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Social Costs of COVID-19 and the Nature of Behavioral Change

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Abstract

The coronavirus disease 2019 (COVID-19) pandemic has not only caused widespread medical damage in terms of death, severe illness, and sequelae, but also economic damage, including bankruptcy, business closures, and unemployment resulting from measures such as the state of emergency declared in Japan aimed at preventing the spread of infection. In addition, there is a fear of becoming infected with the disease. The abovementioned economic losses have resulted in further consequences, including increased domestic violence due to the need to stay at home, increased prevalence of depression, education stagnation due to the closure of schools, and loneliness due to cessation of human interaction. In this paper, we estimate the social costs of the COVID-19 pandemic and clarifying the nature of people's behavioral changes. This research is important for evaluating the policies that have been implemented so far to combat infectious diseases. In addition, we clarified what factors determine the evaluation of policies such as the basic income policy, and what factors determine the abovementioned societal changes in consciousness that serve as the basis for behavioral changes based on support or disapproval of the Swedish strategy.

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has not only caused widespread medical damage in terms of death, severe illness, and sequelae, but also economic damage, including bankruptcy, business closures, and unemployment resulting from measures such as the state of emergency declared in Japan aimed at preventing the

spread of infection. In addition, there is a fear of becoming infected with the disease. The abovementioned economic losses have resulted in further consequences, including increased domestic violence due to the need to stay at home, increased prevalence of depression, education stagnation due to the closure of schools, and loneliness due to cessation of human interaction.

Accurately understanding the social costs of the COVID-19 pandemic and clarifying the nature of people's behavioral changes are important tasks for evidence-based evaluation of the policies that have been implemented so far to combat infectious diseases. These tasks are essential to considering appropriate responses to the threat of infectious diseases that are expected to continue in the future.

Many researchers have investigated the effects of the COVID-19 pandemic on society. Barceló and Sheen (2020) empirically identified barriers to wearing masks, and found that individuals who are younger, more educated, less sensitive to infection, and more introverted are more likely to refuse to wear masks. Ebuenyi (2020) empirically showed that the risk of COVID-19 infection depends on social factors such as poverty as well as health and hygiene status, suggesting the need for reform of the social system in order to combat infectious diseases. Hall et al. (2020) empirically demonstrated the magnitude of the trade-off between preventing the spread of COVID-19 infection and the economy, showing that a mortality rate of 0.44% results in an economic loss of 28%. Tisdell (2020) empirically demonstrated the effectiveness of public policies in preventing the spread of COVID-19, with particular critical examination of the proposition that lockdowns are effective in preventing the spread of COVID-19. His paper poses questions regarding the extent to which individual freedom of choice should be restricted, and the conditions under which policies to prevent the spread of infection can be balanced while minimizing economic costs. Algara et. al.

(2021) empirically analyzed how scientific knowledge influences behavioral change amid the COVID-19 pandemic, providing a comparative behavioral analysis of the various stresses and social problems caused by COVID-19 policies.

Considering the abovementioned studies, the present study aimed to empirically clarify the state of behavioral changes in the general population for preventing the spread of COVID-19 in Japan and to analyze societal changes in consciousness that serve as the basis for behavioral changes and their impact on well-being. In addition, we clarified what factors determine the evaluation of policies such as the basic income policy, and what factors determine the abovementioned societal changes in consciousness that serve as the basis for behavioral changes based on support or disapproval of the Swedish strategy.

The structure of this paper is as follows. Section 2 provides an overview of the data, and Section 3 clarifies the state of behavioral changes toward measures that have been put in place in order to prevent the spread of infection. Section 4 empirically analyzes the impact of behavioral changes and changes in consciousness using estimates of compensation income. Section 5 analyzes the determinants of attitudes toward the basic income policy, and Section 6 examines the relationship between support for or disapproval of the Swedish strategy and attitudes toward infection prevention.

2. Overview of data

The data analyzed in this study were derived from a questionnaire survey entitled “Impact of the Spread of a New Type of Virus Infection on Society and the Economy” conducted September 8–9, 2020. The survey was part of the

“Research Project on COVID-19 Infections” at Doshisha University. Of the 13,502 questionnaires distributed, 2,274 were returned completed (16.8% response rate). After excluding responses those takes quite short time in answering, finally 2,183 were included in the analysis.

The demographic composition of the respondents by age group and the percentage by gender was found to be nearly equal to the actual demographic composition. That is, men were 49.3%, women were 50.7%, those aged less than 40 years were 29.4%, those aged between 40 and 60 years were 36.5%, and those aged over 60 years were 34.2%. When preparing the survey questions, we referred to part of a report by the National Institute for Research Advancement (NIRA) Research Institute (2020).

The data in Table 1 show distributions according to city size, final education, occupation, and personal income before taxes. Large cities were the areas of residence for nearly 40% of the respondents, and a university degree or higher was held by about 50% of the respondents. Retail, transportation and communication, and service industries accounted for 3.8%, 3.8%, and 21.7% of all occupation categories, respectively, and these industries continue to be severely affected by the COVID-19 pandemic. In addition, an annual personal income of less than 6 million yen before tax was reported by 85.1% of the respondents.

Table 1 Distribution of respondents according to city size, education, occupation and annual personal income before tax.

