

**The COVID-19 Pandemic, Child-Rearing, and Wellbeing:
Evidence from Japanese Panel Data**

by

Keiko Iwasaki^a, Koryu Sato^b, Naoki Kondo^b, and Yasuyuki Sawada^c

Abstract

Parenting under COVID-19 is challenging, with parents facing worries about possible infection of their children, having to meet various needs under social restrictions, and confronting with the future uncertainties over education systems for their children. Accordingly, the elevated mental stress of parents has been anticipated but rigorous empirical evidence is scarce. To bridge the gap in the existing studies, we employ sui generis panel data obtained between March 2019 and March 2021 and test the existence of the COVID-19 threat on the wellbeing of parents. We find the increased level of COVID-19 risk impairs the wellbeing of parents with a child in the final year of senior or junior high school significantly. This implies that COVID-19 caused special stress on parents of a child who are preparing for the next level of education. In addition, we find suggestive evidence that the school closure during the pandemic puts special stress on those who mainly works from home and the state of emergency can make those with preschool children depressive.

Keywords: COVID-19; Child-Rearing; Wellbeing; Happiness; K6

JEL Classification Codes: I18; J13

^a NLI Research Institute, kiwasaki@nli-research.co.jp

^b Faculty of Medicine, Kyoto University

^c Faculty of Economics, University of Tokyo

1. Introduction

Parenting under COVID-19 is challenging, with parents facing worries about possible infection of their children, having to meet various needs under social restrictions, and confronting with the uncertainty in future school systems of their children. Accordingly, the elevated mental stress of parents under the COVID-19 pandemic is predicted, but empirical evidence is scarce (Calvano et al., 2021; Achterberg et al., 2021). To bridge the gap in the existing studies, further investigation is imperative by identifying the potential risk factors for mental wellbeing of parents under the threat of COVID-19. To this aim, we examine if the daily reported number of the COVID-19 cases and government's containment policies heterogeneously affect wellbeing of parents with different ages of children.

2. Research Strategy

The unique panel data was obtained from three rounds of web-based panel surveys: The first round of the survey was conducted in March 2019 (n=6,201); the second round was run from February to March in 2020 (n=6,485); and the third round was implemented from February to March in 2021 (n=5,808). Surveys were targeted to employees of companies and civil servants living in Japan who are 18 to 64 years old. Since the dates of responses in each round of the survey and the prefectures the respondents live vary, our data provides exogenous variations on the level of COVID-19 threats measured by the daily number of the COVID-19 cases, as well as the government's containment policies including school closure and the state of emergency.

The school closure of elementary and junior/senior high schools started on February 27th, 2020 in one of the 47 prefectures and expanded to all other prefectures in March 2nd, 2020, while the survey has been conducted in 2020. As to the state of emergency, at the time the third round of the survey was first distributed on February 27th, 10 prefectures were under the state of emergency. Thereafter, the state of emergency of the 6 prefectures was lifted on February 28th and that of other 4 prefectures was lifted on March 21st, while the survey has been conducted in 2021.

These exogenous variations allow us to adopt quasi-experimental identification strategies to test the existence of the heterogenous impact of the COVID-19 threat and the implementation of governmental policies on parents with a child of different age categories. To formulate an empirical model, we define a treatment variable, *COVID*, an ordered variable of the exposed level of COVID-19, which is measured by the number of daily COVID-19 cases of the prefecture¹ a respondent lives on the day one participated in the survey. Also, we define another treatment variable *Policy*, a dummy variable taking one if one is exposed to government's containment policies. Here, the *Policy* variable takes one if one has a child whose school was closed on the day one participated in the survey for the model regressing wellbeing measures in 2020 while the *Policy* variable takes one if one lives in the prefecture which is under the state of emergency at the time of response for the model regressing the wellbeing

¹ Data obtained by NHK (Japan Broadcasting Corporation)
<https://www3.nhk.or.jp/news/special/coronavirus/data/> (Accessed on May 6th, 2021)

measures in 2021.

Furthermore, the surveys were conducted in February and March when many students in the last year of junior/senior high school are preparing for the entrance examinations and/or new school environment, which is counted as one of the most common, large life-changing events in Japan (Horioka et al., 2002). Therefore, we differentiate the impact of the reported number of COVID-19 cases and contamination policies on parents of those who are preparing for the next level of education, which are 15 years old and 18 years old who are the last years of junior high school and senior high school, respectively. In addition, Since the public senior high school entrance examinations are conducted at different timings depending on prefectures in Japan, and many are conducted in February and March, assuming most of the students go to a public senior high school in their own prefecture, we can estimate the timing of the examination. Accordingly, we accommodate the heterogenous treatment effects by allowing treatment effects are specific to child's age as well as pre-examination status. We set up a standard analysis of covariance (ANCOVA) model to estimate the treatment effects:

$$\begin{aligned}
(1) \quad Y_{it} = & \alpha_0 + \beta COVID_{it} + \delta Policy_{it} + \gamma Y_{it-1} + \sum_j \eta^j 1[Child's Age_{it} = S_j] \\
& + \sum_j \beta^j COVID_{it} \times 1[Child's Age_{it} = S_j] \\
& + \sum_k \beta^{k,pre} COVID_{it} \times 1[Child's Age_{it} = S_j] \times 1[Response_{it} < Exam_{it}] \\
& + \beta^{pre} COVID_{it} \times 1[Response_{it} < Exam_{it}] \\
& + \sum_j \delta^j Policy_{it} \times 1[Child's Age_{it} = S_j] \\
& + \sum_k \delta^{k,pre} Policy_{it} \times 1[Child's Age_{it} = A_k] \times 1[Response_{it} < Exam_{it}] \\
& + \delta^{pre} Policy_{it} \times 1[Response_{it} < Exam_{it}] \\
& + \sum_k \theta^k 1[Child's Age_{it} = S_j] \times 1[Response_{it} < Exam_{it}] \\
& + \theta 1[Response_{it} < Exam_{it}] + X_{it}\beta + \varepsilon_{it},
\end{aligned}$$

where Y_{it} is a measure of wellbeing, including happiness and K6². $1[.]$ is an indicator variable taking one if the specification in the bracket is true. S_j refers to different age categories of a child a parent lives with for which we use six categories: $j=1$ if 6 years old and below (preschool), $j=2$ if 7 to 12 years old (elementary school), $j=3$ if 13 to 18 years old (junior/senior high school), and $j=4$ if 19 years old or older, $j=5$ if 15 years old (preparing for entering high school) and $j=6$ if 18 years old (preparing for entering college). $Response$ indicates the date when the participant responded the survey and $Exam$ refers to the date of the public senior high school examination of the prefecture the participant lives. A_k refers to different age of a child one lives with. Here we use two age categories: 15 years old and 18 years old, who are expected take the entrance exams for senior high schools and colleges. The X is a set of observed control variables and ε is an error term.

² The level of happiness is measured by an 11-point Likert scale general happiness question ranging from 1=Miserable to 11=Very happy. In addition to Happiness, we employ K6 introduced by Kessler et al. (2002) as a wellbeing measure, which is a composite index of six questions on mental health that assigns a maximum of four points to each question for 24 points in total. Here, larger K6 indicates more psychological stress.

3. Empirical results

Table 1 presents the estimation results. The dependent variable in the column (1) is happiness level in 2020, column (2) is K6 in 2020, column (3) is happiness level in 2021, and column (4) is K6 in 2021. Column (1) presents that estimated coefficients of both “Dummy =1 if one has a child (15 years) \times COVID” and “Dummy =1 if one has a child (15 years) \times Dummy =1 if answered before the entrance exam \times COVID” are negative and statistically significant, indicating that happiness level of those who have a child preparing for entering senior high school are negatively affected by the number of COVID-19 cases and it is affected even stronger when their children had not been done with the entrance examination.

Column (2) also shows that the “Dummy =1 if one has a child (15 years) \times Dummy =1 if answered before the entrance exam \times COVID” is positive and significant while “Dummy =1 if one has a child (15 years) \times COVID” is insignificant, indicating the number of COVID-19 cases raise anxiety of those who have 15 years child before the examination. Furthermore, “Dummy =1 if one has a child (18 years) \times COVID” is positive and significant while “Dummy =1 if one has a child (18 years) \times Dummy =1 if answered before the entrance exam \times COVID” is negative and significant, suggesting that the number of COVID-19 cases raise anxiety of those who have 18-year-old child after the examination.

In addition, “Dummy=1 if one works from home (more than 2 times a week) \times Policy” is negative and statistically significant in column (1) and positive and statistically significant in column (2), suggesting that the wellbeing of those who mostly works from home got heterogeneously impacted by the school closure of their children. Furthermore, column (2) shows that “Dummy=1 if one has a child (6 years or younger) \times COVID” is negative and statistically significant implying the COVID-19 threat lowers the anxiety of those who have preschool children.

Column (3) presents that “Dummy =1 if one has a child (15 years) \times COVID” and “Dummy =1 if one has a child (18 years) \times COVID” are both negative and significant. Also, “Dummy =1 if one has a child (18 years) \times COVID” \times Dummy=1 if answered before the entrance exam” is positive and significant. These indicate that the COVID-19 threat can lower the happiness of parents with a child preparing to enter a high school and parents with a child preparing to enter college after the examinations.

