Initial Challenges and Protective Factors for the QOL of Mothers with Young Children during COVID-19: Japan and China

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Abstract:
Over the past two years, COVID-19 has spread rapidly throughout the world and made a significant impact on people's lives. This study focused on the initial influence on families with young children in 2020. We investigated the family environment of Japanese and Chinese families with young children during COVID-19 via a questionnaire survey in 2020. We examined the relationship between the changes in family life environment and the QOL (Quality of Life) of mothers in the two societies. The findings suggest that both in Japan and in China, families with young children met a lot of negative changes (e.g., unable to go outside or meet friends as usual, decrease in income) in the family environment during COVID-19, especially during the confinement period, which challenged the well-being of mothers. Meanwhile, they also perceived some positive changes, such as increased family time. In particular, the increased couple time or father-child time had a positive correlation to a mother's sense of life fulfillment, and consequently, it is the sense of life fulfillment that predicted mothers' QOL. The findings of this study suggest that the difficulties/concerns due to the COVID-19 pandemic, including economic disadvantages were risk factors, whereas the life-fulfillment and good family relationships might play a positive role for mothers' QOL during such a challenging period. The differences in effect of these factors on mothers' well-being between the two societies were also discussed.

Keywords: *COVID-19, mothers, QOL, young children, family environment*

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1. Introduction

Over the past two years, COVID-19 has spread rapidly throughout the world. Many countries have implemented self-restraint on outings (SR) or lockdown policies, which have caused dramatic changes in daily life, especially for families with young children. The parents of young children not only have to deal with changes in their own work environment but also have to manage their children's daily lives, hygiene, and schooling. The dramatic change in the life environment has brought great challenges to the physical and mental health of both parents and children. Kindergarten/school closures force children to stay at home for longer durations, which may increase parenting stress. However, the number of studies that have examined parent mental health is small compared to those that have studied child mental health (Kishida, Tsuda, Waite, Creswell, and Ishikawa, 2021). Moreover, levels of depression and anxiety among the parents of primary, middle, and high school students were shown to be higher than those of the parents of college students (Wu, Xu, Yao, et al., 2020). Thus, this study focused on parents with young children.

According to quantitative surveys in Japan, 18%-30% of parents of young children felt parenting stress during the pandemic, and their mental health deteriorated. For example, approximately 18% of families with younger children aged 0-6 years reported serious mental distress ([COVID×Children Survey] 1st Survey Report, National Center for Child Health, and Development, 2020). In a survey with 2489 mothers of young children, the rate of mothers having severe mental distress increased from 20.9% (February 2020) to 25.3% (June 2020) (Kimura, Ide, and Ojima, 2022). Sueki and Ueda (2020) stated that the stress of having to work at home while taking care of children might cause discord and violence in the home. In a 1984 study, Japanese parents with children and adolescents aged 6–15 years reported that full school closure was associated with much higher scores in both child and parent mental health problems compared to schools being fully open (Kishida et al., 2021). Regarding concerns or worries due to COVID-19, approximately 20%~30% of mothers reported that they felt worried about having less connection to their friends, kindergarten/preschool, or the community (Benesse Institute for Educational Research, 2020). A qualitative study by Nojo, Taguchi, Tanaka, et al. (2021) analyzed the difficulties experienced by guardians of infants due to the COVID-19 pandemic and identified 9 types, such as difficulties due to restraints on going out, closure of nursery schools, lack of play space, lack of physical exercise, or concerns about infection. Case studies such as those of Kasahara (2020) and Kuroki (2020) also reported that a long-term stay at home led to more quarrels between siblings or trouble with neighbors, and parents were worried about their children lacking physical exercise and playing digital games all the time. Anxiety, restlessness, concentration difficulties, tiredness, and infantile regression were observed more frequently than before in parents with young children. On the other hand, Kasahara and Yagi (2020) reported that some parents thought that they were able to understand their children better because they could spend more time with them. A review of the effects of COVID-19 on infants, toddlers, and parents from case studies (Chikazawa, Take, and Sasaki, 2021) stated that some mothers reported that their husbands were more cooperative in helping with household chores after they started to work at home. Additionally, in one online nationwide survey of 1030 mothers with young children aged 0-6 years old in May 2020, approximately 70% of mothers felt both enjoyment and anxiety in raising their children during COVID-19 (Benesse Institute for Educational Research, 2020).

The above is the situation in Japan during the COVID-19 pandemic, especially during the SR period. It is well known that China was the first country that implemented a lockdown in Wuhan after

the breakout of COVID-19. In fact, the Chinese government began to restrict the social activities of the population in late January 2020. What about the parenting environment and well-being of families with young children in China? Have parents in China also received the same impact from the restriction of outings?

Numerous studies have been conducted in China since the COVID-19 outbreak in 2019, and most of the prior research has reported a negative influence on parents' well-being during the lockdown or SR period. For example, during the stay-at-home period, child-care activities and joint activities among family members increased due to the prolonged closed environment for both parents and children (Li, Wang, and Chai, 2021), and conflicts in parent–child relationships were magnified in families (Guo, 2020). Wang, Luo, Zhu, et al. (2021) found that parents had mild or severe emotional anxiety during the pandemic. Yang, Shang, Huang, et al. (2020) investigated the psychological and living conditions of 1889 children during COVID-19 via a self-administered questionnaire and found that 2.7% of parent–child relationships became distant compared with those before the pandemic and that parent–child relationships were related to the age of the children as well as the age of the parents, with younger children and parents under 30 years of age reporting more distant parent–child relationships during the pandemic.