City size	%	Final education	%	Occupation	%	Individual annual income before taxation (10,000 yen)	%
Large city(population of one million or larger)	38.4	Junior high school graduates	1.88	Agriculture, forestry and fisheries	0.6	0～200	45.4
Middle City(population	15.8	High school graduate	27.71	Construction	4.1	201～600	39.7

of less than one million)							
Other cities	38.9	Colleges, vocational	19.10	Manufacturing	11.1	601～1000	11.5
Towns or villages	6.8	Graduated from university	45.76	Wholesale business	2.6	1000～	3.4
Total	100.0	Graduate School	5.22	Retail	3.8	Total	100
		Total	99.68	Finance and Insurance	2.5		
				Real Estate	1.9		
				Transportation and Telecommunications	3.8		
				Electric gas	0.7		
				Service industry	21.7		
				Others	8.5		
				Unemployed	38.7		
				Total	100		

3. Behavioral changes toward measures implemented to prevent the spread of infection

3.1 Determinants of wearing masks

In Japan, it is not uncommon to see people wearing masks of their own volition in daily life for various reasons such as to prevent the spread of airborne diseases including the common cold, and to protect themselves from getting sick. However, since COVID-19 began to spread, nearly everyone now wears a mask in almost all public places. Wearing a mask can be inconvenient, bringing about issues such as feeling suffocated and not being able to see each other’s mouths, which makes smooth communication difficult to achieve. Despite these problems, many people still wear masks. So, why have people been wearing masks since COVID-19 began to spread?

There are five factors that address the question posed above, and each have their own corresponding questions that are answered according to a 5-point scale (where 1 = strongly agree and 5 = strongly disagree). The five factors and corresponding questions are as follows.

1) Intention to take preventive measures: After learning that the COVID-19 epidemic had become a pandemic (early February), did you try to take preventive actions (infection avoidance actions)?

2) Attitude toward the effectiveness of infection prevention measures: Do you think that preventive actions (infection avoidance actions) are effective in avoiding infection from COVID-19?

3) Subjective norm: To what extent do you think your family and friends expect you to avoid contracting COVID-19?

4) Knowledge of infection prevention measures: Do you know how to avoid contracting COVID-19 (infection avoidance behavior)?

5) Risk-averse attitude: When you go out, do you usually bring an umbrella if there is a chance of rain according to the weather forecast?

The mean value of question 2) was the highest at 4.17. The second highest one is question 1).

The question on the reasons for wearing a mask was asked as follows, using a 5-point scale (where 1 = don't think so at all and 5 = strongly agree).

To what extent do you support the following reasons for wearing a mask?

1. I think it is necessary to prevent the spread of infectious diseases.

2. I am simply following the rules given by my company, etc.

3. I feel that I will be blamed if I do not wear a mask.

4. Because others around me are wearing masks, it would be bad for them if I don't wear one too.

5. I feel like I will be left out if I don't wear a mask.

The first is answer option is a medical reason, but many people cite "peer pressure" as the reason for wearing a mask. According to Konoue and Sato (2020, p. 5), peer pressure means yielding to the command to follow the "atmosphere" of the majority or mainstream group. They point out that a system unique to Japan called *seken* is at the root of this "pressure to conform". The direct translation of *seken* is "society." However, it has special additional meanings such as the mutual monitoring system. The authors also point out that there are four rules that constitute *seken*: the rule of return, the rule of status, the rule of human egalitarianism, and the rule of witchcraft (Konoue and Sato, 2020, Part 1). In the present survey, we assumed the questions in the present survey followed the rule of return and the rule of human egalitarianism. The rule of return can be seen in answer option 4, where we see that people around us are wearing masks, so we consider not wearing a mask as bad in return. The rule of human egalitarianism is observed in answer options 2, 3, and 5, which express how we spend time with one another and that we have the same friends, and are represented by exchanges such as "thank you for the other day" and "please keep in touch".

In terms of the status of the responses, the medical reason (I think it is necessary to prevent infectious diseases and to prevent their spread) has the highest mean value as a reason for wearing a mask (see descriptive statistics Table 2). The reason, "I feel that I will be blamed if I do not wear a mask," has the next highest mean value followed by "Because others around me are wearing masks, it would be bad for them if I don't wear one too". Thus, the medical reason was found to provide a greater motivation to wear a mask compared with peer pressure.

Next, we attempted to analyze the determinants of wearing masks. The estimated equation for the determinants of wearing masks is shown in equation (1).

$$Mask_i = \alpha + \beta Z_i + \gamma X_i + \varepsilon_i . \quad (1)$$

Here, subscript i is individual i, $Mask_i$ is the variable for wearing a mask when going out, Z_i is a vector of variables consisting of five factors that generally influence infection prevention behavior, X_i is a vector of socioeconomic attributes of individual i, β and γ are vectors of the coefficients of the explanatory variables, and ε is the error term. When estimating equation (1), the five factors mentioned above are separately estimated as explanatory variables.

The estimation results are shown in Table 2. Model 1 is the estimation result in which variables excluding control variables are the explanatory variables, and Model 2 is the estimation result in which the control variables are included in the explanatory variables. When the control variables were included in the explanatory variables, “I feel that I will be blamed if I do not wear a mask” became non-significant, and “I feel like I will be left out if I don’t wear a mask” became significant at 10%.

Factors that influence general infection prevention behavior, such as intentions, attitudes, norms, and knowledge about infection prevention, were all found to be significant at the 1% level. Among those with a high level of knowledge about general infection prevention measures, the use of masks decreased, but among those with a high level of other factors influencing infection prevention behavior, the extent of mask use increased. This was considered to be a reasonable result.

As shown in models 1 and 2, “Because others around me are wearing masks, it would be bad for them if I don’t wear one too ” (the rule of return) takes a positive sign and contributes to mask wearing. On closer examination of

the details of peer pressure in models 1 and 2, “I am simply following the rules given by my company, etc.” has a negative coefficient, suggesting that those who responded with this reason tend not to wear masks in places where the rules do not apply. This can be interpreted to mean that these respondents had doubts about the medical reason for wearing masks but wore them because of corporate rules. In terms of the control variables, women tended to wear masks more often compared with men, and in terms of age, those who tended to not wear masks were in their late 40s, with a U-shaped distribution. High school graduates tended to wear masks less often compared with middle school graduates, and those who were unemployed also tended not to wear masks.

