

# How did you perceive the lifestyle changes caused by the COVID-19 pandemic?

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In this study, we began conducting surveys in April 2020, when COVID-19 infections began to spread, to examine the impact of the related lifestyle changes on well-being during the pandemic. This survey was conducted across all of Japan five times before and after the state of emergency declaration was lifted. We asked the respondents and their partners about their teleworking practices, self-restraint behavior, and subjective well-being and attempted to separate the impact of the government's stay-at-home order from the impact of the survey respondents' behaviors and that of their partners' behavior. The results showed that teleworking during the pandemic may have increased life satisfaction, especially among young people. Although self-restraint behavior reduced well-being among young people, it tended to increase well-being among elderly individuals. On the other hand, self-restraint behavior by partners was found to lead to a decline in well-being among elderly individuals. In addition, we found that both the declaration of a state of emergency and the infection status had little effect on life satisfaction and happiness across all the generation groups. Thus, the results show that lifestyle changes during the pandemic did not necessarily harm well-being, suggesting that the positive or negative impacts of factors differ from generation to generation.

**Key Words:** *Life satisfaction, Happiness, self-restrain, teleworking*

## 1. Introduction

After a case of COVID-19 was reported in Wuhan, China in December 2019, COVID-19 quickly spread worldwide. The World Health Organization (WHO) declared a Public Health Emergency of International Concern (PHEIC) on January 30, 2020, indicating a particular need for an international response; this was followed by an assessment on March 11 that determined that COVID-19 could be characterized as a pandemic<sup>1,2)</sup>. Many countries implemented travel restrictions, curfews, and other measures to control infections, requiring drastic changes in people's daily lives. These movement restrictions included not only cross-border movement but also movement between cities within a country. For example, in the U.S., especially New York State, where the number of infected people was high, a strict lockdown was implemented; companies had to require their employees to stay home or work from home unless it was essential, and fines were imposed on employers who violated this rule. In Europe, the government also established curfew restrictions and imposed

penalties on those who violated them. In France, for example, going out was restricted except for essential shopping. People were required to carry self-report certificates when leaving the house, and fines were imposed for violations.

In Japan, the government recommended the adoption of a new lifestyle in March 2020, and this included refraining from going out and avoiding the "three Cs" (closed spaces, crowded places, and close-contact settings). On April 7 of the same year, a state of emergency was declared in some prefectures, and on April 16, the state of emergency was extended to all the prefectures of Japan. Unlike those implemented in many other countries, the declaration of a state of emergency in Japan was not legally binding on the public, and there were some critical opinions about its effectiveness. However, Mizuno<sup>3)</sup> estimated that the "self-restraint rate," which indicates the extent to which people refrained from going out, reached 40-50% in most prefectures after the declaration of the state of emergency was issued, indicating that the declaration was sufficiently effective even though it did not involve legal binding force.

While public health measures such as ensuring social

distancing and self-restraint are considered essential to contain a virus and thus control the spread of infection<sup>4)</sup>, it has been pointed out that such measures may have a negative impact on mental health. For example, in China, it has been pointed out that measures such as self-restraint cause various psychological problems, although the degree of impact differs depending on gender, age, and social status<sup>5),6)</sup>. Several studies have also reported on the psychological effects of the COVID-19 pandemic, including effects on the relationship between self-restraint requests and health anxiety, financial worry, and loneliness<sup>7),2),16),2)</sup>. Even if a person is not actually infected, these psychological effects may be closely related to his or her satisfaction and happiness with his or her daily life. Trezebinski et al.<sup>8)</sup> found in their mediation analysis that basic hope supports meaning in life and life satisfaction, and increases in the latter two factors result in decreased anxiety and COVID-19 stress. Zacher and Rudolph<sup>9)</sup> also conducted a subjective well-being survey in Germany from December 2019 to May 2020 and analyzed it using a latent growth curve model. They found that although individual differences in life satisfaction are related to controllable stress in oneself and others, the effects of stress appraisals on individual changes in life satisfaction were shown to be small and nonsignificant.

Although many researchers are investigating the relationship between the COVID-19 pandemic and subjective well-being, the results of these studies have been reported to vary by region and survey method<sup>10)</sup>. As pointed out by Zacher and Rudolph<sup>9)</sup>, additional research will be essential in the future.

In this study, we focus on social conditions and individual behaviors (self-restraint and teleworking) during the COVID-19 pandemic in Japan and aim to clarify how these factors affected subjective well-being during this period. To this end, we conducted a total of five surveys throughout Japan over a period of approximately one year beginning in April 2020, when COVID-19 began spreading rapidly. This paper is organized as follows. In Section 2, we clarify the position of this study by reviewing previous studies; in Section 3, we describe the details of the data used in this analysis. In Section 4, we present the results of the analysis and a discussion, and finally, we conclude in Section 5.

## 2. Subjective well-being and the COVID-19 pandemic

In recent years, there has been growing interest not only in economic indicators but also in people's subjective well-being, such as their life satisfaction, happiness and quality of life, and many researchers and policy-makers have conducted studies on the measurement and evaluation of subjective well-being. These studies have shown that subjective well-being is related to various factors other than individual attributes (e.g., gender, age, marriage, and income). For example, The Gallup Organization proposes five components of well-being: the career, social, financial, physical, and community aspects<sup>11)</sup>. The OECD has proposed a well-being index called the Better Life Index, which includes 11 indices: housing, income, jobs, community, education, environment, civic engagement, health, life satisfaction, safety, and work-life balance<sup>12)</sup>. However, the way in which subjective well-being is perceived is not always consistent across countries and regions, which makes it difficult to conduct a unified evaluation. For example, cultural differences have been shown to influence subjective well-being. In Asia, people's happiness level has been shown to increase with other factors, such as appreciation toward others and harmony with nature, whereas the satisfaction of a person's own ego has been shown to enhance well-being in the West<sup>13),14)</sup>. In addition, in contrast to other countries, it has been reported in Japan that the level of a person's well-being does not increase much even in his or her old age<sup>15)</sup>. The Japanese government has also become interested in subjective well-being in recent years, and the Cabinet Office of the Government of Japan has been leading discussions on this topic since 2010<sup>15)</sup>. A report proposed three domains of well-being in Japan, namely, that pertaining to socioeconomic conditions, health, and relatedness. With the spread of COVID-19, many people felt threatened by the risk of death from infection and were suddenly forced to adopt a new lifestyle. The government also declared a state of emergency, requiring restaurants and service establishments to suspend operations or shorten their hours in addition to requiring people to exercise self-restraint. We expect that the COVID-19 pandemic had a direct impact on all components of socioeconomic conditions, health, and relatedness.

In general, deteriorated economic conditions, health, and human relationships harm subjective well-being. However, this does not necessarily mean that the COVID-19 pandemic negatively impacted factors related to these

three domains. While there have been reports on people's increased loneliness and troubles with intimate partners due to a reduction in opportunities to go out as a result of COVID-19-related lockdowns and self-restraint<sup>16),17),18)</sup>, Galdiolo et al.<sup>19)</sup> investigated couples' satisfaction during the COVID-19 lockdowns and found that partners perceived the influence of these lockdowns on couples and family functioning to be increasingly positive over time. Randall et al.<sup>20)</sup> also suggests the possibility that perceived partner positive dyadic coping buffers the negative association between post-COVID-19 psychological distress and relationship quality. In addition, Zacher and Rudolph<sup>9)</sup> found from multiple surveys that not only life satisfaction and positive affect but also negative affect declined after March 2020, and they cited a decrease in affective experiences themselves as a possible explanation.