On the other hand, some related studies found that parent–child time increased during the pandemic, parent–child relationships were more harmonious, parental companionship positively influenced the emotions of children aged 3-6, and children's emotional state was good during the pandemic (Ma, Du, Wang et al., 2020). Hu (2020) investigated the current situation of children's home play of sports during the pandemic via a questionnaire, and the results showed that parents spent significantly more time with their children playing games and that the frequency of parent–child interactions increased compared to the pre-pandemic period. From this perspective, the increased parent–child time might be a positive factor for parent–child interaction or parent–child relationships.

As stated above, previous research has reported that both in Japan and in China, the family life environment (such as daily life at home, time spent with family, child-care time, and family relationships mentioned in the above previous research) changed dramatically during the pandemic, affecting the well-being of parents. Most of the previous research confirmed that parents with younger children showed more negative outcomes during the COVID-19 pandemic. However, in a few studies (e.g., Chikazawa, Take, and Sasaki, 2021; Ma et al., 2020), positive changes in couple relationships and parent–child relationships were also suggested. Although there are far fewer positive findings than negative ones, it is necessary to examine the positive changes during the pandemic as well as the negative ones. In fact, most of the previous research focused on negative changes and only used negative indices or scales (e.g., depression, anxiety, stress, psychological distress) to assess the mental health of individuals (Yamamoto, Uchiumi, Suzuki, Yoshimoto, Murillo-Rodriguez, 2020; Kikuchi, Machida, Nakamura, et al., 2020). This study tried to use quality of life (QOL) as a positive index to examine the mental health of parents during the pandemic. QOL refers to one's satisfaction in important domains of life as judged by one's own standards and culture (WHOQOL Group, 1995). As a major indicator of well-being, QOL has been used both in various disciplines and in everyday life (Yoshitake, Sun, Sugawara, et al., 2016).

However, the relationship between parents' QOL and environmental changes due to the COVID-19 pandemic has not been empirically examined in Japan and China, and the risk factors (i.e., factors associated with lower QOL) and the protective factors (factors associated with higher QOL) have not been verified. Another problem is that most of the previous research combined the data of fathers and

mothers in terms of parents' well-being. Given the gender differences and gender roles in most Asian families, it is necessary to examine the well-being of parents by gender or investigate fathers or mothers separately. In fact, it is found that the burden of childcare due to school closures is mainly placed on women, and gender roles tend to lead to increased housework for women when they refrain from going out. These findings have suggested gender differences in the impact of refraining from going out due to COVID-19 (Rabbani, Khan, Piryani, Khan, Abid, 2021; Alon, Coskun, Doepke, Koll, and Tertilt, 2021).

Therefore, this study focused on the well-being of mothers, and the objectives of this study were to 1) investigate the changes in the life environment of families with young children during COVID-19; 2) examine the relationship between environmental changes and the well-being of mothers; 3) identify the risk and protective factors for mothers; and 4) make a cultural comparison between Japan and China. Although Japan and China share some common aspects of Asian culture, the two countries have different social systems and have implemented different anti-COVID-19 measures. Have families with young children in the two countries encountered the same challenges or not? It is necessary to understand the common impacts as well as the unique circumstances in the two countries during COVID-19 so that we can learn from each other and explore effective ways to respond in the case of a pandemic.

Based on the results of the prior studies from Japan and China stated above, it is thought that COVID-19 has led to great changes in family life and had both positive and negative impacts on mothers with young children. The hypotheses of this study are as follows.

Hypothesis 1: The risk factors for mothers' well-being are perceived difficulties in daily life (such as difficulty in obtaining necessities, being unable to go to school/work, and difficulty in balancing work and childcare) due to COVID-19.

Hypothesis 2: Increased family time during SR is a protective factor.

Hypothesis 3: Family relationships are a key factor for the well-being of mothers.

The factors are assumed to have the same effect in different cultures, but the size of the effect might be different in the two countries, given the different social situations of Japan and China. Considering that the Chinese government activated a Level 1 response mechanism for the major sudden public health event and implemented a strict lockdown after the breakout of COVID-19, whereas the Japanese government implemented self-restraint on outings (relatively loose lockdown), it is interesting to compare the influence of the two levels of restraint on family life. It is assumed that the influence on Chinese families might be greater than that on Japanese families. For example, it is predicted that more difficulties in daily life and higher stress might be perceived by Chinese mothers.

2. Method

(1) Procedure

We prepared Japanese and Chinese versions of questionnaires regarding the changes in family life due to COVID-19 and the well-being of mothers during the first SR period (April-May 2020 in Japan and January-February 2020 in China) and at the present time (when the survey was conducted). In Japan, the survey was conducted during September-October 2020 in Osaka, when the number of new infected people each day was not less than that in the first SR period, but self-restraint was not imposed by the government. After the COVID-19 outbreak, Osaka imposed self-restraint on outings from April 7 to May 12 in 2020.

In China, the survey was conducted in Shanghai in November 2020, when the number of new infected people each day was near 0. After the COVID-19 outbreak, the Shanghai government-imposed self-restraint on outings from January 24 (January 24 to February 2 was the Spring Festival holiday), 2020 to March 24, 2020. In early March, kindergartens began online communication with the parents of children, mainly to give advice to help parents with home protection and home child-care.