We found that there was a correlation between the five reasons (items) for wearing masks, and that the coefficients changed depending on the combination of items. Therefore, we performed principal component analysis of the five items in response to the question about the reason why respondents wore masks, as shown in Table 3)[[Please update the reasons in the table to match the wordings used in the manuscript.]]. The first component was strongly correlated with the instructions of companies and other organizations and the rules of public constructs, which we called the sympathetic pressure component. The second component was strongly correlated with the medical reason, so we called this the medical reasons component. The same estimation using these two components led to models 3 and 4 in Table 2. Model 3 is the estimation result in which variables other than the control variables are the explanatory variables, and model 4 is the estimation result in which the control variables are the explanatory variables. Using these models, the results were the same, indicating that the presence or absence of the control variables was not important. In both models 3 and 4, the medical reason component, “I think it is necessary to prevent infectious diseases and to prevent their spread” was the most common reason for wearing masks, with a coefficient value about

twice as large as that of the synchronous pressure component. (In Table 2, the standardized coefficients are not shown, but they are parallel to the magnitude of the regression coefficients.)

Table 2 Estimated results: determinants of wearing masks

			Explained variable: Mask when you go out. 1=Not applicable at all,...,5=Very applicable			
			Model 1	Model 2	Model 3	Model 4
Factors that generally affect infection prevention behavior	Intended to take infection prevention measures		0.178	0.1642	0.184	0.1712
			[8.76] ***	[8.06] ***	[9.05] ***	[8.40] ***
	Attitude toward effectiveness of infection prevention measures		0.0727	0.069	0.0859	0.0825
			[2.89] ***	[2.75] ***	[3.44] ***	[3.30] ***
	Subjective norms		0.0571	0.0638	0.0562	0.0626
			[3.22] ***	[3.49] ***	[3.15] ***	[3.41] ***
	Knowledge of infection prevention measures		-0.1018	-0.0988	-0.0988	-0.096
			[-4.88] ***	[-4.72] ***	[-4.73] ***	[-4.57] ***
Reasons for wearing a mask	Medical reasons	I think it is necessary to prevent the spread of infectious diseases	0.3137	0.3052		
			[13.66] ***	[13.21] ***		
	Tuning pressure	I am simply following the rules given by my company, etc.	-0.0339	-0.0343		
			[-2.29] **	[-2.31] **		
		I feel that I will be blamed if I do not wear a mask	0.0474	0.0275		
			[2.16] **	[1.24]		
		Because others around me are wearing masks, it would be bad for them if I don't wear one too	0.0609	0.0592		
			[2.79] ***	[2.71] ***		
		I feel like I will be left out if I don't wear a mask	0.023	0.0316		
			[1.28]	[1.75] *		
	Tuning pressure component				0.1121	0.1028
					[7.32] ***	[6.68] ***
	Ingredients for medical reasons				0.2731	0.2621
					[14.44] ***	[13.65] ***
Risk aversion attitude	Risk aversion attitude			0.0089		0.0078
				[1.02]		[0.90]
Income	Income (10,000 yen)			-0.0001		0
				[-0.01]		[-0.00]
Marital Status	Unmarried (Ref)					
	Married			0.0547		0.0535
				[1.44]		[1.40]
	Divorce			0.0745		0.0581
				[0.98]		[0.76]
	Bereavement			0.0787		0.06
				[0.75]		[0.57]
Gender	Male (Ref)					
	Women			0.1412		0.1317
				[3.87] ***		[3.61] ***
Age	Age			0.0751		0.0693
				[2.20] **		[2.03] **
	Age square			-0.0043		-0.0039
				[-2.16] **		[-1.93] *
Education	Junior high school graduate (ref)					
	High school graduates, vocational school graduates (including vocational schools), technical college graduates, junior college graduates			-0.104		-0.1113
				[-3.12] ***		[-3.33] ***
	Graduated from university and graduate school			-0.9294		-0.9443
				[-2.73] ***		[-2.76] ***
	Don't know			-0.028		-0.0274
				[-1.94] *		[-1.91] *
Employment status	Management and Executives			0.0026		-0.013
				[0.03]		[-0.13]
	Full-time and full-time employees with regular employment(Ref)					
	.					
	Contracts, temporary staffing, dispatch, part-time jobs, internal employment, etc.			-0.049		-0.0511
				[-0.95]		[-0.98]
	Self-employed			0.0579		0.0423
				[0.81]		[0.59]

	Students		-0.1792		-0.1887
			[-1.17]		[-1.23]
	Unemployed		-0.1094		-0.1158
			[-1.98] **		[-2.09] **
	Others		0.0201		0.0143
			[0.15]		[0.11]
City size	Large city		0.0512		0.0545
			[0.79]		[0.84]
	Middle City		0.015		0.0219
			[0.21]		[0.31]
	Other cities		0.0134		0.0094
			[0.21]		[0.15]
	Towns or villages(ref)				
	Constant	2.0519	1.9166	3.6772	3.4736
		[18.55] ***	[9.95] ***	[32.55] ***	[17.98] ***
	Adj-r-squared	0.3161	0.3314	0.3112	0.3258
	N	1944	1944	1944	1944
Note)* ,**and* indicate significant at 10%, 5% and 1% levels, respectively. [ ] is a t-value.					

Table 3 Reason for wearing a mask: principal component analysis

	The first Principal Component	The second Principal Component
I feel like I will be left out if I don't wear a mask	0.822	-0.06
Because others around me are wearing masks, it would be bad for them if I don't wear one too	0.814	0.238
I feel that I will be blamed if I do not wear a mask.	0.793	0.2
I am simply following the rules given by my company, etc.	0.69	-0.492
I think it is necessary to prevent the spread of infectious diseases	0.128	0.891