In addition, as to the impact of the contamination policy, “Dummy=1 if one has a child (6 years or younger) \times Policy” is negative and significant in column (3) and positive and significant in column (4), indicating that the state of emergency impairs the wellbeing of those who have preschool children.

4. Discussion

In summary, our analysis generates four empirical findings. First, we find that wellbeing of parents who have a child preparing for entering senior high school or college are negatively affected by the daily reported number of COVID-19 cases. The stress was observed, especially among parents of those who were preparing for high school entrance examination in 2020, but also among parents of those who finished the examination both in 2020 and 2021. Second, we find the reported number of COVID-19 cases reduced the stress of parents with a preschool child (6 years or younger) in 2020. One of the

possible reasons for this positive impact might be caused by the reported smaller risk of the COVID-19 infection among small children at that time (AFP, March 14th, 2020). as well as the possible positive impact of caregiving on mental health (Roth et al. 2015; Schulz & Sherwood, 2009; Poulin et al., 2013) These possibilities should be further examined in future study. Third, we find the state of emergency can elevate mental stress of those with a preschool child. Finally, we find that the school closure put special stress on parents who mainly work from home.

Our empirical findings provide a couple of policy implications. First, since our results present that those who have a child preparing for the next level of education get high stress from the threat of the COVID-19, special considerations would be critical to ease the uncertainty of the school system caused by the pandemic for expected students and their parents, such as providing on time information frequently. Also, mental health care needs for parents with small children should be considered when posing the state of emergency. Furthermore, social support and mental health care for working parents should be considered when requesting to close schools. While COVID-19 has brought about long-lasting changes to the global economy, it is up to policymakers to use this opportunity to adapt COVID-19 responses to address longer-term challenges.

Reference

- Achterberg, Michelle, Simone Dobbelaar, Olga D. Boer, and Eveline A. Crone, 2021. "Perceived stress as mediator for longitudinal effects of the COVID-19 lockdown on wellbeing of parents and children." *Scientific Reports* 11, 2971. <https://doi.org/10.1038/s41598-021-81720-8>
- AFP, March 14, 2021. "kodomo wa jyu syouka shinikui ga kansen hiromeru risuku mo" in Japanese. <https://www.afpbb.com/articles/-/3273333>(Accessed May 9th, 2021)
- Calvano, Claudia, Lara Engelke, Jessica Di Bella, Jana Kindermann, Babette Renneberg, and Sibylle M. Winter, 2021. "Families in the COVID-19 pandemic: parental stress, parent mental health and the occurrence of adverse childhood experiences—results of a representative survey in Germany." *European Child & Adolescent Psychiatry*. <https://doi.org/10.1007/s00787-021-01739-0>
- Horioka, Charles Yuji, Akane Murakami, and Miki Kohara, 2002. "How do the Japanese cope with risk?", *Seoul Journal of Economics*, 15(1), 1-30.
- Kessler, Ronald, Gavin Andrews, Lisa Colpe, Hiripi EE, Daniel Mroczek, Sharon-Lise Normand, Ellen Walters, and Alan Zaslavsky, 2002. "Short screening scales to monitor population prevalences and trends in non-specific psychological distress", *Psychological Medicine*, 32, 959-76.
- Poulin, Michael J., Stephanie L. Brown, Amanda J. Dillard, and Dylan M. Smith (2013). "Giving to others and the association between stress and mortality," *American Journal of Public Health*, 103(9), 1649–1655.
- Roth, David L., Lisa Fredman, William E. Haley, 2015. "Informal caregiving and its Impact on health: A reappraisal from population-based studies," *The Gerontologist*, 55 (2), 309–319.
- Schulz, Richard and Paula R Sherwood, 2008. "Physical and mental health effects of family caregiving." *The American Journal of Nursing*, 108 (9), 23-27.

Table 1. Estimation Results of Equation (1)