Therefore, in this study, we focus on the stay-at-home order implemented during the COVID-19 pandemic in Japan and attempt to analyze its effects on subjective well-being based on the actual behaviors exhibited by people. It has been reported that the government's stay-at-home order elicited self-quarantine behavior<sup>21)</sup>. Even when such orders are not legally enforceable, as was the case in Japan, the effect of self-quarantining has been verified through analyses of mobile statistical data<sup>22),23)</sup>. However, as reported by Galdiolo et al.<sup>19)</sup> and Randall et al.<sup>20)</sup>, self-quarantine behaviors have not necessarily had exclusively negative effects. It has also been pointed out that there is considerable heterogeneity across studies<sup>10)</sup>, and cultural variation is considered to be a factor<sup>20)</sup>. The results of studies that focus on specific regions, such as the present study, are important in terms of examining the impact of the COVID-19 pandemic in an integrated manner.

Note that survey-based research is subject to certain limitations related to survey implementation. Even when data from multiple surveys are used, the effects of various events that occur between the surveys may be considered as if they were the effects of a single representative event. For this reason, few studies have been able to separate the impact of the government's stay-at-home order from the impact of actual behaviors. There are many possible reasons why people may have followed the government's request to refrain from going out. In addition to an avoidance of the risk of infection, external factors such as the shortened opening hours of restaurants may also be cited. Another possible reason, for instance, is the perceived stigma of going out. Under the state of emergency, going out was regarded as an antisocial behavior, as it was the so-

cial norm to refrain from going out. It has been pointed out that a fear of being recognized as having been outside the house was a concern under the state of emergency declaration<sup>24)</sup>. These effects were caused by the declaration of the state of emergency and are different from the effects of actual self-restraint behaviors. In addition, although many related studies have been conducted, only a few have utilized longitudinal data during the COVID-19 pandemic. Therefore, while various factors have been identified, few studies have been able to address causal relationships. To overcome these shortcomings, some studies have analyzed the impact of lockdowns based on data such as those on Google trends or the number of counseling sessions conducted<sup>25),26),27)</sup>. In these studies, mental effects are inferred from actual behaviors (e.g., performing a search, making a phone call). However, it is difficult to directly relate an individual's behavior to general indicators such as his or her life satisfaction<sup>28)</sup>.

Hence, this study attempts to separate the impact of the government's stay-at-home order from the impact of the survey respondents' behaviors and that of their partners' behaviors by conducting questionnaire surveys. As previously mentioned, it is difficult to adequately separate events that occurred between two surveys in a questionnaire-based analysis. We conducted a total of five surveys, which are described in detail in Section 3. In particular, we attempted to conduct surveys between and after the declarations of the two states of emergency, which occurred under similar infection situations. Thus, we aimed to clarify the effects that may have been included in the differences between the two state of emergency declarations and to distinguish these from the effects of actual self-restraint behaviors.

### 3. Data

Figure 1 shows the number of newly infected patients and the periods of state of emergency declarations in Japan from the early stages of the spread of COVID-19 infection to April 2021. The number of newly infected patients increased rapidly around late March 2020, especially in Tokyo and other urban areas. Although the spread of the disease was milder than it was in Europe, a state of emergency was declared on April 7 due to a shortage of medical care. The measures implemented in accordance with this declaration covered the seven prefectures of Tokyo, Kanagawa, Saitama, Chiba, Osaka, Hyogo, and Fukuoka and were expanded to cover the entire country on April 16,

2020. Subsequently, the government reduced the number of target areas based on the infection situation and other factors, and the state of emergency was lifted nationwide on May 25, 2020. After the spread of COVID-19 appeared to be under control, the number of infected people began to gradually increase again in late June of the same year, and voluntary self-restraint was again recommended. However, during this so-called second wave, the number of new infections peaked in early August and gradually declined, although a state of emergency was not declared<sup>1</sup>. Although it was hoped that the disease would be eradicated, it was not, and the number of newly infected persons began to increase again around November of the same year. This third wave coincided with the year-end and New Year holidays, which is when travel increases, and infection spread rapidly in the Tokyo metropolitan area as well as the Kansai and Chukyo areas. The number of newly infected persons was extremely high compared to the previous cases; thus, the government declared a state of emergency for the second time on January 7, 2021 for the Tokyo, Saitama, Chiba, and Kanagawa prefectures, and one week later, on January 14, 2021, Tochigi, Gifu, Aichi, Osaka, Hyogo, Kyoto, and Fukuoka were added to the coverage area. The scope of the declaration was subsequently reduced as the number of newly infected cases decreased, and the emergency measures implemented for the third wave were finally lifted on March 21 of the same year.

In this study, we conducted a questionnaire survey on life during the COVID-19 pandemic, covering factors such as life satisfaction, and we targeted all of Japan during the period between the first and third waves of COVID-19. The survey was conducted online by a professional survey company. As shown in Figure 1, the first survey was conducted on April 26, 2020, and the next four surveys were conducted on May 19, 2020; June 30, 2020; February 24, 2021; and March 31, 2021. The survey dates corresponded to the periods when the emergency measures were put into place and after they were lifted to account for the infection situation and the implementation of the emergency measures. In particular, the first, second, and fourth surveys were conducted when emergency measures were being put into place and the number of new patients was decreasing after the declaration of the state of emergency was issued. The first survey was conducted when the entire country was under the declaration, and the second survey was conducted when only some areas were under it. The

third and fifth surveys were conducted after the declarations were lifted and when the number of newly infected patients had begun to increase.

This survey targeted men and women over the age of 18 who were registered with a professional survey company. They provided the survey company with demographic information such as age, gender, occupation, and annual income in advance, and this information was also used in this analysis. Initially, 1149 respondents completed the first survey, and the second and subsequent questionnaires were administered to individuals who had responded to the previous survey. Therefore, the numbers of respondents corresponding to the second survey and the surveys thereafter were 992, 912, 762, and 728, respectively. In other words, there were 728 respondents who responded to all five surveys, and 421 respondents abandoned their responses midway through the survey. The attributes of the respondents are described in Table 1. In addition to providing the aggregate results regarding all the respondent attributes, Table 1 includes the aggregate results regarding the attributes of individuals with complete and incomplete responses (hereafter, the complete and incomplete respondents, respectively).

Focusing first on age, we found that the average age of all the respondents was 52.4 years, while the average age of the complete respondents was slightly higher at 53.5 years. The complete respondents were somewhat older than the incomplete respondents ( $p < 0.01$ ). On the other hand, the results of a  $\chi^2$  test of gender, marital status, and the presence of children did not reveal any significant differences between the complete and incomplete respondents. The sample was roughly evenly split between men and women; moreover, over 60% of the respondents were married and almost 50% had children. The results regarding annual income were significant, and the annual income of the complete respondents was slightly higher than that of the incomplete respondents ( $p = 0.063$ ). Approximately 40% of the respondents had annual income in the range of 2 to 6 million yen. In this analysis, the average value of the selected category (e.g., 1.5 million for the range 1 million-1.99 million) was used as each respondent's annual household income. The respondents' education was categorized as follows: junior high school graduate or lower, high school graduate, junior college/technical school graduate, university graduate, graduate school graduate or higher, and other. The "other" category included those who answered "not educated" or "do not know." Respondents who had graduated from high school, junior college/technical

<sup>1</sup> Although a state of emergency was not declared, some point out that the government's call for restaurants to shorten their hours and for people to refrain from going out was effective<sup>29)</sup>