3.2 Behavioral changes and changes in consciousness brought about by COVID-19

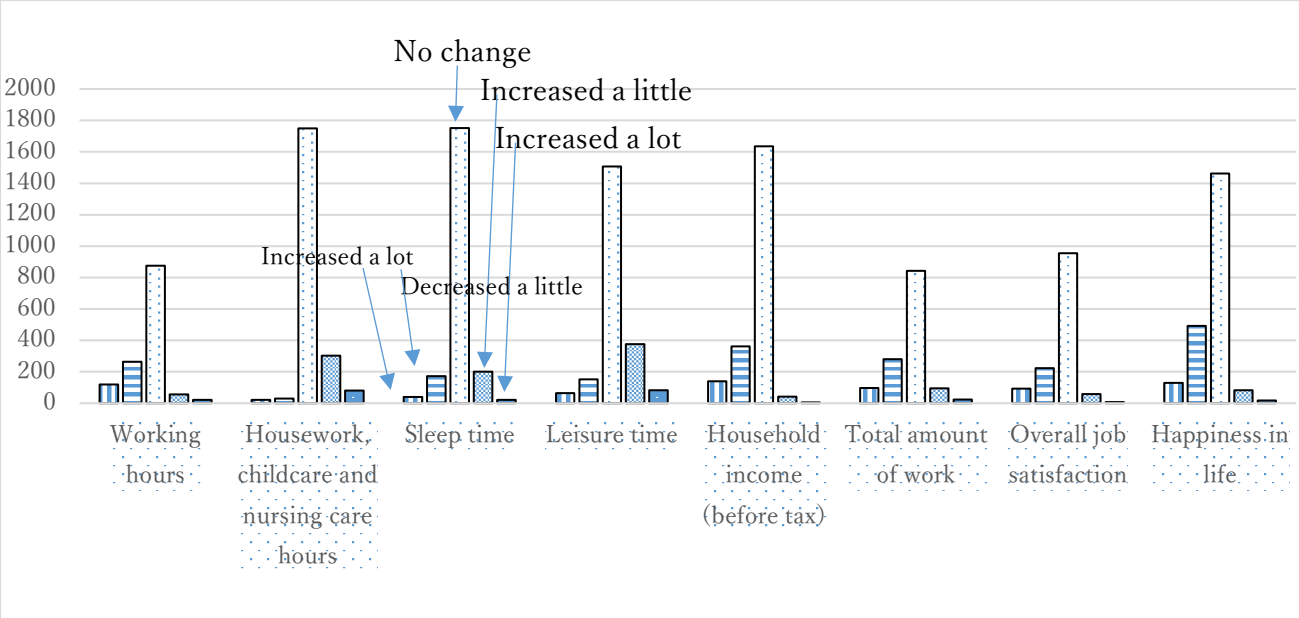
COVID-19 has affected various industries and people. The possible effects can be predicted using models. For example, Kaplan et al. (2020) performed simulation analysis using a model consisting of epidemiological and economic sectors to clarify the trade-offs between preventing the spread of infection and economic activities. However, we believe that empirical analysis of people's behavioral changes to prevent the spread of infection will enable us to more accurately predict policy effects and trade-off relationships. In this paper, we used a questionnaire survey to identify behavioral changes to prevent the spread of infection and clarified the relationship between behavioral changes and socioeconomic factors.

In the questionnaire survey, the respondents were asked about the impact of the spread of COVID-19 for eight items as follows. They were asked the same question for the eight items, “Since January 2020, how do you think the following has changed in daily life since the spread of the COVID-19?” The results are shown in Table 4. The eight items were classified as behavioral changes or changes in consciousness. The behavioral changes included changes in working hours; housework, childcare, and nursing care hours; sleeping hours; leisure time; pre-tax household income, and the total workload. The changes in consciousness included changes in overall job satisfaction and overall life happiness. Figure 1 plots the distribution of the responses in Table 4. Most respondents answered “no change” for all items. The items to which most of the respondents answered “decreased” were working hours, sleeping hours, pre-tax household income, total workload, overall job satisfaction, and overall life happiness. The items to which most of the respondents answered “increased” were housework, childcare, and nursing care hours and leisure time. The number of respondents who answered that sleeping hours decreased and those who answered that sleeping hours increased appeared to be roughly equal, but slightly more respondents answered that sleeping hours would increase.

Table 4 Effects of COVID-19 on daily life

	Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Household income (before tax)	Total workload	Overall job satisfaction	Overall life happiness
Decreased a lot	119	21	39	64	139	97	92	129
Decreased a little	265	30	172	152	361	281	224	493
No change	876	1750	1751	1508	1636	842	955	1462
Increased a little	57	302	200	376	42	95	59	82
Increased a lot	21	80	21	83	5	23	8	17
Number of resp.	1338	2183	2183	2183	2183	1338	1338	2183
Mean value	2.7	3.18	3	3.12	2.73	2.75	2.75	2.71

Figure 1 Distribution of the effects of COVID-19 on daily life



To examine what attributes were affected by the spread of COVID-19, we conducted regression analysis on the affected items. The estimated equation is shown in equation (2).

$$Z_i = \alpha + \beta X_i + \varepsilon_i . \qquad (2)$$

Here, subscript i is individual i, and Z_i is the eight items of behavioral changes and changes in consciousness. X_i is the vector of socioeconomic attributes of individual i, consisting of income, age, gender, city size, marital status, education, employment status, number of children, and occupation. β is the vector of coefficients of explanatory variables, and ε is the error term. The eight items of behavioral changes and changes in consciousness are working hours; housework, childcare, and nursing care hours; sleeping hours; leisure time; household income (before tax), total workload, overall job satisfaction, and overall life happiness. The eight items were answered using the 5-point method but were treated as continuous variables in the estimation.

The estimation results are shown in Table 5. The variables that were found to be statistically significant were income, age, marital status, education, self-employed employment status, and finance and insurance occupations.

Higher income tended to increase with increased total workload, sleeping hours, leisure time, and overall life happiness, suggesting a more favorable situation.

Age had an effect on housework, childcare and nursing care hours; leisure time; and overall life happiness. The influence was not linear, but U-shaped or inverted U-shaped. The burden of housework, childcare, and nursing care hours was concentrated among married women with children, but it peaked in the early 40s, with an inverted U-shape. On the other hand, leisure time decreased with age, but after the early 40s it began to increase, and the degree of impact was a U-shaped and opposite to that of housework, childcare, and nursing care hours. Overall life happiness also decreased with age, but increased after the early 50s, with a U-shaped degree of influence.