(2) Participants

Japan: The survey was conducted from September to October 2020 with the cooperation of the registrants of the "Ibaraki Cohort Study" (It is a longitudinal study conducted since 2017 in Ibaraki City, Osaka, so it was called the "Ibaraki Cohort." It aims to investigate the well-being of women from pregnancy to postpartum. The participants were recruited between 2017 and 2018 with the cooperation of Ibaraki City Children's Health Center. Please see more details in Senoo, Sun, Higo, et al. (2020)). Osaka is the economic center of West Japan, and Ibaraki is a suburban city in Osaka. An invitation letter was distributed by email to all 88 registrants who had at least one child aged 0-2 years old at the time of survey implementation. A total of 77 mothers signed the consent form and completed this questionnaire online effectively. The response rate was 88%.

China: Given that most Chinese families with children aged 0-2 years have grandparents taking care of their grandchildren in daily life and the change in parenting environment is thought to be less even during the COVID-19 pandemic, the survey was answered by the mothers of children aged 3-6 years with the cooperation of a kindergarten in Songjiang, Shanghai. Shanghai is the economic center of East China, and Songjiang is a district in Shanghai. An invitation letter was distributed by the kindergarten to the guardians of all 572 children enrolled in this kindergarten. Finally, 560 mothers of the children agreed to participate in the study, signed the consent form and completed the questionnaires online at home. The mean age of the children was 4.72 years (SD = 1.06), and that of the mothers was 33.92 years (SD = 4.10). The response rate was 98%.

(3) Measures

In this study, the questionnaire contained three parts: demographic information, changes in family life environment (FLE) due to the COVID-19 pandemic, and well-being of mothers in the last two weeks and during the first SR period. The following is the detailed content:

Demographic information: family structure (marital status, family member), age, work of parents, age/sex of child(ren), number of children, and hospital visit experience due to physical/mental illness in SR.

Changes in family life during SR: family income decrease ("The household income has decreased or is likely to decrease due to COVID-19"), family time (time spent with family, see detailed items in Table 3), life fulfillment ("I felt more fulfilled in my life"), family relationship ("I felt closer to my family" and "Conflicts between family members increased" (reversal item)). Each item was coded with "yes = 1" and "no = 0." For the perceived difficulties/concerns in daily life (see details in Table 2), one point is added for each item selected (except the item "Conflicts between family members increased"), and higher scores indicate more difficulties and worries.

Well-being of mothers: stress during SR, mothers' quality of life (QOL) in the last two weeks and during the first SR period. This study used the QOLPW (a QOL scale for pregnant or parenting mothers, Sun, Yato, Senoo, et al., 2021) to appraise the QOL of mothers. The scale consists of 21 items, involving 5 items about general QOL and 17 items from five specific dimensions

(psychological health, physical health, social relationships, life environment, and social welfare environment), such as "Do you feel satisfied with your present life?" Mothers were asked to appraise their QOL based on the actual situation at two time points: during the first SR period and the last two weeks (after SR). Items were rated on a four-point scale (from 1 = "not at all" to 4 = "extremely"). The reliability of the scales was α_China =.95; α_Japan =87.

(4) Analysis

First, we compared the QOL scores in the SR period with those in the non-SR period and between Japanese mothers and Chinese mothers using a *t* test. Second, the relationship between mothers' well-being (QOL and perceived stress during SR) and family environment changes (e.g., family time, family relationship, difficulties/concerns) was examined using correlation analysis. Furthermore, the contribution of family environment variables to mothers' QOL was examined by multiple regression. "Income decrease" and "have a job or not in SR" were coded as "yes" =1, and "no" =0.

3. Results

(1) Demographic Statistics

Table 1. Descriptive statistics of demographic variables

	Japan		China	
	n	%	*n*	%
Age(yrs)	77		303*	
20~30	10	13.0	39	12.9
30~40	61	79.2	244	80.5
>40	6	7.8	20	6.6
(*M, SD*)	33.9	4.6	33.9	4.1
Number of children	77		560	
1	29	37.7	297	53.0
2	36	46.8	258	46.1
3	8	10.4	3	0.5
4	4	5.2	2	0.4
(*M, SD*)	1.8	0.8	1.48	0.5
Child's age (years)				
0-2	56	72.7	N/A	N/A
3-6	56	72.7	560	100
>6	24	31.2	N/A	N/A
Family income decrease				
yes	59	76.6	403	72.0
no	16	20.8	157	28.0
Hospital visit experience in SR				
yes	6	7.8	24	4.3
no	71	92.2	536	95.7
Employment in SR				
yes	34	44.20	421	75.20
no	42	54.50	139	24.80

* There are 257 missing data on mothers' age in Chinese data. The *n* here is 303. The *n* for other variables is 560.

Table 1 shows the demographic information of the mothers' age, number of children, work status, hospital visit experience and the frequency of families with income decreased in SR. As 257 Chinese mothers filled in the age of their child instead of their own age in the field of "your age," their data were treated as missing data. According to the basic demographic information collected from the cohort study conducted regularly, among the 77 Japanese mothers, 56 (72.72%) of them had a child aged 3-6 years old at the time the survey was conducted.

(2) Changes in Family Life Environment during SR Period

1) Perceived Difficulties and concerns

Regarding the difficulties and concerns perceived by mothers during the SR period (multiple answer questions), the most common responses in Japan were, in order of frequency, "I could not meet my relatives and friends" (92.21%), "I could not go out as usual" (76.60%), and "My child(ren) could not play outside" (58.44%). In China, the top three were "I could not go out as usual" (64.46%), "My child(ren) spent too much time watching electronic screens "(58.75%), and "My child(ren) could not play outside" (46.79%) (Table 2).