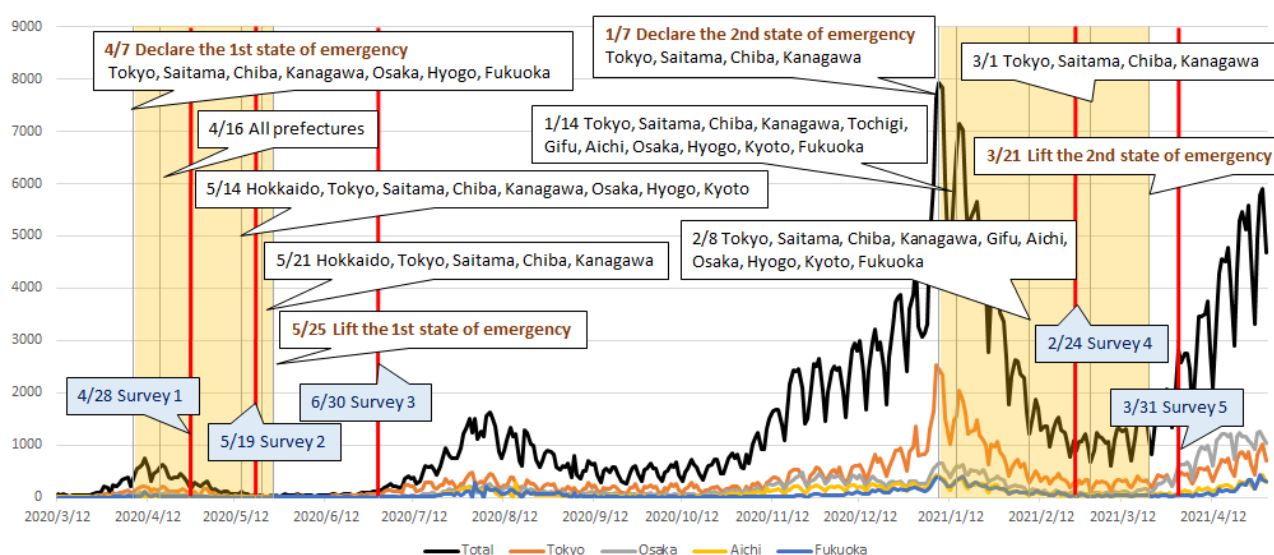


Fig. 1 Number of new infections and emergency declarations issued

school, or university accounted for approximately 90% of the total. There was a significant difference between the complete and incomplete respondents at the 5% level in the  $\chi^2$  test ( $p = 0.044$ ).

From these respondents, we obtained responses on happiness, life satisfaction, health, community, and income change in all five surveys. In the fourth and fifth surveys, we also obtained responses on teleworking status and staying at home to complement the series of surveys. The other variables used in this analysis were a variable denoting the state of emergency declarations and a variable denoting the number of new cases.

**Happiness:** Happiness was rated on a five-point scale, namely, 1-completely unhappy, 2-slightly unhappy, 3-neither, 4-slightly happy, and 5-completely happy, in response to the question, "All in all, how happy are you?"

**Life satisfaction:** Life satisfaction was rated on a five-point scale, namely, 1-completely dissatisfied, 2-slightly dissatisfied, 3-neither, 4-slightly satisfied, and 5-completely satisfied, in response to the question, "All in all, how satisfied are you with your life?"

These were done to give positive situations a higher score.

**Health:** This indicator was used only to determine the respondents' health status at the time of the survey, and the respondents were asked, "How is your overall health?" Therefore, COVID-19 was not mentioned in this question. Responses were given on a 5-point scale as follows: 1 - very bad, 2 - a little bad, 3 - undecided, 4 - a little good, and 5 - very good.

**Community:** To measure their level of attachment to the communities in which they lived, the respondents were asked, "How attached are you to the community in which you live?" A 5-point scale was used: 1-no attachment at all, 2-not much attachment, 3-neither, 4-somewhat attached, 5-very attached.

**Change in income:** In the second and subsequent surveys, the respondents were asked about any changes in household income during the previous two months (Figure 2). The following eight options were offered in response to the question, "Was there any difference in your household income during X (e.g., March) compared to your income before the coronavirus began to spread?": decreased by approximately 50 to 100%, decreased by approximately 10 to 50%, decreased by a few percent to approximately 10%, no change, increased by a few percent to approximately 10%, increased by approximately 10 to 50%, increased by approximately 50 to 100%, increased by more than 100%. The second survey (initiated on May 19, 2020) covered March and April 2020, the third survey (initiated on June 30, 2020) covered May and June 2020, and the fourth survey (initiated on February 24, 2021) covered December 2020 and January 2021. Because all the surveys, including the first one, were conducted at the end of the respective month, we used the responses corresponding to the month in which the survey began to construct the variable for income change in each survey. In addition, since 60 to 70% of the respondents indicated that their income was no different from their income before the COVID-19 pandemic, the data were tabulated

into three groups: those whose household income had decreased (*inc.decrease*), those whose income had remained approximately the same, and those whose income had increased (*inc.increase*). A corresponding dummy variable was created.

Although there are many factors that influence happiness and life satisfaction, CMW<sup>15)</sup> identified "socioeconomic conditions," "health," and "relatedness" as the three main axes in the Japanese subjective well-being survey. Since it has been pointed out that perceptions of happiness are highly dependent on national characteristics<sup>14),30)</sup> and since this survey was conducted in Japan, changes in health, community, and income were used as the three key variables of this study.

**Working from home and self-restraint:** Questions on teleworking and self-restraint were included in the fourth and fifth surveys. The respondents were asked to report on their teleworking and self-restraint status, as well as that of their partners, for each month of the past year. Since it was necessary to go back about one year, to make it as easy as possible for respondents to answer, we asked them to "Select all the months since last year in which more than half of your or your partner's work has been transferred to teleworking. Additionally, please select all the months in which you think you were more cautious about going out than you were before the COVID-19 pandemic." In the fifth survey, a similar question was asked in relation to March 2021. As with the "change in income" question, for these items, the responses corresponding to the month in which the survey was conducted were coded as dummy variables (1 if selected and 0 otherwise). Figure 3 shows the changes in the respondents' teleworking and self-restraint status. The vertical axis shows the percentage of respondents who answered "yes" to the above question; those who answered "no" include the respondents who indicated that they did not have a partner.

The percentages of respondents teleworking and practicing self-restraint increased around March and April 2020 but then declined slightly, and these percentages increased again around November 2020. These results are generally consistent with the number of people infected and the state of emergency declarations.

**State of emergency:** As shown in Figure 1, the periods during which a state of emergency was declared differed by prefecture. Therefore, a dummy variable was used; this variable equaled 1 for prefectures that had declared a state of emergency at the time the focal survey was initiated and 0 for prefectures that had not.

**Infection status:** Two variables were prepared to denote infection status using relevant data at the prefecture level provided by Sapporo Medical University. The first variable was the number of new infections in the week immediately prior to the start of the survey (*num.patients* [1,000 people]); the second was a dummy variable denoting the trend of increasing infections, and it was set to 1 if the number of new infections in the week immediately prior to the survey exceeded the number of new infections two weeks prior to the survey and 0 otherwise (*dmy.patients*).