Relative to unmarried respondents, married respondents were affected in terms of working hours (+:+(-) means plus(minus) of coefficient),housework, childcare, and nursing care hours (+), leisure time (−), household income (before taxation) (+), total workload (+), and overall overall life happiness (+). Although there was damage in the form of increased working hours; increased housework, childcare, and nursing care hours; decreased leisure time; and increased total workload, there was an increase in pre-tax household income and overall life happiness. Married respondents were more affected compared with unmarried people because they have family relationships in addition to their social relationships. In terms of education, compared with those who have graduated from university and graduate school, those who graduated high school, vocational school, technical college, and junior college were affected by housework, childcare, and nursing care hours (−), household income (before taxes) (−), total workload (−), and overall job satisfaction (−).

In terms of employment status, compared with full-time regular employees and regular staff, those who were self-employed were affected by working hours (−), pre-tax household income (−), total workload (−), overall job satisfaction (−), total workload (−), overall job satisfaction (−), and overall life happiness (−). These negative impacts were significant, and as work decreased, overall job satisfaction and overall life happiness also decreased. Respondents who were self-employed found it difficult to work remotely because they needed to be in contact with other people. Therefore, they were likely to be more susceptible to such negative changes. Managers and executives were affected by overall job satisfaction (−). The number of children significantly increased housework, childcare, and nursing care hours. In terms of occupation, compared with the manufacturing industry, the finance and insurance industry was affected by working hours (+), sleeping hours (+), household income (before tax) (+), and total workload (+). Although their household income increased, their total workload also increased.

Thus, those who experienced relatively large negative impacts were in their early 40s, married, either high school, vocational school, technical college, or junior college graduates, and self-employed. In contrast, those who experienced positive impacts had higher incomes, with happiness observed to increase among married respondents and also with age among respondents who were older.

Table 5 Determinants of behavioral changes

		Explainer variable: 1 = decreased considerably, ... , 5 = increased considerably.							
		Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Household income (before taxation)	Total workload	Overall job satisfaction	A sense of well-being in life
Income	Income: 10,000yen	0.0095	0.0006	0.0213	0.0318	0.0139	0.0228	0.0133	0.0241
		[0.87]	[0.08]	[2.62]***	[3.04]***	[1.48]	[2.09]**	[1.36]	[2.36]**
Age	Age	0.0296	0.1132	-0.032	-0.1237	-0.0209	0.0076	-0.0429	-0.119
		[0.57]	[3.22]***	[-0.83]	[-2.50]**	[-0.47]	[0.15]	[-0.93]	[-2.46]**
	Age square	-0.0034	-0.0078	0.0021	0.0085	0.0005	-0.0023	0.0017	0.0064
		[-1.04]	[-3.55]***	[0.86]	[2.76]***	[0.18]	[-0.71]	[0.60]	[2.12]**
Sex	Male(ref)	0	0	0	0	0	0	0	0
		[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
	Female	-0.0112	0.1299	-0.0334	0.0107	-0.0038	-0.0557	-0.0498	-0.0008
		[-0.21]	[3.62]***	[-0.85]	[0.21]	[-0.08]	[-1.05]	[-1.06]	[-0.02]
City Size	Large city	-0.0118	0.0534	-0.0083	0.0451	-0.0337	0.1051	0.0317	0.0554
		[-0.12]	[0.81]	[-0.11]	[0.48]	[-0.40]	[1.08]	[0.36]	[0.61]
	Middle city	-0.0781	-0.0078	0.0016	0.101	-0.0258	0.0668	-0.002	0.065
		[-0.75]	[-0.11]	[0.02]	[1.01]	[-0.29]	[0.64]	[-0.02]	[0.67]
	Other city	-0.0614	0.009	0.0089	0.1068	-0.0272	0.0443	-0.0432	-0.0053
		[-0.63]	[0.14]	[0.12]	[1.15]	[-0.32]	[0.45]	[-0.50]	[-0.06]
	Towns or villages(ref)	0	0	0	0	0	0	0	0
		[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
Marital Status	Unmarried(ref)	0	0	0	0	0	0	0	0
		[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
	Married	0.1765	0.1129	-0.0555	-0.1073	0.0911	0.1192	0.0443	0.1282
		[2.88]***	[2.72]***	[-1.22]	[-1.84]*	[1.74]*	[1.96]*	[0.81]	[2.25]**
	Divorce	0.1159	0.024	-0.0618	-0.03	0.0015	0.0776	-0.0266	0.1166
		[1.07]	[0.33]	[-0.77]	[-0.29]	[0.02]	[0.72]	[-0.28]	[1.16]
	Bereavement	0.2561	0.1968	0.1034	-0.2573	0.0944	0.243	0.2938	-0.1096
		[1.12]	[1.27]	[0.61]	[-1.18]	[0.48]	[1.07]	[1.45]	[-0.52]
Education	Junior high school graduate (ref)	0.2526	-0.1239	-0.1127	-0.247	0.3622	0.0139	-0.0061	0.1718
		[1.15]	[-0.83]	[-0.69]	[-1.18]	[1.93]*	[0.06]	[-0.03]	[0.84]
	High school graduates, vocational school graduates junior college graduates	-0.075	-0.0747	0.0067	0.0698	-0.0784	-0.1096	-0.0746	-0.0708
		[-1.52]	[-2.23]**	[0.18]	[1.49]	[-1.86]*	[-2.23]**	[-1.70]*	[-1.55]
	Graduated from university and graduate school	0	0	0	0	0	0	0	0
		[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
	Don't know	0.6148	-0.461	-0.1454	-0.2366	-0.1719	-0.1761	-0.2059	-0.301
		[1.36]	[-1.50]	[-0.43]	[-0.55]	[-0.44]	[-0.39]	[-0.51]	[-0.72]
Employment Status	Management and Executives	-0.2002	-0.0191	-0.0083	-0.0964	-0.0454	-0.188	-0.2325	0.0191
		[-1.64]	[-0.23]	[-0.09]	[-0.83]	[-0.44]	[-1.55]	[-2.14]**	[0.17]
	Full-time and regular (Ref)	0	0	0	0	0	0	0	0
	.	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
	Contracts, temporary staffing etc.	-0.0587	0.0497	-0.0022	0.0325	-0.0633	-0.0206	0.0032	-0.0635
		[-0.91]	[1.13]	[-0.04]	[0.53]	[-1.14]	[-0.32]	[0.06]	[-1.06]
	Self-employed	-0.1543	0.0568	-0.0523	0.1155	-0.309	-0.22	-0.1946	-0.1522
		[-1.78]*	[0.97]	[-0.81]	[1.40]	[-4.17]***	[-2.55]**	[-2.53]**	[-1.89]*
	Students	-0.0704	-0.1038	-0.0655	0.1161	0.0849	-0.0153	0.1616	0.1453
		[-0.42]	[-0.92]	[-0.53]	[0.73]	[0.60]	[-0.09]	[1.09]	[0.94]
N. of Children	N. of children	-0.0338	0.0581	-0.0122	-0.0416	-0.0329	-0.0211	0.0092	-0.027
		[-1.14]	[2.90]***	[-0.56]	[-1.48]	[-1.30]	[-0.72]	[0.35]	[-0.98]