2) Family Life

Except for the negative changes in life brought by COVID-19 as stated above, the positive changes were also reported. In Japan, more than 67% of mothers reported that they felt closer to their families, and 88.21% in China. Further, more than 70% of mothers reported that their family time (among parents and children) increased during SR (see details in Table 3). However, only 38.96% of Japanese mothers felt more fulfilled in their lives, which was much lower than for Chinese mothers (76.07%).

(3) Mothers' Well-being during SR and after SR

According to the results of self-evaluation by the mothers for their own QOL during the survey period (September to October 2020, after the SR period ended) and the SR period, respectively, it was found that the QOL of mothers during the SR period was significantly lower than that in non-SR period (at present, the survey period) both in Japan and in China (Table 4). In addition, we compared the QOL of mothers in the two countries and found that both during SR and after SR, the QOL of Japanese mothers were significantly lower than those of Chinese mothers ($t = -7.80$, $p < .01$).

Table 2. The frequency of difficulties and concerns perceived by mothers during SR

	Japan (n = 77)		China (n = 560)	
Difficulties/concerns during SR (MA questions)	Frequency	%	Frequency	%
I could not go out as usual	59	76.6	361	64.5
I could not buy the necessities of life	20	26.0	25	4.5
Family finances became difficult	6	7.8	40	7.1
Lack of information about the COVID-19 pandemic	11	14.3	21	3.8
I could not meet with relatives and friends	71	92.2	176	31.4
Lack of exercise	35	45.5	209	37.3
Disruptions in the routine of life	18	23.4	110	19.6
Having to look after children due to school closure	42	54.5	85	15.2
My child(ren) could not study at home	4	5.2	73	13.0
My child(ren) could not play outside	45	58.4	262	46.8
My child(ren) could not meet with friends	40	51.9	145	25.9
My child(ren) spent too much time on electronics	25	32.5	329	58.8
I or my husband had some troubles at work	24	31.2	16	2.9
Family members seemed irritable at home	23	29.9	26	4.6
Conflicts between family members increased	19	25.0	21	3.8

Table 3. The frequency of items about changes in family life during SR

	Japan (n = 77)		China (n = 560)	
	Frequency	%	Frequency	%
Mothers' time at home increased	70	90.9	443	79.1
Children's time at home increased	68	88.3	504	90.0
Fathers' time at home increased	60	77.9	420	75.0
Couple time increased	58	75.3	408	72.9
Father-child time increased	61	79.2	431	77.0
Family time increased	66	85.7	452	80.7
I felt more fulfilled in my life	30	39.0	426	76.1
I felt closer to my family members	51	67.1	494	88.2

Table 4. The comparison of mothers' QOL during SR and after SR

	during SR	after SR	
	M(SD)	*M(SD)*	*t*
Japanese_mother	52.79(9.67)	62.76(8.98)	-12.92**
Chinese_mother	63.79(10.56)	72.26(10.08)	-19.74**

** $p < .01$; SR: self-restraint period

(4) Relationship Between Family Environment and Mothers' QOL

In order to clarify the relationship between family environment and the well-being of mothers, the following analyses were conducted:

1) Correlation between Family Environment and Mothers' QOL

The correlations between family environment (e.g., income, number of children, family time, life fulfillment, family relationship, difficulties/concerns during SR), and mothers' well-being (e.g., stress, QOL) were examined. Given there were less than 20 mothers in Japan who reported that they perceived a behavioral change in parent-child interactions, the correlation between variables of behavior changes and the other variables were not analyzed.

The correlation results (Table 5) indicate that both in Japan and China, the increased family time, family relationship, difficulties/concerns, and life fulfillment during SR had a significant correlation to the variables used as mothers' well-being (i.e., stress, QOL). On the other hand, differences were also found between Japan and China. For example, the increased family time had a positive correlation to family relationship ($r = .421$, $p < .01$) in China, but no significant correlation in Japan. The increase in mothers' stay-at-home time ("home time increase mother") had significant positive correlation to mothers' perceived life fulfillment, family relationship, difficulties/concerns, and QOL ($r = .288$, $p < .01$; $r = .350$, $p < .01$; $r = .085$, $p < .05$; $r = .103$, $p < .05$; $r = .115$, $p < .01$) in China, but in Japan mothers' increased time only had significant positive correlation to perceived difficulties/concerns ($r = .310$, $p < .01$). In other words, the increase in mothers' stay-at-home time had a positive association with their well-being in China, but no positive effect and only a negative effect in Japan. In terms of the increase in children's stay-at-home time ("home time increase child"), it had significant positive correlation to mothers' perceived life fulfillment, family relationship and mothers' QOL after SR in China *(*$r = .190$, $p < .01$; $r = .362$, $p < .01$; $r = .087$, $p < .05$), but not in Japan. It implies that the increase in children's stay-at-home time had a positive association with mothers' well-being in China, but no significant influence in Japan. As for the increase in fathers' stay-at-home time ("home time increase father"), it had a significant negative correlation to mothers' perceived difficulties/concerns ($r = -.236$, $p < .05$) in Japan, but not in China. It suggests that the increase in fathers' stay-at-home time had a positive association with mothers' well-being in Japan, but no significant influence in China. In addition, the decrease in family income had significant correlation to family relationship, mothers' perceived difficulties/concerns, stress, QOL_during-SR, QOL_after-SR and mothers' working status in SR ($r = -.135$, $r = .213$, $r = .217$, $r = -.188$, $r = -.163$, $r = -.184$, $p < .01$, respectively) in China, but no significant correlation in Japan.