**Other variables:** We also controlled for personal attributes that are associated with happiness, life satisfaction, and stress in our analysis. Several previous studies have pointed out the impacts of demographics<sup>5),31),32),17),33),34),28)</sup>. In particular, the relationship between age and happiness is said to be a U-shaped curve. Although the increase in happiness observed in old age is lower in Japan than in other countries, we attempted to analyze it by including the square of the age term, following existing studies. In addition, the respondents were categorized into five family composition groups, namely, one person, couple, two generations, three or more generations, and other (dormitory, shared house, etc. ), and these were added as dummy variables (one person was used as the standard). This item was added as a variable because of concerns that it might reflect the effects of the COVID-19 disaster. The increase in time spent at home during the pandemic increased the amount of time spent sharing the same space with family members or roommates. Therefore, we needed to control for family composition in our analysis of the effects of teleworking and self-restraint. In addition, we controlled for the respondents' prefectures of residence and occupation types. There were many regional differences in the status of COVID-19 infections; for example, explosive increases in the number of infections were accelerated in large cities such as Tokyo and tourist destinations such as Okinawa. With regard to occupation, it is easy to imagine that people's risk of infection and changes in work patterns during the pandemic differed depending on their type of occupation. The respondents were classified into 47 prefecture groups according to their place of residence and into 11 occupation categories: full-time employees, contract employees, managers, civil servants, self-employed individuals, freelance workers, medical professionals, homemakers, students, part-time employees, and unemployed individuals.

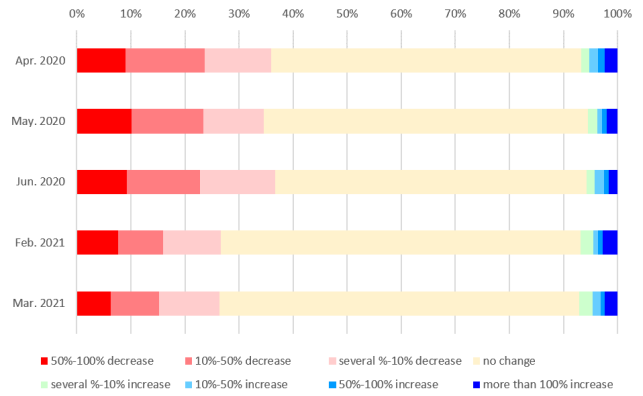
**Table 1** Sample characteristics

| Characteristic                            | Overall<br>(N=1149) | Complete<br>(N=728) | Incomplete<br>(N=421) | <i>p</i> |
|---|---------------------|---------------------|-----------------------|----------|
| <b>Age (years)</b>                        |                     |                     |                       |          |
| M (SD)                                    | 52.4 (14.1)         | 53.5 (13.0)         | 50.4 (15.7)           | < .001   |
| Mdn [min, max]                            | 52 [18, 90]         | 53 [19, 90]         | 51 [18, 80]           |          |
| <b>Gender</b>                             |                     |                     |                       |          |
| Male                                      | 595 (51.8)          | 384 (52.7)          | 211 (50.1)            | 0.390    |
| Female                                    | 554 (48.2)          | 344 (47.3)          | 210 (49.9)            |          |
| <b>Annual household income (mil. Yen)</b> |                     |                     |                       |          |
| 0 - .99                                   | 90 (7.8)            | 58 (8.0)            | 32 (7.6)              | 0.063    |
| 1 - 1.99                                  | 96 (8.4)            | 63 (8.7)            | 33 (7.8)              |          |
| 2 - 2.99                                  | 140 (12.2)          | 80 (11)             | 60 (14.3)             |          |
| 3 - 3.99                                  | 160 (13.9)          | 89 (12.2)           | 71 (16.9)             |          |
| 4 - 4.99                                  | 156 (13.6)          | 111 (15.2)          | 45 (10.7)             |          |
| 5 - 5.99                                  | 118 (10.3)          | 75 (10.3)           | 43 (10.2)             |          |
| 6 - 6.99                                  | 89 (7.7)            | 63 (8.7)            | 26 (6.2)              |          |
| 7 - 7.99                                  | 80 (7.0)            | 49 (6.7)            | 31 (7.4)              |          |
| 8 - 8.99                                  | 45 (3.9)            | 28 (3.8)            | 17 (4.0)              |          |
| 9 - 9.99                                  | 56 (4.9)            | 28 (3.8)            | 28 (6.7)              |          |
| 10 - 11.99                                | 45 (3.9)            | 33 (4.5)            | 12 (2.9)              |          |
| 12 - 14.99                                | 35 (3)              | 26 (3.6)            | 9 (2.1)               |          |
| 15 - 17.99                                | 10 (0.9)            | 8 (1.1)             | 2 (0.5)               |          |
| 18 - 19.99                                | 6 (0.5)             | 4 (0.5)             | 2 (0.5)               |          |
| 20-                                       | 23 (2.0)            | 13 (1.8)            | 10 (2.4)              |          |
| <b>Married</b>                            |                     |                     |                       |          |
| Yes                                       | 727 (63.3)          | 461 (63.3)          | 266 (63.2)            | 0.962    |
| No  | 422 (36.7)          | 267 (36.7)          | 155 (36.8)            |          |
| <b>Child</b>                              |                     |                     |                       |          |
| Yes                                       | 578 (50.3)          | 364 (50.0)          | 214 (50.8)            | 0.785    |
| No  | 571 (49.7)          | 364 (50.0)          | 207 (49.2)            |          |
| <b>Education</b>                          |                     |                     |                       |          |
| Less than junior high school graduate     | 27 (2.3)            | 12 (1.6)            | 15 (3.6)              | 0.044    |
| High school                               | 353 (30.7)          | 243 (33.4)          | 110 (26.1)            |          |
| Junior college or technical college       | 256 (22.3)          | 154 (21.2)          | 102 (24.2)            |          |
| University                                | 436 (37.9)          | 276 (37.9)          | 160 (38.0)            |          |
| Graduated school                          | 56 (4.9)            | 33 (4.5)            | 23 (5.5)              |          |
| Others (no education or I don't know)     | 21 (1.8)            | 11 (1.5)            | 10 (2.4)              |          |
| <b>Happiness</b>                          |                     |                     |                       |          |
| 1 - completely unhappy                    | 75 (6.5)            | 52 (7.1)            | 23 (5.5)              | < .001   |
| 2 - slightly unhappy                      | 289 (25.2)          | 125 (17.2)          | 164 (39.0)            |          |
| 3 - neither                               | 299 (26.0)          | 191 (26.2)          | 108 (25.7)            |          |
| 4 - slightly happy                        | 523 (45.5)          | 323 (44.4)          | 200 (47.5)            |          |
| 5 - completely happy                      | 63 (5.5)            | 37 (5.1)            | 26 (6.2)              |          |
| <b>Life satisfaction</b>                  |                     |                     |                       |          |
| 1 - completely dissatisfied               | 113 (9.8)           | 73 (10.0)           | 40 (9.5)              | 0.271    |
| 2 - slightly dissatisfied                 | 239 (20.8)          | 142 (19.5)          | 97 (23.0)             |          |
| 3 - neither                               | 287 (25.0)          | 193 (26.5)          | 94 (22.3)             |          |
| 4 - slightly satisfied                    | 464 (40.4)          | 295 (40.5)          | 169 (40.1)            |          |
| 5 - completely satisfied                  | 46 (4.0)            | 25 (3.4)            | 21 (5.0)              |          |

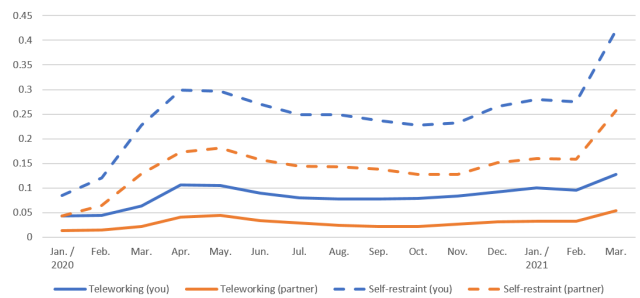
Note: Data are presented as n (%) unless otherwise noted. The *p* value reflects comparison between complete and incomplete respondents.