Occupation	Agriculture, Forestry and Fisheries and Mining	-0.1765	-0.0095	-0.1576	-0.3015	0.4318	0.3397	0.0592	-0.1296
		[-0.74]	[-0.06]	[-0.89]	[-1.32]	[2.11]**	[1.42]	[0.28]	[-0.58]
	Construction	0.1003	0.0084	0.0758	-0.0577	0.1362	0.1792	0.0478	0.0293
		[0.99]	[0.12]	[1.01]	[-0.60]	[1.57]	[1.78]*	[0.53]	[0.31]
	Manufacturing(ref)	0	0	0	0	0	0	0	0
		[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
	Wholesale business	-0.0518	0.1038	0.1214	0.1315	-0.079	-0.0598	-0.065	-0.0343
		[-0.43]	[1.27]	[1.35]	[1.14]	[-0.76]	[-0.50]	[-0.60]	[-0.30]
	Retail	0.0047	-0.0294	0.0463	-0.1802	-0.0977	0.0267	-0.0572	0.0113
		[0.05]	[-0.42]	[0.61]	[-1.84]*	[-1.11]	[0.26]	[-0.63]	[0.12]
	Finance and Insurance	0.2705	0.1081	0.1619	-0.0158	0.3325	0.2147	0.1059	0.105
		[2.21]**	[1.30]	[1.79]*	[-0.14]	[3.18]***	[1.76]*	[0.97]	[0.92]
	Real Estate	-0.0182	-0.1498	0.0807	0.054	0.2248	-0.0669	0.131	0.011
		[-0.13]	[-1.57]	[0.77]	[0.40]	[1.87]*	[-0.48]	[1.04]	[0.08]
	Transportation and telecommunications	0.1377	0.0161	0.0486	0.0211	-0.0495	0.0977	0.0193	0.0477
		[1.35]	[0.23]	[0.64]	[0.22]	[-0.57]	[0.97]	[0.21]	[0.50]
	Electricity, gas, water and heat supply	0.164	-0.0274	0.1772	-0.1093	0.1407	0.3095	0.1521	0.297
		[0.79]	[-0.19]	[1.15]	[-0.55]	[0.79]	[1.50]	[0.82]	[1.54]
	Service industry	0.0995	0.0124	0.0454	-0.1124	0.0225	0.1493	-0.0054	0.0637
		[1.50]	[0.28]	[0.93]	[-1.78]*	[0.40]	[2.27]**	[-0.09]	[1.04]
	Others	0.1518	0.0357	0.0423	-0.1092	0.0864	0.1668	-0.021	-0.0033
		[1.77]*	[0.61]	[0.66]	[-1.33]	[1.18]	[1.95]*	[-0.27]	[-0.04]
	Constant	2.61	2.567	3.0274	3.4547	2.7782	2.6002	2.9196	3.0373
		[12.17]***	[17.67]***	[19.04]***	[16.90]***	[15.15]***	[12.18]***	[15.30]***	[15.23]***
	Adj-r-squ*red	0.0187	0.0519	-0.0012	0.018	0.0423	0.0333	0.0133	0.0214
	N	1200	1200	1200	1200	1200	1200	1200	1200

Note)* ,**and* indicate significant at 10%, 5% and 1% levels, respectively. [ ] is a t-value.

4. Impact of behavioral changes on changes in consciousness

4.1 Impact of COVID-19 on behavioral changes in terms well-being

We analyzed the impact of COVID-19 on behavioral changes in terms of well-being. The estimated equation is shown in equation (3).

$$Happiness_i = \alpha + \beta Z_i + \gamma X_i + \varepsilon_i, \qquad (3)$$

where subscript i is individual i, $Happiness_i$ is individual i's sense of well-being, Z_i is the items of behavioral changes, X_i is the vector of socioeconomic attributes of individual i, β and γ are the coefficients of the explanatory variables,

and ε is the error term. There are nine items of behavioral changes and changes in consciousness, as follows: working hours; housework, childcare, and nursing care hours; sleeping hours; leisure time; personal income; household income; total workload; overall job satisfaction; and overall life happiness. These items were answered using the 5-point method, and for the responses to behavioral changes and changes in consciousness, “increased significantly” and “increased somewhat” were combined into “increased,” “no change” was unchanged, and “decreased significantly” and “decreased somewhat” were combined into “decreased” in the three response groups that were used as dummy variables. As shown in Table 6, when estimating equation (3), the nine items were estimated as explanatory variables one at a time, rather than at the same time. In the estimation, the income explanatory variable was used as a class value. For example, income between 1 million and 2 million yen was converted to a monetary value such as 1.5 million yen. This method was used when calculating the compensation variant, which is analyzed later in this paper.

