear a mask even they are at home. In addition, family members may not comply with the other members’ requests for family distancing efforts. In this case, conflicts between family members may occur, which may lower individual psychological well-being. For example, a person who is very concerned about personal hygiene can ask his/her cohabitant to wash his/her hands and to take a shower after returning home. If the cohabitant complies well with the request, the co-residing person may appreciate it. However, if the cohabitant does not follow the person’s asking, the requesting person may become angry or concern with the possibility of the latent coronavirus spread at home. These all examples imply the existence of conflicts within family members.

In sum, conflicts within the family can arise from different family distancing efforts (e.g., personal hygiene) among family members. For example, one family member may prefer to take a shower immediately after coming back home, washing hands several times per day, and not sharing towels with other family members. That person may feel uncomfortable, annoying, or stressed when a partner or other family member does not have the same family distancing perspective. If the actual efforts fit the expectations well, family members’ positive psychological well-being will be kept under COVID-19.

Finally, the findings from our study have also contributed to the literature by providing the links between social distancing and family distancing. The number of family members living together was significantly associated with conflicts in a social gathering. This estimation result implies that social distancing is connected to family distancing because respondents who live with many family members may expose to the high potential transmission of coronavirus through social gatherings. After the COVID-19 breakout, many news media, reports, and governors often featured young people and asked them to do social distancing more seriously due to the impacts of their behaviors on other family members (Ortiz, 2020). The governors warned those young adults that may have no symptoms, but they can put their family members (e.g., parents or grandparents) in danger when they go back home (O’Kane, 2020). Since there is little empirical research to verify that the youngsters make less effort for social distancing and thus deserve for blames, it needs further study to clarify the relationships.

Moreover, the physical health status is significantly associated with all conflicts due to having different opinions on hygiene, social gathering, and eating habits. Especially, the results support a recent report that there are
conflicts in social gatherings between parents who are more likely to be cautious about the danger of Coronaviruses than their children who want to go out and play with their friends ignoring the threat (Lee & Ward, 2020). Family members who have weak health status may more ask other family members to keep social distancing at home. However, family members who have strong health status may not follow the request, which in turn leads to making a conflict in the family. Our research findings suggest that specific groups of people may need to make more family distancing efforts.

Our study has several limitations. First, we used cross-section data collected through convenience sampling. Respondents who voluntarily participated in this research have different characteristics from the population. Compared with the population information on age and gender from the National Statistical Office, (Statistics Korea, 2019), the participants in our study are younger (mean age = 37.06 years) and more female-oriented (female = 65.1%, male = 34.9%; 53.6 males for every 100 females) than the sample population from the national statistics: age (mean = 44.4 years) and gender (104.6 males for every 100 females in South Korea). In order to have a more accurate interpretation and generalization of the results, more representative samples may be required for the analysis.

In addition, a causal relationship between variables is not clearly revealed because this article used cross-section data. Thus, future studies would be worthwhile to examine the topic by using longitudinal data. Another limitation is the use of self-report data: since there is only one reporter per household about family conflict variables, we could not conduct the dyadic analyses. To consider the dynamics of family members in the family system, we need to examine mutual emotions from dyadic data in the future. Relatedly, the reliability and validity in our study cannot be assessed because we measured a single item for the dependent, explanatory, control, and mediation variables (Byrne, 2013; Hair et al., 2010).

Although we have several limitations in this paper, the findings contribute to expanding our knowledge of family conflict under COVID-19. We introduced the concept of family distancing and examined which variables are associated with family distancing efforts. Family conflicts were associated with relative poorer health, more mental stress, more family members living together, and greater age. In addition, the results show that lower compliance with the request for family distancing is significantly associated with a higher degree of negative emotions (i.e., anger), which in turn was associated with more family conflict. The findings highlight the potential importance of family distancing efforts to understand family conflict.
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Notes
1. The SurveyMonkey is the popular online survey software. https://www.techradar.com/best/best-survey-tools
2. The “Kakao” talk is the most popular messenger that Korean people use (Wise App, 2019), which is available at https://www.wiseapp.co.kr/.
3. Dropping the 95 respondents with missing demographic information may create estimation bias.
4. Non-married respondents do not necessarily mean that they live alone because they can live with their parents or children.