Table 5. The correlation between mothers' well-being and variables of family environment

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Income_decrease	1	.097	.055	.057	.062	.002	-.039	.058	-.007	-.097*	-.135**	.213**	.217**	-.188**	-.163**	-.184**
2 Age of mother	.049	1	.461**	.014	-.089	.058	.065	.043	.046	.010	.019	.084	.012	-.039	.001	-.072
3 Number of children	-.225*	.244*	1	.053	.011	.066	.108*	.105*	.069	.052	-.000	.099*	-.042	-.061	.009	-.132**
4 Home time increase_mother	.068	-.124	-.010	1	.590**	.616**	.605**	.543**	.728**	.288**	.350**	.085*	.052	.103*	.115**	-.133**
5 Home time increase_child	.105	-.211	.024	.588**	1	.467**	.399**	.411**	.425**	.190**	.362**	.081	.033	.065	.087*	-.026
6 Home time increase_father	-.002	-.146	-.226*	.050	.001	1	.760**	.761**	.606**	.324**	.353**	.065	-.012	.109**	.120**	-.074
7 Couple time increase	-.040	-.041	-.082	.029	-.114	.785**	1	.791**	.689**	.392**	.396**	.038	-.041	.162**	.160**	-.146**
8 Father-child time increase	-.095	-.064	-.225*	-.051	-.087	.731**	.672**	1	.636**	.339**	.307**	.081	-.022	.133**	.141**	-.108*
9 Family time increase	.050	.043	-.039	-.000	-.033	.409**	.541**	.614**	1	.394**	.421**	.088*	.040	.087*	.090*	-.124**
10 Life fulfillment	.125	-.142	-.063	.067	.125	.233*	.334**	.344**	.326**	1	.484**	-.163**	-.222**	.315**	.251**	-.080
11 Family Relationship	-.177	-.248*	-.101	-.001	.048	.234*	.305**	.265*	.195	.426**	1	-.115**	-.170**	.269**	.243**	.004
12 Difficulties/concerns	.039	.233*	.346**	.310**	.088	-.236*	-.291*	-.290*	-.158	-.261*	-.176	1	.332**	-.214**	-.062	-.172**
13 Stress during SR	-.023	.031	-.051	.160	-.041	-.123	-.129	-.053	-.155	-.256*	-.183	.275*	1	-.424**	-.241**	-.077
14 QOL_mother_during SR	-.064	-.065	-.030	.022	.063	.073	.131	.113	.144	.373**	.234*	-.298**	-.338**	1	.516**	.049
15 QOL_mother_after SR	-.157	.039	.072	-.127	-.043	.115	.163	.125	.091	.465**	.345**	-.327**	-.330**	.748**	1	-.002
16 Employment/NA in SR	.246*	.176	-.118	-.171	-.162	-.089	-.153	.010	.144	.140	-.027	-.116	-.150	.145	.181	1

:p<.05;:p<.01;***:p<.001,left_down:Japan,Right_top:China*

2) Multiple Regressions on Mothers' QOL During SR

Based on the results of correlation analysis, five variables of family environment related to COVID-19 were selected (namely, "income decrease," "family relationships," "difficulties/concerns due to the COVID-19," "life fulfillment" and "have a job or not in SR"), and their contribution to the QOL of mothers during SR were examined using stepwise multiple regression analysis and the results showed the variables with predictive power of the discriminant function. Table 6 shows the standardized regression coefficients (β) of variables on QOL_total and each QOL subscale. It indicates that these variables of family environment had different effects on different dimensions of QOL, even when controlling the basic demographic variables (such as age of mother, number of children in a family, hospital visit experience in SR of a mother). Moreover, there were common relationships as well as distinguishable ones among family environment variables and mothers' QOL between Japan and China. For example, in Japan the "difficulties/concerns" (β= -.243, p< .05) and "life fulfillment" (β= .283, p< .05) were associated with the QOL_total, while in China, "income decrease" (β= -.137, p< .05), "family relationship" (β= .206, p< .001), "difficulties/concerns" (β= -.112, p< .05), and "life-fulfillment" (β= .138, p< .05), four variables of family environment were significant predictors of the QOL_total. In Japan, "family relationship" (β= .274, p < .05) and "difficulties/concerns" (β= -.230, p < .05) were predictive of psychological QOL, while in China, "family relationship" (β= .215, p < .001) and "life fulfillment" (β= .167, p < .01) were significant predictors. In terms of physical QOL, in Japan, "hospital visit experience" (β= -.258, p < .05) and "difficulties/concerns" (β= -.325, p < .01) were significant negative predictors, while in China, "income decrease" (β= -.132, p< .05) and "family relationship" (β= .222, p< .001) were significant predictors. In Japan, no variable had significant prediction of mothers' QOL_social, while in China "number of children" (β= -.118, p< .05), "family relationship" (β= .334, p< .001) and "difficulties/concerns" (β= -.128, p< .05) predicted social QOL. As for the environment dimensions of QOL, in Japan "income decrease" had a negative, and "life-fulfillment" had a positive effect on the mothers' QOL_environment1 (i.e., environment in living aspect) (β= -.297, p< .01; β= .277, p< .05), and "have a job or not in SR"

(β= .253, p< .05) was a significant prediction of mothers' QOL in environment2 (environment in medical/welfare aspect). While in China, "income-decrease," "difficulties/concerns" and "life fulfillment" were associated with mothers' QOL_environment1 (β= -.236, p< .001; β= -.132, p< .05; β= .149, p< .01), and "number of children," "family relationship" and "difficulties/concerns" predicted mothers' QOL_enviornment2 (β= -.152, p< .01; β= .189, p< .001; β= -.152, p< .01). In a word, as a common finding, both in Japan and in China, "life-fulfillment" had a significant positive effect on mothers' QOL_total, "income decrease" had a significant negative effect on mothers' QOL in life environment, and no associations were found between the age and mothers' QOL. For Japan, no association was found for the number of children either. For Chinese families, family members' relationships are more important in influencing multiple aspects of mothers' QOL, and whether or not the caregiver had a job during SR had no effect on mothers' QOL. The other variables of family environment (e.g., "family relationship," "difficulties/concerns") had different effects on the specific dimension of QOL between Japan and China.