The results presented in Table 6 were analyzed, focusing on statistically significant cases. As housework, childcare, and caregiving increased, and as sleeping hours decreased, the sense of well-being decreased. The cause might be increased burden and stress. As for leisure time and personal income, the sense of well-being decreased in the “decreased” group and increased in the “increased” group. This was also true for overall job satisfaction and overall life happiness. The results for household income were the same, but these results were not significant in the “increased” group. These findings were considered reasonable.

Table 6 Impact of behavioral changes and changes in consciousness on well-being

The description variable (happiness of the whole life): 1 = decreased considerably, and 5 = increased considerably.

		Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Personal income	Household income	Total workload	Overall job satisfaction	a sense of well-being throughout one's life
Behavioral change items	Reduced	-0.17382	0.223622	-0.28068	-0.54523	-0.45232	-0.50734	-0.168796	-0.744940	-1.01658039
		[-1.34]	[0.75]	[-1.78]*	[-3.55]***	[-3.99]***	[-4.68]***	[-1.29]	[-5.47]***	[-10.31]***
	No change (ref)									
	Increased	-0.23779	-0.24484	-0.00704	0.220315	0.649554	0.370176	-0.00316	0.7337928	1.27583049
		[-0.95]	[-1.98]**	[-0.05]	[1.96]**	[2.25]**	[1.22]	[-0.02]	[2.83]***	[6.16]***
Income	Income(10,000yen)	0.000803	0.000795	0.000792	0.000745	0.000755	0.000736	0.0007708	0.0007472	0.00071026
		[3.38]***	[3.81]***	[3.79]***	[3.58]***	[3.63]***	[3.53]***	[3.25]***	[3.21]***	[3.54]***
Marital Status	Unmarried(ref)									
	Married	1.036126	1.179877	1.157336	1.191526	1.132994	1.14728	1.0367952	1.0372247	1.10139252
		[7.41]***	[10.29]***	[10.22]***	[10.54]***	[10.07]***	[10.21]***	[7.43]***	[7.56]***	[10.14]***
	Divorce	-0.07962	-0.11223	-0.11734	-0.12356	-0.12623	-0.10734	-0.077150	-0.050171	-0.16592357
		[-0.29]	[-0.49]	[-0.52]	[-0.55]	[-0.56]	[-0.48]	[-0.28]	[-0.18]	[-0.76]
	Bereavement	-0.73736	0.413594	0.39902	0.42542	0.379786	0.401678	-0.724469	-0.846301	0.42910431
		[-1.26]	[1.32]	[1.27]	[1.36]	[1.22]	[1.29]	[-1.24]	[-1.47]	[1.42]
Sex	Male(ref)									
	Female	0.438112	0.662428	0.646712	0.643336	0.633972	0.634363	0.4320969	0.4663673	0.66298924
		[3.24]***	[6.22]***	[6.11]***	[6.09]***	[6.04]***	[6.04]***	[3.20]***	[3.51]***	[6.52]***
Age	Age	-0.55116	-0.38088	-0.40094	-0.38328	-0.38382	-0.39373	-0.550014	-0.540107	-0.34673301
		[-4.10]***	[-3.74]***	[-3.94]***	[-3.78]***	[-3.79]***	[-3.89]***	[-4.09]***	[-4.09]***	[-3.55]***
	Age square	0.039662	0.028182	0.029512	0.028205	0.02865	0.029035	0.0397352	0.0394478	0.02706629
		[4.77]***	[4.69]***	[4.93]***	[4.73]***	[4.81]***	[4.88]***	[4.77]***	[4.82]***	[4.71]***
Education	Junior high, High school, etc									
	University, Graduate school	0.302805	0.166393	0.15786	0.170954	0.164139	0.150979	0.2934957	0.2710636	0.13983823
		[2.38]**	[1.69]*	[1.60]	[1.74]*	[1.67]*	[1.54]	[2.30]**	[2.16]**	[1.48]
	Don't know	-3.03537	-2.96406	-2.91711	-2.88378	-3.12614	-2.83516	-3.038186	-2.93755898	-2.8057895
		[-2.59]***	[-2.95]***	[-2.91]***	[-2.89]***	[-3.13]***	[-2.84]***	[-2.60]***	[-2.56]**	[-2.92]***
Health	Healthy	0.807338	0.829522	0.815442	0.821809	0.817469	0.813745	0.8085588	0.7554132	0.74316905
		[14.86]***	[19.53]***	[18.98]***	[19.44]***	[19.34]***	[19.24]***	[14.86]***	[13.97]***	[17.99]***
Employment Status	Management and Executives	0.501537	0.517386	0.514925	0.531867	0.543037	0.539959	0.5107622	0.5758613	0.46721941
		[1.58]	[1.68]*	[1.67]*	[1.73]*	[1.77]*	[1.76]*	[1.60]	[1.84]*	[1.58]
	Full-time and regular (Ref)									
	.									
	Contracts, temporary staffing etc.	-0.01912	-0.11598	-0.12272	-0.11594	-0.09215	-0.11156	-0.0235568	-0.03712566	-0.06610321
		[-0.12]	[-0.77]	[-0.81]	[-0.77]	[-0.61]	[-0.74]	[-0.15]	[-0.23]	[-0.45]
	Self-employed	0.164521	0.206008	0.202051	0.189353	0.304542	0.288369	0.1646476	0.2478887	0.29090398
		[0.75]	[0.97]	[0.95]	[0.90]	[1.44]	[1.36]	[0.75]	[1.15]	[1.43]
	Students		0.218454	0.196023	0.169767	0.170434	0.180183			0.28692733
			[0.48]	[0.43]	[0.38]	[0.38]	[0.40]			[0.66]
	Unemployed		0.163223	0.139798	0.172893	0.07049	0.073439			0.13966348
			[1.05]	[0.90]	[1.11]	[0.45]	[0.47]			[0.93]
	Others	0.831153	0.712439	0.738363	0.70094	0.687414	0.66693	0.823219	0.765137	0.62289047
		[2.02]**	[1.82]*	[1.88]*	[1.80]*	[1.76]*	[1.71]*	[2.00]**	[1.89]*	[1.65]*
City Size	Large city	0.300864	0.370197	0.359568	0.339814	0.345154	0.357926	0.28312719	0.26393293	0.34096415
		[1.19]	[1.92]*	[1.86]*	[1.77]*	[1.80]*	[1.87]*	[1.11]	[1.06]	[1.84]*
	Middle city	0.390648	0.226246	0.222675	0.192997	0.207517	0.23585	0.36563487	0.34586368	0.17958349
		[1.42]	[1.08]	[1.06]	[0.93]	[0.99]	[1.13]	[1.33]	[1.28]	[0.89]
	Other city	0.173675	0.157082	0.14808	0.123923	0.135113	0.155883	0.15872339	0.17179674	0.19080812
		[0.68]	[0.82]	[0.77]	[0.65]	[0.71]	[0.82]	[0.62]	[0.69]	[1.04]
	Towns or villages(ref)									
	Constant	4.009802	3.293694	3.436364	3.350357	3.468989	3.550803	4.01429367	4.23718686	3.65649061
		[6.91]***	[7.18]***	[7.47]***	[7.33]***	[7.58]***	[7.77]***	[6.89]***	[7.40]***	[8.27]***
	Adjusted R^2	0.285258	0.30371	0.303154	0.30902	0.310314	0.310863	0.28486587	0.30859085	0.3568396
	Sample size	1200	1944	1944	1944	1944	1944	1200	1200	1944