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### Appendix. The Estimation Results with FIML

**Table A1.** Results of Demographic Characteristics on Family Distancing Efforts under COVID-19.

| Variables                  | Pre          | Post          | Change         |
|----------------------------|--------------|---------------|----------------|
|                            | Linear       | Non-linear    | Linear         | Non-linear    | Linear       | Non-linear    |
|                            | b (SE)       | b (SE)        | b (SE)         | b (SE)        | b (SE)       | b (SE)        |
| A. Hand wash               |              |               |                |               |              |               |
| Age                        | 0.01 (0.01)  | 0.02* (0.01)  | 0.01** (0.01)  | 0.02** (0.01) | -0.00 (0.01) | -0.00 (0.01)  |
| Gender (male)              | -0.36** (0.15) | -0.34* (0.14) | -0.21** (0.09) | -0.34* (0.15) | 0.17 (0.13)  | 0.20 (0.14)   |
| Education                  | -0.01 (0.03) | -0.01 (0.03)  | 0.02 (0.02)    | 0.04 (0.03)   | 0.04* (0.02) | 0.05 (0.03)   |
| Married                    | 0.24 (0.17)  | 0.20 (0.16)   | 0.01 (0.10)    | -0.00 (0.20)  | -0.26* (0.14) | -0.34* (0.15) |
| Physical health            | 0.05 (0.08)  | 0.05 (0.07)   | -0.03 (0.05)   | -0.07 (0.08)  | -0.07 (0.07) | -0.05 (0.07)  |
| Mental stress              | 0.02 (0.03)  | 0.02 (0.03)   | 0.03 (0.02)    | 0.04 (0.03)   | -0.00 (0.03) | 0.01 (0.02)   |
| # of family members        | 0.15** (0.06) | 0.16* (0.07)  | 0.14*** (0.04) | 0.26*** (0.07) | -0.01 (0.05) | -0.02 (0.06)  |
| I(Outbreak region)         | -0.09 (0.13) | -0.10 (0.14)  | 0.00 (0.09)    | 0.04 (0.15)   | 0.07 (0.11)  | 0.06 (0.13)   |
| Constant                   | 4.37*** (0.66) | 4.59*** (0.42) | 0.21 (0.56)    |                |               |               |
| R²                         | 0.10         | 0.12          | 0.22           | 0.03           | 0.05          |
| Pseudo R²                  | 0.13         | 0.22          | 0.22           | 0.05           |
| N                          | 324          | 324           | 324            | 324            | 324           | 324           |

(continued)
| Variables                        | Pre                  |          | Post                 |          | Change               |          |
|---------------------------------|----------------------|----------|----------------------|----------|----------------------|----------|
|                                 | Linear b (SE)        | Non-linear b (SE) | Linear b (SE)        | Non-linear b (SE) | Linear b (SE)        | Non-linear b (SE) |
| B. Towel use                    |                      |          |                      |          |                      |          |
| Age                             | 0.00 (0.00)          | 0.01 (0.01) | 0.01* (0.00)         | 0.01 (0.01) | 0.00 (0.00)          | 0.01 (0.01) |
| Gender (male)                   | -0.07 (0.06)         | -0.19 (0.19) | -0.15** (0.06)       | -0.38* (0.17) | -0.07 (0.05)         | -0.27 (0.19) |
| Education                       | -0.01 (0.01)         | -0.02 (0.04) | -0.02 (0.01)         | -0.05 (0.03) | -0.02 (0.01)         | -0.04 (0.04) |
| Married                         | -0.14* (0.08)        | -0.28 (0.21) | -0.11 (0.08)         | -0.20 (0.21) | 0.01 (0.07)          | -0.04 (0.20) |
| Physical health                 | 0.03 (0.03)          | 0.10 (0.11) | -0.00 (0.04)         | 0.01 (0.10) | -0.03 (0.03)         | -0.08 (0.10) |
| Mental stress                   | -0.01 (0.01)         | -0.04 (0.04) | 0.01 (0.01)          | 0.02 (0.04) | 0.02* (0.01)         | 0.06 (0.04) |
| # of family members            | -0.05 (0.03)         | -0.10 (0.08) | -0.02 (0.03)         | -0.04 (0.08) | 0.02 (0.02)          | 0.05 (0.10) |
| I(Outbreak region)             | -0.06 (0.06)         | -0.15 (0.17) | -0.03 (0.06)         | -0.05 (0.16) | 0.04 (0.05)          | 0.16 (0.18) |
| Constant                        | 0.41 (0.26)          | 0.57* (0.30) | 0.21 (0.25)          | 0.06      | 0.09                 |          |
| $R^2$                           | 0.06                 | 0.06     | 0.06                 | 0.06      | 0.06                 | 0.06     |
| Pseudo $R^2$                    |                      |          |                      | 0.06      | 0.09                 |          |
| N                               | 324                  | 324      | 324                  | 324       | 324                  | 324      |
### Table A1. (continued)