Table 6. Multiple regression on mothers' QOL during SR (standardized regression coefficient, β)

	QOL					
Japan	Total	Psychological	Physical	Social	Environment1	Environment2
Age of mother	-	-	-	-	-	-
Number of children	-	-	-	-	-	-
Hospital visit experience	-	-	-.258*	-	-	-
Income decrease	-	-	-	-	-.297**	-
Family Relationship	-	.274*	-	-	-	-
Difficulties/concerns	-.243*	-.230*	-.325**	-	-	-
Life-fulfillment	.283*	-	-	-	.277*	-
Employment/NA	-	-	-	-	-	.253*
R2	.174***	.155**	.201***	-	.148**	.064*
China	Total	Psychological	Physical	Social	Environment1	Environment2
Age of mother	-	-	-	-	-	-
Number of children	-.107*	-	-	-.118*	-	-.152**
Hospital visit experience	-	-	-	-	-	-
Income decrease	-.137*	-	-.132*	-	-.236***	-
Family Relationship	.206***	.215***	.222***	.334***	-	.189***
Difficulties/concerns	-.112*	-	-	-.128*	-.132*	-.152**
Life-fulfillment	.138*	.167**	-	-	.149**	-
Employment/NA	-	-	-	-	-	-
R2	.168***	.108***	.077***	.163***	.119***	.099***

:p<.05;:p<.01;***:p<.001; -:the respective predictor was not included in the stepwise model.*

4. Discussion

(1) Changes in Family Environment Due to COVID-19

1) Negative Aspects

The results indicate that most of the mothers, both in Japan and in China, perceived a negative influence of COVID-19 on their daily lives. In particular, they felt various difficulties due to being restrained from going out to meet friends/relatives. Furthermore, "My child(ren) could not play

outside" was a common concern in both countries. This is consistent with the study of Nojo et al. (2021), which also suggested that "unable to play outside" is the greatest difficulty experienced by guardians of infants during the pandemic. On the other hand, there are also some different trends between the two countries. For example, the rate of mothers who reported that their social relationships were interfered with was higher in Japan than in China. On the other hand, more Chinese mothers were concerned about their children's prolonged use of electronic devices. This is probably related to the fact that all the Chinese families in this study had a child aged 3~6 years old who may use electronic devices for education (e.g., online lessons) or pleasure (e.g., watching videos or playing games) more frequently than those under three years old. In China, online education products for young children have recently become prevalent, especially during the SR period. On the other hand, in Japan, although 72.7% of the families had a child aged 3~6 years old, the main target child of the "Ibaraki Cohort" was a 0-2-year-old child. Those mothers with a child under 3 years old probably need more support from their relatives and friends. Although the rate of living together with grandparents is less than 10% in urban areas in Japan, more than 50% of mothers with a child 0-2 years old reported that they had received support from grandparents (not only physical support but also emotional support when needed), as well as other relatives or "mom friends" living nearby (Benesse Institute for Educational Research, 2011). However, during SR, the mothers were not able to meet with the people around them, making it difficult for them to obtain support, which is why approximately 90% of respondents in Japan felt that it was a matter of concern.

In China, since most families live with their grandparents when their children are young (Sun and Jiang, 2021), it is thought that they are able to interact easily with their relatives even during SR. Accordingly, the rate of mothers who chose "I could not meet my relatives and friends" was less than in Japan. However, the results of this study indicate that Chinese mothers felt more worried about the long screen time of their children. Perhaps the implementation of online classes and the use of educational applications became more popular in China during SR than usual (Wu et al., 2021).

Additionally, the rate of Japanese mothers who perceived troubles at work and in family relationships was much higher than that of Chinese mothers. For example, "I or my husband had some troubles at work" (2.86% in China, 30.77% in Japan), "Family members seemed irritable at home" (4.64% in China, 29.49% in Japan), and "Conflict between family members increased" (3.8% in China, 24.4% in Japan). Perhaps as mentioned above, in China, young mothers live near grandparents' homes and use more private child-care support (i.e., support from grandparents or relatives) (Sun and Jiang, 2021; Tong, 2020), so even during the SR period, they could receive support in family life and feel less stress related to work. Perhaps another reason is that a part of the SR period in China was the Spring Festival holiday, and the Chinese government implemented a severe lockdown, so most of the parents had less work during that period and less stress related to work. Regarding the family relationship, although previous Chinese research reported deterioration in the parent–child relationship, the rate was lower than 5% (Yang et al., 2020), less than the rate reported by Japanese mothers in this study. It appears that COVID-19 might have brought more difficulties or concerns to Japanese mothers with young children than to Chinese mothers. Although the restraint on going out was stricter in Shanghai, it seems that the difficulties or concerns due to SR were not as many as we anticipated, even less those that reported by Japanese mothers. Perhaps even living in a condition of strict lockdown, if people have sufficient living materials and support within the family, the negative impact of the pandemic on family life could be mitigated to some extent.