#### 4. Results and discussion

Using the above data, we analyze the impacts of factors related to the declaration of the state of emergency on subjective well-being. First, Table 2 shows the results of the analysis when life satisfaction (Columns 1-3) and happiness (Columns 4-6) are the explained variables for the respondents as a whole. Here, we show the estimation results of a model estimated based on ordinary least squares (OLS) where prefecture of residence, occupation, family structure, and time are controlled as dummy variables for each explained variable and a fixed-effects (FE) model where time and individual fixed effects are con-



**Fig. 2** Change in income compared to before the COVID-19 pandemic



**Fig. 3** Teleworking and self-restraint status

trolled. For the former, we used two models with different input variables. In the first model, variables related to whether a state of emergency had been declared and the infection status were added in conjunction with demographic variables; in the second model, variables related to changes in income since the beginning of the COVID-19 pandemic (*inc\_decrease*, *inc\_increase*), self-restraint (*SR*) and the working-from-home (*WFH*) status of the respondents and their partners were added. In the FE model, we also included variables denoting changes in income since the beginning of the COVID-19 pandemic, self-restraint and the working-from-home status of the respondents and their partners. Only the variables of interest are highlighted in the tables. (Detailed estimation results are in Tables A and B of the Online Appendix in the separate supplemental material file.)

##### (1) Baseline estimation

Table 2 shows the results regarding the notable variables. The effects of the stay-at-home order and the infection status were considered here by adding as variables the state of emergency declaration status at the time of each survey, the number of new patients in the previous

**Table 2** The relevant results of the OLS and FE analysis of all the data

| Dep. Variable                      | Life satisfaction     |                        |                       | Happiness             |                        |                      |
|------------------------------------|-----------------------|------------------------|-----------------------|-----------------------|------------------------|----------------------|
|                                    | (1)                   | (2)                    | (3)                   | (4)                   | (5)                    | (6)                  |
|                                    | OLS                   | OLS                    | FE                    | OLS                   | OLS                    | FE                   |
| No. Observations                   | 4543                  | 3742                   | 3742                  | 4543                  | 3742                   | 3742                 |
| R-Squared (Within)                 | -                     | -                      | 0.0348                | -                     | -                      | 0.0284               |
| R-Squared (Between)                | -                     | -                      | 0.1740                | -                     | -                      | 0.1254               |
| R-Squared (Overall)                | 0.3775                | 0.3990                 | 0.1432                | 0.3989                | 0.4288                 | 0.1078               |
| <i>inc_decrease</i>                |                       | -0.2605***<br>(0.0327) | -0.0670**<br>(0.0331) |                       | -0.2200***<br>(0.0307) | -0.0359<br>(0.0288)  |
| <i>inc_increase</i>                |                       | -0.0550<br>(0.0625)    | 0.0028<br>(0.0524)    |                       | -0.0192<br>(0.0587)    | 0.0800*<br>(0.0455)  |
| <i>log(income)</i>                 | 0.1622***<br>(0.0221) | 0.1513***<br>(0.0248)  |                       | 0.1327***<br>(0.0208) | 0.1086***<br>(0.0233)  |                      |
| <i>WFH(self)</i>                   |                       | 0.0929*<br>(0.0532)    | 0.1297**<br>(0.0647)  |                       | 0.0497<br>(0.0499)     | -0.0416<br>(0.0562)  |
| <i>WFH(partner)</i>                |                       | -0.0274<br>(0.0766)    | -0.0081<br>(0.0953)   |                       | -0.0918<br>(0.0720)    | -0.0819<br>(0.0828)  |
| <i>SR(self)</i>                    |                       | -0.0706<br>(0.0461)    | -0.1039**<br>(0.0504) |                       | 0.0220<br>(0.0433)     | -0.0050<br>(0.0438)  |
| <i>SR(partner)</i>                 |                       | 0.1974***<br>(0.0563)  | 0.1075*<br>(0.0618)   |                       | 0.1424***<br>(0.0529)  | 0.0412<br>(0.0537)   |
| <i>state of emergency</i>          | 0.0152<br>(0.0547)    | -0.0049<br>(0.0597)    | 0.0069<br>(0.0389)    | 0.029<br>(0.0514)     | 0.0264<br>(0.0561)     | 0.0353<br>(0.0338)   |
| <i>num_patients</i>                | -0.0342<br>(0.0543)   | -0.0161<br>(0.0562)    | -0.0102<br>(0.03672)  | -0.0328<br>(0.0510)   | -0.0196<br>(0.05278)   | -0.0106<br>(0.03192) |
| <i>dmy_patients</i>                | 0.0121<br>(0.0397)    | -0.0018<br>(0.0432)    | 0.0084<br>(0.0282)    | -0.0019<br>(0.0373)   | -0.0067<br>(0.0406)    | 0.0022<br>(0.0245)   |
| <i>num_patients * dmy_patients</i> | -0.0859<br>(0.0548)   | -0.0237<br>(0.056)     | -0.024<br>(0.0365)    | 0.0261<br>(0.0515)    | -0.0187<br>(0.0526)    | -0.0192<br>(0.0317)  |

\*, <.1, \*\*, <.05, \*\*\*, <.01. Std. Errors reported in parentheses.

week, a dummy denoting whether the number of new patients had increased over that of the previous two weeks, and their cross terms, which were not significant and had small estimates in most estimations<sup>2</sup>. In Models (1) and (4), the only variable related to the stay-at-home order was the state of emergency declaration, and self-restraint behaviors and teleworking were not taken into account separately. However, we did not observe any significant effects of the state of emergency declaration itself or the infection situation. Similarly, in Models (2) and (5), which were estimated by OLS, the variables denoting changes in income since the beginning of the pandemic and the self-restraint and teleworking of the respondents and their partners were added, but the estimated coefficients of the state of emergency declaration and the infection situation were small and not significant. The same was true of Models (3) and (6), which were the fixed effects models. In other words, neither the declaration of a state of emergency nor familiar

infection conditions changed life satisfaction or happiness much, and we could not find causal relationships.

In contrast, focusing on Models (2) and (3), which used life satisfaction as the explained variable, the respondents' own teleworking was positively significant, with coefficients estimated at 0.0929 (s.e. 0.0532) and 0.1297 (s.e. 0.0647), respectively. Additionally, the respondents' self-restraint behavior was negatively significant in only Model (3), and the coefficient was -0.1039 (s.e. 0.0504). These results indicate that teleworking generally increases life satisfaction, whereas self-restraint decreases life satisfaction. In addition, it is estimated that the behavior of an individual's partner also affects his or her life satisfaction. The estimated values for partners' teleworking were small and not significant, but those for partners' self-restraint behavior were equal to 0.1974 (s.e. 0.0563) for (2) and 0.1075 (s.e. 0.0618) for (3), both of which were found to be significant. The results suggest that people's life satisfaction increased when their partners refrained from going out. In terms of income, the coefficient of the income decrease dummy was -0.2605 (s.e. 0.0327) and -0.0670 (s.e.

<sup>2</sup> We also analyzed models in which these variables were added independently but did not find significant changes in the estimation results.