| Variables                        | Pre Linear | Pre Non-linear | Post Linear | Post Non-linear | Change Linear | Change Non-linear |
|----------------------------------|------------|----------------|-------------|-----------------|--------------|-------------------|
|                                  | b (SE)     | b (SE)         | b (SE)      | b (SE)          | b (SE)       | b (SE)            |
| C. Physical affection            |            |                |             |                 |              |                   |
| Age                              | -0.08***   | -0.03***       | -0.07***    | -0.03***        | 0.00         | 0.01              |
| Gender (male)                    | -0.66***   | -0.42***       | -0.38**     | -0.28**         | 0.28**       | 0.34**            |
| Education                        | 0.06 (0.05)| 0.03 (0.03)    | 0.10**      | 0.05*           | 0.04         | 0.04              |
| Married                          | 3.02***    | 1.34***        | 2.94***     | 1.31***         | -0.08        | -0.03             |
| Physical health                  | 0.22*      | 0.18*(0.06)    | 0.27**      | 0.20**          | 0.05         | -0.02             |
| Mental stress                    | 0.03 (0.05)| 0.04 (0.03)    | 0.00        | 0.02            | -0.03        | -0.04             |
| # of family members              | 0.22*      | 0.02 (0.07)    | 0.20*       | 0.02            | -0.02        | 0.03              |
| l(Outbreak region)               | -0.37*     | -0.33**        | -0.46**     | -0.38**         | -0.08        | -0.15             |
| Constant                         | 1.62 (1.00)| 0.59 (1.04)    | 0.45        | 0.45            | -1.03        | 0.05              |
| $R^2$                            | 0.50       | 0.45           | 0.46        | 0.45            | 0.04         |                   |
| Pseudo $R^2$                     |            |                |             |                 |              |                   |
| N                                | 324        | 324            | 324         | 324             | 324          | 324               |
Table A1. (continued)

| Variables                  | Pre      |          |          | Post      |          |          | Change   |          |          |
|----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|                            | Linear   | Non-linear | Linear   | Non-linear | Linear   | Non-linear | Linear   | Non-linear | Linear   | Non-linear |
|                            | b (SE)   | b (SE)   | b (SE)   | b (SE)   | b (SE)   | b (SE)   | b (SE)   | b (SE)   | b (SE)   |
| D. Social gathering        |          |          |          |          |          |          |          |          |          |
| Age                        | -0.00 (0.00) | -0.00 (0.01) | -0.01** (0.00) | -0.02** (0.01) | -0.00 (0.00) | -0.01 (0.00) | -0.01 (0.01) | -0.01 (0.01) |
| Gender (male)              | -0.20*** (0.06) | -0.54*** (0.14) | 0.10* (0.06) | 0.32** (0.16) | 0.29*** (0.06) | 0.70*** (0.13) |          |          |
| Education                  | 0.02* (0.01) | 0.06* (0.03) | -0.01 (0.01) | -0.04 (0.04) | -0.03** (0.01) | -0.08** (0.03) |          |          |
| Married                    | -0.18** (0.08) | -0.49** (0.20) | -0.04 (0.06) | -0.09 (0.20) | 0.12 (0.07) | 0.30 (0.17) |          |          |
| Physical health            | 0.09*** (0.03) | 0.24*** (0.10) | 0.03 (0.03) | 0.10 (0.09) | -0.06* (0.03) | -0.15* (0.09) |          |          |
| Mental stress              | 0.01 (0.01) | 0.03 (0.03) | 0.00 (0.01) | 0.01 (0.04) | -0.01 (0.01) | -0.01 (0.03) |          |          |
| # of family number         | 0.05* (0.03) | 0.13* (0.08) | -0.01 (0.02) | -0.06 (0.08) | -0.06** (0.03) | -0.16** (0.07) |          |          |
| I(Outbreak region)         | -0.12** (0.05) | -0.30** (0.15) | -0.11** (0.05) | -0.36** (0.16) | 0.00 (0.06) | 0.00 (0.14) |          |          |
| Constant                   | 0.13 (0.25) | 0.51** (0.23) | 0.38 (0.27) |          |          |          |          |          |
| R²                         | 0.11      | 0.09      | 0.12      |          |          |          |          |          |
| Pseudo R²                  | 0.18      | 0.18      | 0.18      |          |          |          |          |          |
| N                          | 324       | 324       | 324       | 324       | 324       | 324       | 324       | 324       |