2) Positive Aspects

Although both in Japan and in China, most mothers (approximately 70%~90%) reported that their family time increased during the SR period, the rate of mothers who felt fulfilled in life was much lower in Japan than in China. This indicates that even though the mothers in the two countries felt the same increase in the quantity of family time, the quality of family life they perceived may be different. Regarding family relationships, both the Chinese mothers (88%) and the Japanese mothers (67%) felt closer to their families. However, the rate of family conflicts in Japan was lower than that in China, perhaps related to the result about family conflicts mentioned above (i.e., the rate of mothers who reported an increase in family conflict was higher in Japan than in China). It is speculated that mothers in Japan suffered more stress in their family life due to COVID-19. To examine this speculation, we compared the QOL of mothers in the two countries and confirmed that both during SR and after SR, the QOL of Japanese mothers was significantly lower than that of Chinese mothers. However, the subjective bias problem might also exist in the comparison between China and Japan, since Japanese individuals tend to be more conservative when answering self-appraisal questionnaires (He, 1999). To collect more objective information, data on behavioral changes or appraisals by others may be necessary in the future.

(2) Changes in Mothers' QOL due to COVID-19

The results indicate that both in Japan and in China, the mothers' QOL during SR was significantly lower than that after SR. This finding is consistent with findings using a negative index of well-being, such as increased depressive or anxiety symptoms in parents in Japan (Kimura, Kimura, Ojima, 2020) and China (Wang et al., 2021). Combined with the specific items of difficulties and concerns perceived by mothers, it is thought that the restraint on going out during the pandemic might be the main reason for great changes in family life rather than COVID-19 itself. Although there is still less research comparing the SR period to the non-SR period during the COVID-19 pandemic, Yamamoto et al. (2020) confirmed the psychological impact of SR (from April to May 2020, the same as the SR period in this study) in Japan compared to the previous data before the pandemic. Kishida et al. (2021) also suggested that school closures were associated with more mental health problems in children and parents than schools being open during the same pandemic condition. Further comparison between SR and non-SR periods with the same variables is necessary in the future.

(3) Relationship between Environmental Changes and Mothers' QOL

According to the results of the correlation between family environment changes and mothers' QOL, generally speaking, both in Japan and China, the increase in family time (including mothers/fathers/children's time at home and spending time with family members) had a positive relationship to life fulfillment and family relationships, which were key factors for mothers' QOL.

In Japan, however, the increase in mothers' time at home had no relationship to mothers' sense of life fulfillment, but the increase in couple time/father-child time/family-time had a significantly positive relationship to mothers' sense of life fulfillment. A similar positive association was found between couple time and family relationships. These results suggest that fathers' involvement in family life might have a more significant impact on the quality of family life and family relationships in Japan. Furthermore, the negative correlation between fathers' home-time increase and mothers' perceived difficulties/concerns suggests that the more time a father stayed at home, the fewer difficulties/concerns his wife perceived. This implies that fathers staying at home might relieve

mothers' stress during a challenging period such as COVID-19. This confirmed the important role of a father in a family. A previous study also pointed out that fathers' increased time at home might reduce mothers' psychological distress during COVID-19 (Kimura, Ide, and Ojima, 2022). Conversely, the positive relationship between mothers' home-time increase and their perceived difficulties/concerns implies that in Japan, the more time a mother stayed at home, the more difficulties/concerns she felt. However, no direct correlation was found between the variables of family time and the QOL of mothers. This suggests that the quantity of family time might not be a key factor in the well-being of mothers, but the quality of family life makes a difference, such as life fulfillment and family relationships, which had a significant correlation with mothers' QOL.

In contrast to Japan, all of the variables of family time, not only father-related ones, had a significantly positive association with family relationships and life fulfillment in China. Furthermore, mothers' home-time increase had a positive association with their QOL in China. One explanation is that most Chinese mothers are working mothers (Zhou, 2020), so working at home might reduce the strain of commuting and make them enjoy more family time with the help of grandparents regarding housework. According to the survey by Sun and Jiang (2021), approximately 63% of young couples with young children live together with grandparents, approximately 14% of young families live near grandparents in Shanghai, and grandparents provide strong childcare support. Therefore, working from home might have different effects on mothers' work and life. "Life fulfillment" and "family relationship," as in Japan, had a significantly positive correlation with mothers' QOL in China. Consequently, the influence of the two variables, as key factors, was further examined using multiple regression analysis to compare their effectiveness in the two countries.

The results of multiple regression indicate that both in Japan and in China, mothers' sense of fulfillment in life was a significant predictor of their QOL_total. It confirms that the quality of family life, more than the quantity of family time, affects the well-being of mothers. Additionally, in China, the family relationship was a more general predictor of mothers' QOL_total, QOL_psychological, QOL_physical, QOL_social and QOL_environment2. As mentioned above, in China, the connection within extended families is stronger than that in Japan, and young couples receive more support from grandparents when children are young. Thus, while young couples benefit from the support of grandparents, they also have to suffer the risk of complicated interpersonal relationships within an extended family. Therefore, in China, the family relationship might have more variability and more influence on mothers' QOL. A good family relationship is a protective factor for a mother's well-being, especially during a challenging period.