Dependent variable:	(1) Happiness (2020)	(2) K6 (2020)	(3) Happiness (2021)	(4) K6 (2021)
Y_{t-1}	0.679*** (0.0137)	0.586*** (0.0144)	0.695*** (0.0149)	0.638*** (0.0147)
<i>COVID</i>	0.00848 (0.00693)	-0.00574 (0.0138)	-0.00333 (0.00208)	-0.00437 (0.00618)
Dummy=1 if one has a child (6 years or younger) \times <i>COVID</i>	0.0216 (0.0199)	-0.117** (0.0466)	0.00172 (0.00110)	0.0000237 (0.00318)
Dummy=1 if one has a child (7 years to 12 years) \times <i>COVID</i>	-0.105 (0.106)	-0.310 (0.335)	-0.000401 (0.00123)	0.00455 (0.00291)
Dummy=1 if one has a child (13 years to 18 years) \times <i>COVID</i>	-0.160 (0.114)	-0.299 (0.299)	0.000717 (0.000887)	-0.00108 (0.00446)
Dummy=1 if one has a child (19 years or older) \times <i>COVID</i>	-0.00939 (0.00947)	0.0261 (0.0218)	0.00154 (0.00146)	-0.000578 (0.00262)
Dummy=1 if one has a child (15 years) \times <i>COVID</i>	-0.088*** (0.0321)	-0.155 (0.112)	-0.0088*** (0.00266)	0.0169 (0.0105)
Dummy=1 if one has a child (18 years) \times <i>COVID</i>	-0.0301 (0.0239)	0.123*** (0.0440)	-0.0089*** (0.00256)	0.0112 (0.0104)
Dummy=1 if one has a child (15 years) \times <i>COVID</i>	-0.429* (0.251)	1.736** (0.780)	0.00718 (0.0152)	-0.0120 (0.0379)
\times Dummy=1 if answered before the entrance exam	0.265 (0.401)	-1.785* (0.964)	0.0211* (0.0123)	-0.0372 (0.0285)
Dummy=1 if one has a child (18 years) \times <i>COVID</i>	-0.144 (0.390)	-0.557 (0.854)	-0.422 (0.507)	0.366 (2.001)
<i>Policy</i>				
Dummy=1 if one has a child (6 years or younger) \times <i>Policy</i>			-0.464** (0.222)	1.396*** (0.525)
Dummy=1 if one has a child (7 years to 12 years) \times <i>Policy</i>	0.336 (0.441)	0.791 (0.874)	0.123 (0.227)	-0.743 (0.612)
Dummy=1 if one has a child (13 years to 18 years) \times <i>Policy</i>			0.0905 (0.196)	-0.372 (0.891)
Dummy=1 if one has a child (19 years or older) \times <i>Policy</i>			-0.0856 (0.200)	-0.0261 (0.591)
Dummy=1 if one has a child (15 years) \times <i>Policy</i>	-0.113 (0.560)	1.864 (1.152)	-0.211 (0.454)	-5.400*** (1.403)
Dummy=1 if one has a child (18 years) \times <i>Policy</i>	0.400 (1.088)	-0.613 (2.215)	-3.119*** (0.760)	-1.761 (6.105)
Dummy=1 if one works from home (less than 2 times a week) \times <i>Policy</i>	0.423 (0.430)	-0.539 (0.947)	0.186 (0.165)	-1.010** (0.431)
Dummy=1 if one works from home (more than 2 times a week) \times <i>Policy</i>	-1.785** (0.688)	3.841*** (0.850)	-0.0372 (0.160)	-0.160 (0.414)
<i>Policy</i> \times <i>COVID</i>	0.127 (0.110)	0.279 (0.300)	0.00213 (0.00221)	0.00723 (0.00648)
Dummy=1 if one has a child (15 years) \times <i>Policy</i>	0.539 (1.077)	-1.208 (3.241)	0.202 (0.596)	4.704** (2.184)
\times Dummy=1 if answered before the entrance exam	-1.620 (1.409)	8.213** (4.144)	3.086** (1.187)	2.802 (5.903)
Dummy=1 if one has a child (18 years) \times <i>Policy</i>				
\times Dummy=1 if answered before the entrance exam				
N	6485	6485	5808	5808
Adjusted R-squared	0.332	0.264	0.431	0.358

Notes: The dependent variable is Y_t . For column (1) and (2), *Policy* takes one if one has a child whose school was closed on the day one participated in the survey for column (1) and (2) while it takes one if one lives in the prefecture which is under the state of emergency at the time of response for column (3) and (4). The Cluster robust standard errors (clustered by 110 sex-age-living area groups used to gather the respondents on the online survey) are in parentheses. The constant term is not presented. Other control variables are: child's categorical age dummies, Dummy=1 if answered before the entrance exam, Dummy=1 if one has a child (15 years) \times Dummy=1 if answered before the entrance exam, Dummy=1 if one has a child (18 years) \times Dummy=1 if answered before the entrance exam, *COVID* \times Dummy=1 if answered before the entrance exam, *Policy* \times Dummy=1 if answered before the entrance exam, a dummy variable for female, age, a dummy variable for university graduates, commuting method dummies, a dummy variable for those who live alone, a dummy variables for those who live with a partner, a dummy variables for those who live with parents, a dummy variables for those who live with grandparents, a dummy variable for those who live with someone who need special care, dummies for industrial fields of the company one works for, income dummies, a dummy variable for married respondents, response date dummies, prefecture dummies, frequency of home office dummies, a dummy variable for missing data of Y_{t-1} , and a dummy variable for missing data about the frequency of working from home. Since we include the dummy to measure missing data, Y_{t-1} (Happiness in 2019) include missing data, replaced by 0. Those coefficients are not reported in the table but are available from the corresponding author upon request.

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level.