Note. Asterisks denote a statistical significance in a two-tailed test. *p < 0.10  **p < 0.05  ***p < 0.01.
Table A2. Results of Demographic Characteristics on Conflicts in Social Gathering and Eating Habit

| Variables                  | Hygiene |                      | Social Gathering |                      | Eating Habit |                      |
|----------------------------|---------|-----------------------|------------------|-----------------------|--------------|-----------------------|
|                            | b (SE)  | b (SE)                | b (SE)           | b (SE)                | b (SE)       | b (SE)                |
| Age                        | 0.01 (0.01) | 0.01 (0.01)          | 0.01 (0.01)      | 0.01 (0.01)          | 0.01***(0.01) | 0.02***(0.01)         |
| Gender                     | 0.03 (0.10) | 0.12 (0.16)          | 0.06 (0.19)      | 0.09 (0.11)          | 0.09 (0.11)  | 0.21 (0.15)           |
| Education                  | 0.00 (0.02) | 0.01 (0.03)          | 0.00 (0.03)      | 0.00 (0.03)          | 0.00 (0.03)  | 0.00 (0.03)           |
| Marital status             | 0.16 (0.13) | 0.20 (0.18)          | 0.20 (0.19)      | 0.25 (0.17)          | 0.08 (0.14)  | 0.07 (0.17)           |
| Physical health status     | 0.25*** (0.06) | 0.35*** (0.07)       | 0.24*** (0.08)   | 0.25*** (0.08)       | 0.19*** (0.05) | 0.29*** (0.08)       |
| Mental stress status       | 0.01 (0.02) | 0.01 (0.03)          | 0.09*** (0.03)   | 0.08*** (0.03)       | 0.06** (0.02) | 0.07** (0.03)         |
| # of family number         | 0.03 (0.05) | 0.01 (0.07)          | 0.14** (0.07)    | 0.15** (0.06)        | 0.08 (0.05)  | 0.10 (0.07)           |
| I(Outbreak region)         | 0.06 (0.11) | 0.08 (0.14)          | 0.03 (0.14)      | 0.04 (0.14)          | -0.06 (0.10) | -0.07 (0.14)          |
| Constant                   | 2.00*** (0.51) | 2.06*** (0.74)       | 1.71*** (0.48)   |                       |              |                       |
| $R^2$                      | 0.11     | 0.11                 | 0.12             |                       |              |                       |
| Pseudo $R^2$               | 0.14     | 0.13                 | 0.15             |                       |              |                       |
| N                          | 324      | 324                  | 324              | 324                   | 324          | 324                   |

Note. Asterisks denote a statistical significance in a two-tailed test. *p < 0.10 ** p < 0.05 *** p < 0.01.
| Variables                                           | Path          | B (SE)       | 95% CI for Indirect Effect |
|-----------------------------------------------------|---------------|--------------|---------------------------|
| **X = Degree of family members' compliance**        | X → M1        | −0.34**(0.10)|                           |
| **M1 = Feeling angry from family members’ compliance** | M1 → Y        | 0.44***(0.06)|                           |
| **M2 = Feeling thankful for family members’ compliance** | X → M1 → Y    | −0.15**(0.05) | −0.24                     |
| **Y = Conflicts in hygiene**                        | X → M2        | 0.61***(0.09)|                           |
|                                                    | M2 → Y        | −0.05 (0.05) |                           |
|                                                    | X → M2 → Y    | −0.03 (0.03) | −0.08                     |
|                                                    | X → Y         | −0.09 (0.08) |                           |

Note. Asterisks denote a statistical significance in a two-tailed test. *p < 0.10 ** p < 0.05 *** p < 0.01.
Nine control variables (age, gender, education, marital status, physical health status, mental stress status, number of family living together, and outbreak region) are included in the current investigation.

Note. b = unstandardized regression coefficients; SE = standard error; Bootstrapped resample is 5000; LLCI = lower level of confidence interval; ULCI = upper level of confidence interval; The confidence intervals reflect a significant indirect effect through not containing zero.