Another common factor that predicted mothers' QOL was decrease in income. In both Japan and China, a decrease in income had a significant negative association with mothers' QOL in the life environment. This indicates that the challenging financial conditions due to COVID-19 were a risk factor for mothers' QOL in both countries. Although Kikuchi et al. (2020) pointed out the higher risk of low-income people developing SPD (severe psychological distress) during the pandemic, the present study confirmed the risk of income decrease (change) for mothers' QOL. However, in Japan, the decrease in income only affected the QOL on the life environment dimension but had no significant influence on the other dimensions of QOL. In contrast, in China, the decrease in income also had a significantly negative prediction of mothers' QOL_total (i.e., general QOL). This implies that financial conditions might have a wider influence on mothers' QOL in China.

5. Conclusion

Compared to the previous research which largely focused on the negative effects of COVID-19, this study investigated both the positive and negative changes in the family environment of families with young children during the first SR period due to COVID-19. Furthermore, we used a positive psychological index (QOL) to examine the well-being of mothers and explored both protective factors and risk factors in such a challenging situation based on the cultural context.

The findings suggest that both in Japan and in China, families with young children experienced many negative changes (e.g., an inability to go outside or meet friends as usual, a decrease in income) in the family environment during COVID-19, especially during the confinement period, which challenged the well-being of mothers. Both Japanese mothers and Chinese mothers reported lower QOL during SR. On the other hand, they perceived some positive changes, such as increased family time. In particular, increased couple time or father-child time had a positive correlation with a mother's sense of life fulfillment, and consequently, life fulfillment predicted mothers' QOL.

In summary, the findings of this study suggest that the difficulties/concerns due to the COVID-19 pandemic, including economic disadvantage, were risk factors, whereas life fulfillment and good family relationships played a positive role in the well-being of mothers during the challenging SR situation.

Regarding the difference between Japan and China, it was found that Japanese mothers reported lower QOL than Chinese mothers during the first SR period, although we assumed that Japanese families had fewer difficulties under the condition of a relatively loose lockdown. For the factors of QOL, the family relationship showed a more significant effect on mothers' QOL in China. Moreover, the increased stay-at-home time of mothers was found to have different effects on mothers' well-being. In China, it had a positive correlation with family relationships and mothers' QOL, whereas in Japan, it had a stronger positive correlation with their perceived difficulties/concerns. This implies that the same change might have different effects on mothers in different sociocultural contexts.

6. Limitations and Future Direction

Given that both Ibaraki and Songjiang are suburban areas of large cities (Osaka/Shanghai), the two samples of this study are similar and comparable to some extent in terms of geography. However, there are still some limitations to the sampling. First, we used convenience sampling rather than random sampling, which caused the age range of children to not be exactly the same in the two countries. It is necessary to collect more matching data from the two countries to perform further comparisons in the future. Second, there is a large gap in the sample size. A larger Japanese sample is necessary to fill the gap in sample size. Third, the Japanese data were collected by researchers directly, but the Chinese data were collected via a kindergarten. The high response rate reflects that the parents might find it difficult to refuse the survey, and it might increase the possibility of socially desirable responses. However, the high response rate ensured the representativeness of the data, since a response rate of $\geq 80\%$ is expected to reduce the nonresponse bias. The survey in China was anonymous, which is thought to be able to guarantee the authenticity of responses to some extent. In addition, considering that the pandemic was an unexpected event, and it was not easy to collect the same information in two countries simultaneously, the data of this study, with high response rates both in Japan and in China, are considered to be valuable as an initial comparison.

Another limitation is that this study adopted a retrospective survey regarding the situation in the first SR period. Subjective bias may exist when respondents recalled their situation a few months ago, even though the experience during the first SR was thought to be very specific and therefore may be memorable. Furthermore, the implementation date of the survey in Japan is approximately 3 months after the first SR, whereas the implementation date in China is approximately 6 months after the SR, which might lead to a larger bias in recalling the situation in the SR period for Chinese mothers (i.e., an undervaluation or an overvaluation in Chinese mothers).

In terms of the variables, although this study focused on the changes that occurred in the family environment during the pandemic, more basic demographic information, such as living conditions (i.e., living with grandparents or not, house size), family income before the pandemic, and education level of parents, should be collected as the control variables in a multiple regression analysis.

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Appendix 1. The items in each domain of QOL and the Means and SDs.

Domain	During SR				After SR				Items
	Japan		China		Japan		China		
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Psychological	10.58	(3.31)	12.70	(2.40)	12.99	(2.73)	13.71	(2.30)	I feel meaningful being a mother I feel fulfilled being a mother I feel peaceful being a mother I feel I am growing as a human since I became a mother
Physical	12.31	(2.59)	12.34	(1.93)	12.35	(2.18)	13.20	(1.94)	I enjoy eating well I am satisfied with my current health condition I sleep well I have physical pain or discomfort that interferes with my life
Social	9.21	(2.21)	12.31	(2.26)	11.84	(2.08)	13.56	(2.18)	I am satisfied with the support of my friends I am satisfied with my relationships with people around me I have a lot of interaction with friends and acquaintances I am satisfied with my marital relationship
Environment_1	8.17	(2.05)	8.74	(1.89)	9.13	(2.03)	9.78	(1.74)	I am satisfied with the accessibility of childcare support services I am satisfied with the accessibility of medical facilities
Environment_2	3.17	(1.26)	5.90	(1.36)	4.65	(1.29)	6.47	(1.29)	I am satisfied with my current housing conditions I am satisfied with my living environment I am satisfied with my current economic conditions
General	52.68	(9.68)	63.79	(10.56)	62.82	(9.02)	70.33	(10.10)	I enjoy my life now I am satisfied with my life I feel energized in my daily life I am satisfied with myself