0.0331) in Models (2) and (3), and these were both negative and significant results. The income increase dummy was nonsignificant in relation to life satisfaction. Next, focusing on the model with happiness as the explained variable, we find that neither the respondent's own self-restraint behavior (teleworking and self-restraint) nor that of his or her partner is significant for happiness. Model (5) was the only model in which partner self-restraint was positively significant (0.1424; s.e. 0.0529), indicating that the respondents whose partners refrained from going out were slightly happier than those whose partners did not. Regarding changes in income, Model (6) reveals a trend in which happiness increases with an increase in income, albeit at the 10% level of significance (0.0800; s.e. 0.0455).

The above suggests the following effects on well-being brought about by the COVID-19 pandemic in Japan. First, the state of emergency declaration itself had little effect on well-being, and the recent infection situation in the immediate area and the increase or decrease in the number of infected people are not considered to be factors that affect well-being. In Models (1) and (4), other factors related to the declaration of a state of emergency were not included among the variables. Therefore, the effect was estimated as the total impact of the emergency declaration rather than the impact of the emergency declaration itself. One possibility is that the positive and negative factors related to the declaration of a state of emergency could have canceled each other out. Our observation of both positive and negative factors in Models (2) and (5) supports the validity of this hypothesis. Banks et al.<sup>28)</sup> pointed out that mental health may have deteriorated before the lockdown and the stay-at-home order and that it may have stabilized after the lockdown. We consider that the results of this study are consistent with this opinion. In addition, there may be some effects unique to Japan. Although a state of emergency was declared, it was not legally binding. Additionally, surveys of private companies at the time showed a high percentage of support for the declaration of a state of emergency, suggesting that the public wanted a state of emergency to be declared<sup>3</sup>. However, although this study focused on teleworking, self-restraint behavior, and partner relationships, it cannot be said that the state of the emergency declaration itself had no effect since some fac-

tors could not be separated from the effects of the state of emergency declaration, such as exercise. In terms of actual behavior, it could be suggested that subjective well-being may be affected by individuals' behavior and that of their partners. In particular, both an individual's behaviors and those of his or her partner are factors that affect life satisfaction, and their effects are not necessarily negative. The results of this study show that teleworking independently leads to an increase in life satisfaction. Although expectations regarding the potential benefits of teleworking were high before the pandemic, there were concerns about the physical and mental health effects<sup>38),39),40)</sup>. In addition to the benefits of reduced commute time and increased free time, a benefit that may cause many people to consider working from home is the ability to reduce the risk of infection, which is an advantage in a pandemic. Relationships with close partners may also be involved; Galdiolo et al.<sup>19)</sup> pointed out that opportunities for communication that arise during lockdown increase couples' well-being. Teleworking increases these opportunities by causing people to be at home. While self-restraint was shown to have a negative impact on life satisfaction, the results regarding partners' self-restraint were favorable, suggesting that the increase in time spent together at home during the pandemic was viewed positively by the respondents to this survey.

## (2) Generational differences

Next, we attempted to analyze the differences in effects across generations by creating subgroups for each generation. In the previous analysis, we included age and its square term as variables to account for age differences, but previous studies have pointed out that perceptions of the effects of the pandemic vary greatly depending on age. Klaiber et al.<sup>33)</sup> also found that during the pandemic, young and middle-aged people faced more interpersonal conflicts and work- and family-related daily stressors. On the other hand, older adults were less concerned about the threat of COVID-19 and had better affective well-being. Bruine de Bruin<sup>34)</sup> also reported that elderly people have a more optimistic outlook on COVID-19. Therefore, we also divided the data into three groups according to the respondents' ages to examine these differences in the studied effects. Here, the respondents were categorized into three groups (young, middle-aged, and elderly), namely, under 40 years old, between 40 and 59 years old, and over 60 years old, with sample sizes of 545 (222 respondents), 1901 (544 respondents), and 1296 (383 respondents), respectively.

Graphs depicting the average life satisfaction and hap-

<sup>3</sup> For example, the following articles are available. Eighty-four percent of the respondents to a certain survey were in favor of the nationwide expansion of the first declaration of a state of emergency<sup>35)</sup>. A total of 72.5% were in favor of the second state of emergency declaration<sup>36)</sup>. A total of 43.3% of the respondents (27.1% in favor) were against the lifting of the second state of emergency declaration on March 21<sup>37)</sup>.

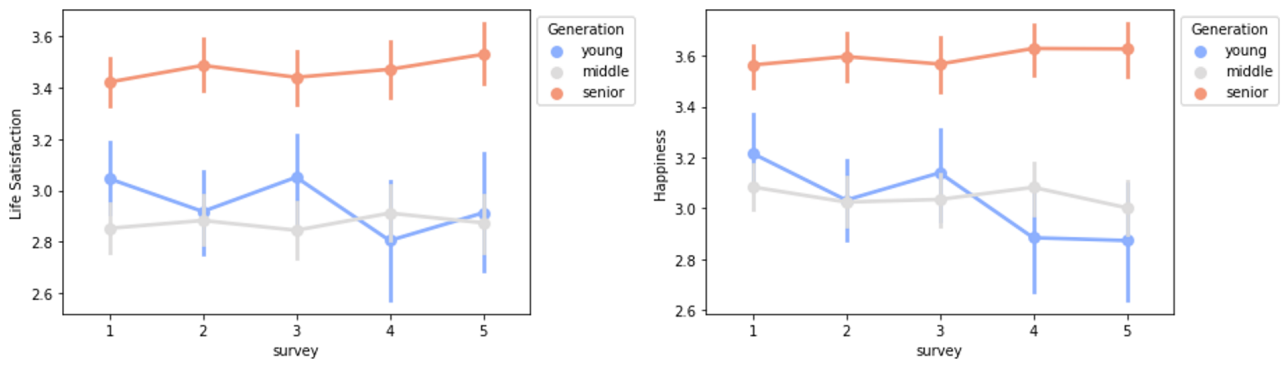


Fig. 4 Differences in life satisfaction and happiness by generation

piness of each group are shown in Figure 4. These figures clearly show that the scores of the elderly group were higher than those of the other groups. In addition, the youngest group showed greater variation across the surveys than the other groups. Helliwell et al.<sup>11)</sup> also surveyed people's level of well-being during the pandemic by generation, and similar to the present study, a high level of well-being was observed among elderly individuals. However, the survey showed that the youngest group exhibited little variation over the survey period, while the middle-aged and elderly groups showed similar levels of variation. This may be due to the influence of the survey area and the timing of the survey, but there are commonly large differences across generations; moreover, the relatively similar patterns of variation of the middle-aged and elderly groups may be a common feature of the two groups.

Subsequently, OLS and FE analyses were conducted for each of the subgroups. The life satisfaction and happiness estimates are shown in Table 3. These results show that the estimated values and their significance differ considerably by generation. As was the case with our analysis of all the data, both the declaration of a state of emergency and the infection status had little effect on life satisfaction and happiness across all the generation groups. Models (1) through (6) use life satisfaction as the explained variable. When we focus on the respondents' teleworking in these models, the estimated values are the highest in the young group (0.3923, s.e. 0.1691) when analyzed with FE, and the estimated values decrease as age increases. Significance was found in only the model for the young group. Conversely, the estimated value of the respondents' self-restraint was -0.2575 (s.e. 0.1224) for the youngest group and -0.0931 (s.e. 0.0673) and 0.0237 (s.e. 0.1072) for the middle-aged and elderly groups, respectively; this result indicate a gradually decreasing effect. As was the case with teleworking,

significance was confirmed for only the young group. The variables related to partner behavior were not significant according to our FE analysis. However, in the OLS models, partner self-restraint behavior was significant for all generations. In the young group, those whose partners exhibited self-restraint tended to be more satisfied with their lives, but this trend reversed with increasing age. Particularly in the older age groups, life satisfaction tended to be low not only among those whose partners were not going out but also among those whose partners were teleworking. The effect of changes in income observed in the overall analysis was not found to be significant in the FE analysis of the subgroups.

Next, we turn to Models (7) to (12), in which happiness is the explained variable. In the OLS analysis, the coefficients of the self-restraint behavior of the respondents were -0.4470 (s.e. 0.1247), -0.0009 (s.e. 0.0572), and 0.0009 (s.e. 0.0572) for the young, middle-aged, and elderly groups, respectively, while an effect of teleworking on the level of happiness was not observed. In other words, the level of happiness of the self-restraint group tends to be lower than that of the young group, but this difference disappears almost completely in the middle-aged group; moreover, in the elderly group, self-restraining individuals have a higher level of happiness. In contrast, the coefficients of the partners' self-restraint behavior were estimated to be 0.6373 (s.e., 0.1995), 0.1655 (s.e., 0.0712), and -0.1956 (s.e., 0.0953), indicating that the happiness level of those whose partners practice self-restraint is higher in the young group; however, this tendency is reversed in the elderly group. These results are consistent with those of the analysis of life satisfaction. In the FE analysis, significant differences were found in only the elderly group, with the coefficient of self-restraint behavior estimated at 0.2051 (s.e. 0.0918) and that of partner

Table 3 The relevant results of the OLS and FE analyses of the subgrouped data

| Dep. Variable                      | Life satisfaction      |                       |                        |                     |                        |                     | Happiness              |                      |                        |                     |                        |                       |
|------------------------------------|------------------------|-----------------------|------------------------|---------------------|------------------------|---------------------|------------------------|----------------------|------------------------|---------------------|------------------------|-----------------------|
|                                    | young (-39)            |                       | middle-aged (40-59)    |                     | elderly (60-)          |                     | young (-39)            |                      | middle-aged (40-59)    |                     | elderly (60-)          |                       |
|                                    | (1)                    | (2)                   | (3)                    | (4)                 | (5)                    | (6)                 | (7)                    | (8)                  | (9)                    | (10)                | (11)                   | (12)                  |
| Estimator                          | OLS                    | FE                    | OLS                    | FE                  | OLS                    | FE                  | OLS                    | FE                   | OLS                    | FE                  | OLS                    | FE                    |
| No. Observations                   | 545                    | 545                   | 1901                   | 1901                | 1296                   | 1296                | 545                    | 545                  | 1901                   | 1901                | 1296                   | 1296                  |
| R-Squared (Within)                 |                        | 0.1113                |                        | 0.0321              |                        | 0.0322              |                        | 0.0802               |                        | 0.0348              |                        | 0.0370                |
| R-Squared (Between)                |                        | 0.2598                |                        | 0.1789              |                        | 0.1274              |                        | 0.1839               |                        | 0.1224              |                        | 0.0774                |
| R-Squared (Overall)                | 0.6024                 | 0.2251                | 0.4057                 | 0.1448              | 0.4198                 | 0.1047              | 0.6173                 | 0.1633               | 0.4479                 | 0.1076              | 0.4341                 | 0.0681                |
| <i>inc_decrease</i>                | -0.0693<br>(0.0927)    | -0.0809<br>(0.0889)   | -0.2716***<br>(0.0450) | -0.0607<br>(0.0473) | -0.2800***<br>(0.0555) | -0.0688<br>(0.0543) | -0.1378<br>(0.0919)    | -0.1582*<br>(0.0868) | -0.1827***<br>(0.0419) | -0.0145<br>(0.0395) | -0.2026***<br>(0.0505) | 0.0056<br>(0.0465)    |
| <i>inc_increase</i>                | 0.1435<br>(0.1575)     | 0.1276<br>(0.1417)    | -0.0207<br>(0.0905)    | -0.0375<br>(0.0776) | -0.1253<br>(0.0997)    | 0.0034<br>(0.0808)  | 0.2494<br>(0.1563)     | 0.2037<br>(0.1382)   | 0.0130<br>(0.0843)     | 0.0755<br>(0.0649)  | -0.0547<br>(0.0908)    | 0.0248<br>(0.0692)    |
| <i>log(income)</i>                 | -0.0978<br>(0.0840)    |                       | 0.2595***<br>(0.0373)  |                     | 0.1080***<br>(0.0396)  |                     | 0.0501<br>(0.0833)     |                      | 0.2251***<br>(0.0347)  |                     | 0.0075<br>(0.0361)     |                       |
| <i>WFH(self)</i>                   | 0.2113<br>(0.1641)     | 0.3923**<br>(0.1691)  | 0.0350<br>(0.0668)     | 0.1021<br>(0.0848)  | 0.2216*<br>(0.1136)    | 0.0452<br>(0.1427)  | 0.0784<br>(0.1628)     | 0.0227<br>(0.1650)   | -0.0212<br>(0.0622)    | -0.0524<br>(0.0710) | 0.1557<br>(0.1034)     | -0.0343<br>(0.1222)   |
| <i>WFH(partner)</i>                | 0.0828<br>(0.2548)     | -0.4287<br>(0.2802)   | 0.0686<br>(0.0922)     | 0.0507<br>(0.1107)  | -0.4770***<br>(0.1782) | 0.1122<br>(0.5603)  | -0.1338<br>(0.2528)    | -0.4272<br>(0.2734)  | -0.0861<br>(0.0859)    | -0.0347<br>(0.0926) | -0.2604<br>(0.1623)    | 0.1491<br>(0.4799)    |
| <i>SR(self)</i>                    | -0.5811***<br>(0.1257) | -0.2575**<br>(0.1224) | -0.1069*<br>(0.0614)   | -0.0931<br>(0.0673) | 0.3258***<br>(0.1001)  | 0.0237<br>(0.1072)  | -0.4470***<br>(0.1247) | -0.0709<br>(0.1194)  | 0.0009<br>(0.0572)     | -0.0411<br>(0.0563) | 0.3993***<br>(0.0911)  | 0.2051**<br>(0.0918)  |
| <i>SR(partner)</i>                 | 0.7163***<br>(0.2011)  | 0.1710<br>(0.2118)    | 0.1978***<br>(0.0765)  | 0.1418<br>(0.0868)  | -0.1940*<br>(0.1091)   | -0.0341<br>(0.1112) | 0.6373***<br>(0.1995)  | 0.2460<br>(0.2066)   | 0.1655**<br>(0.0712)   | 0.0976<br>(0.0726)  | -0.2440**<br>(0.0994)  | -0.1956**<br>(0.0953) |
| <i>state of emergency</i>          | -0.1716<br>(0.1463)    | -0.1221<br>(0.1132)   | 0.0119<br>(0.0857)     | 0.0309<br>(0.0584)  | 0.0010<br>(0.0867)     | 0.0062<br>(0.0580)  | -0.0372<br>(0.1451)    | -0.0093<br>(0.1104)  | 0.0583<br>(0.0798)     | 0.0830*<br>(0.0489) | -0.0344<br>(0.0790)    | -0.0268<br>(0.0497)   |
| <i>num_patients</i>                | -0.0802<br>(0.1498)    | -0.0688<br>(0.1158)   | 0.0158<br>(0.076)      | 0.0262<br>(0.0524)  | -0.0753<br>(0.0834)    | -0.0501<br>(0.0561) | 0.0509<br>(0.1486)     | 0.0596<br>(0.113)    | -0.0225<br>(0.0707)    | -0.0031<br>(0.0439) | -0.0749<br>(0.0759)    | -0.0523<br>(0.048)    |
| <i>dmy_patients</i>                | 2.831e-05<br>(0.1042)  | 0.0265<br>(0.0808)    | 0.0122<br>(0.0625)     | 0.0215<br>(0.0425)  | -0.0156<br>(0.0618)    | -0.0136<br>(0.0413) | -0.0250<br>(0.1034)    | -0.0208<br>(0.0788)  | -0.0084<br>(0.0582)    | 0.0129<br>(0.0356)  | 0.0049<br>(0.0563)     | 0.0096<br>(0.0354)    |
| <i>num_patients * dmy_patients</i> | 0.0162<br>(0.1503)     | 0.061<br>(0.1162)     | -0.0439<br>(0.0761)    | -0.0501<br>(0.0517) | -0.003<br>(0.0845)     | -0.0203<br>(0.0569) | -0.058<br>(0.1491)     | -0.007<br>(0.1134)   | 0.0156<br>(0.0709)     | 0.0054<br>(0.0432)  | -0.0558<br>(0.077)     | -0.0708<br>(0.0487)   |
| Control                            |                        |                       |                        |                     |                        |                     |                        |                      |                        |                     |                        |                       |
| time                               | yes                    |                       | yes                    |                     | yes                    |                     | yes                    |                      | yes                    |                     | yes                    |                       |
| prefecture                         | yes                    |                       | yes                    |                     | yes                    |                     | yes                    |                      | yes                    |                     | yes                    |                       |
| job                                | yes                    |                       | yes                    |                     | yes                    |                     | yes                    |                      | yes                    |                     | yes                    |                       |

\*: $<.1$ , \*\*: $<.05$ , \*\*\*: $<.01$ . Std. errors are reported in parentheses

self-restraint behavior at -0.1956 (s.e. 0.0953). With regard to the impact of the pandemic on income, in contrast to the results of the overall analysis, there was no increase in happiness due to increased income. The OLS analysis estimated a negative value for the effect of the decrease in income, and this effect was significant for the middle-aged and elderly groups. The young group was the only group where a negative causality was observed in the FE analysis.

The above results indicate the following. The declaration of a state of emergency and the infection status was shown to have little impact on subjective well-being in the analysis by generation, as was the case with the overall estimates, and there were no differences across the age groups. The largest differences between the age groups were due to the behavior of the respondents and their partners. While teleworking improved life satisfaction in the overall estimation, positive significance was observed in only the young group in the generational analysis. According to Cabinet Office<sup>41)</sup>, 21.5% of people in Japan were teleworking as of December 2020, and more than half of them hoped that more than 50% of their work would consist of teleworking in the future. In addition, the results showed that a large percentage of young people changed their attitudes toward work-life balance, placing greater

importance on their lives rather than on their jobs; indeed, compared to the period before the spread of the infectious disease, such attitudes tended to be stronger among young people. Moreover, the top two advantages of teleworking were shown to be the elimination of the need to commute and the effective use of spare time, which suggests that teleworking is favored by young people who wish to focus on their daily lives. The fact that young people are more likely to adapt to new approaches and situations may also be a factor in this causal relationship among young people. The characteristics of self-restraint behavior also varied significantly across generations. While self-restraint behavior tended to be associated with lower life satisfaction and happiness in the young group, the correlation was reversed as the respondents' ages increased. Causality was observed in only the young group in relation to life satisfaction and in the elderly group in relation to happiness. Klaiber et al.<sup>33)</sup> found that elderly individuals report more positive events in their daily diary data. These results suggest that elderly individuals may have been able to enjoy their self-restrained situation more, such as by finding new pleasure in their situations. In contrast, the opposite trend was observed in relation to partner self-restraint behavior. In the young group, life satisfaction and happi-

ness were higher for those whose partners practiced self-restraint, whereas these factors were lower for the older group whose partners did so. Various possible explanations come to mind for this result. In a survey by Cabinet Office<sup>41)</sup>, more than 80% of the respondents who reported increased time spent with their families during the pandemic indicated that they would like to maintain this time with their families in the future. In addition, more than 40% of those who reported an increase in the husband's role in child-rearing and household chores and of those who reported an increase in both roles reported an improvement in their marital relationship, while less than 20% of those who reported an increase in the wife's role reported an improvement in their marital relationship. In the young group, the division of household chores and child-rearing was altered by the pandemic, which may have resulted in the improvement of relationships. Many of the couples in the elderly group had already finished child-rearing, and the burden of household chores may have been placed on only one of the spouses, but this study cannot indicate the reason for this.

## 5. Conclusion

In this study, we conducted a series of surveys covering approximately one year and starting in April 2020, when COVID-19 infections began to spread. By separating the teleworking and self-restraint behavior of the survey respondents and their partners during the pandemic from the effects of the state of emergency declaration, we revealed that the lifestyle changes that arose during the pandemic did not necessarily harm well-being. It also became clear that the effects of these actions during the pandemic varied greatly across generations. For example, a causal relationship emerged in which teleworking increased life satisfaction in the young group of respondents; however, this effect was small, and causality was not observed in the middle-aged and elderly groups. In addition, while in the young group, there was a negative correlation between subjective well-being and self-restraint behavior and a positive correlation with the self-restraint behavior of partners, the opposite was true in the elderly group. The reason for these results is thought to stem from differences in how different generations perceive various behaviors adopted under the state of emergency declaration. The government's stay-at-home order may have been perceived by young people as a constraint. On the other hand, elderly people may have viewed it more optimistically, choosing to use their time in

a meaningful way, as shown by Klaiber et al.<sup>33)</sup> and Bruine de Bruin<sup>34)</sup>. Conversely, the effect of the self-restraint behavior of partners is presumably a reflection of relationships with family members or close partners and of factors such as life-work balance.

In addition, this study suggests that pandemic-induced lifestyle changes have both positive and negative effects on subjective well-being. Therefore, considering the impact of lockdowns or stay-at-home orders as a single overall impact would lead to variation across studies, as Prati et al.<sup>10)</sup> point out. In this study, the results show that the impact of the state of emergency declaration is almost negligible through a separation of the impact of teleworking and self-restraint behavior. This may be due in part to the fact that there has been a high level of support for the state of emergency declaration in Japan, but the limitation of this study should also be understood. Although we considered the behavior of the respondents and their partners in addition to the state of emergency declaration and the daily changes in the number of infected persons, not all the behavioral changes stemming from stay-at-home orders could be captured as variables. For example, the frequencies of exercise and shopping for daily necessities are possible factors, but they were not taken into account in this study. Since the timing of the emergency declaration and its lifting differ from prefecture to prefecture, the variables in our analysis represent simply whether a state of emergency had been declared in the focal area. Therefore, it is difficult to conduct a more detailed analysis focused on factors such as changes within the period when the state of emergency was in place. To better clarify such factors, a more advanced analysis, such as one that combines different approaches in addition to the questionnaire survey, is necessary.

Several years have passed since the pandemic occurred, but its aftermath is still ongoing. We need to continue to investigate and accumulate knowledge not only on the short-term effects of the pandemic on well-being but also on its long-term effects. In addition to differences in gender and age, differences in the government response, national character, and culture have significant impacts. The accumulation of these findings will provide effective countermeasures against similar risks in the future.

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