Note) *, **, and *** are significant at 10%, 5% and 1% levels, respectively. [ ] is a t-value.

4.2 The economic value of behavioral changes and changes in consciousness

Behavioral and consciousness changes were found to have an impact on raising and lowering the sense of well-being. In this section, we evaluate these changes in monetary terms. When evaluating the welfare of a variable in monetary terms, we used the compensating variation (CV) and the equivalent variation (EV), where CV is the willingness to pay (WTP) and EV expresses unwillingness to accept compensation (WTP) or willingness to accept compensation (WTA). In general, WTP and WTA are respectively defined as follows:

$$v(p^0, Q^0, y^0) = \upsilon(p^1, Q^1, y^1 - WTP), \quad (4)$$

$$\mathrm{v}(p^0, Q^1, y^0) = v(p^0, Q^0, y^0 + WTA), \quad (5)$$

Here, v(·) is the indirect utility function, p is the price level, Q is a non-market good, y is income, and the superscript numbers 0 and 1 indicate the state before and after the non-market good is consumed, respectively. We also considered subjective well-being (SWB) of an individual, which was assumed to be the indirect utility function, and happiness (H) and life satisfaction (LS) were used as measures of SWB. We estimated a happiness function, as follows:

$$Happiness_i = \alpha + \beta y_i + \gamma z_i + \lambda X_i + \varepsilon_i . \quad (6)$$

Here, subscript i denotes individual i, $Happiness_i$ denotes individual i's sense of well-being, y_i denotes individual i's income, z_i is a vector of evaluations such as sleep, X_i is a vector of individual i's socioeconomic attributes, and β, γ, and λ are coefficients of explanatory variables (where γ and λ are vectors). When the state before the COVID-19 outbreak is denoted by the subscript 0 and the state after the outbreak is denoted by the subscript 1, we used the well-being function equation (6), and obtained the WTP_i of individual i as follows:

$$\alpha + \beta y_i^0 + \gamma z_i^0 + \lambda X_i^0 + \varepsilon_i = \alpha + \beta(y_i^1 - WTP) + \gamma z_i^1 + \lambda X_i^0 + \varepsilon_i . \quad (7)$$

From this, WTP_i was estimated as shown by the following equation:

$$WTP = (y_i^1 - y_i^0) + \sum_j \frac{\gamma_j}{\beta}(z_{ji}^1 - z_{ji}^0). \qquad (8)$$

Here, z^1_j-z^0_j are the eight items of behavioral changes and changes in consciousness due to the spread of COVID-19 (overall well-being throughout one's life is excluded). Because we did not know the respondents' incomes after the COVID-19 outbreak, they were assumed to be the same as before the outbreak.

Based on the results in Table 6, and compared with "no change", we considered the compensating changes per person for each item, as shown in Table 7(a). Because the situation worsened with increased housework, childcare, and nursing care hours and total workload, the compensating variables were negative. The unit is 10,000 yen, so the decrease represented by minus 3.54 million yen in sleeping hours seemed quite large. However, for household income, calculations were based on annual household income, so the figure was only about 10,000 yen per day. For housework, childcare, and nursing care hours, sleeping hours, and household income, we found only negative compensatory changes. In terms of leisure time, the amount of compensation for decrease in leisure time was much larger than that for increase in leisure time, indicating that the inability to go out caused considerable damage. In terms of personal income, the compensation for increase in income was much larger than that for decrease in income. It is very interesting that the valuations are asymmetrically done between increase in income and decrease in income. Decrease and increase in overall job satisfaction were evaluated to be almost the same. Overall life happiness was evaluated higher than the other items, with a decrease of 14.31 million yen, or about 40,000 yen per day. Increase in overall life happiness was evaluated as greater than its decrease, and the overall result was positive. However, as seen in Table 4, for many respondents, each behavioral change and change in consciousness decreased, so the compensation change as a whole was negative. Thus, on a per capita basis, although the compensation change was positive for overall well-

being and personal income, it was negative for housework, childcare, and nursing care hours, sleeping hours, and household income. We were able to confirm that these respondents experienced damage in their daily lives. The compensation variables for working hours and total workload were statistically insignificant, so the compensation variable was zero.

The overall compensating variables for each item in Japan are shown in Table 7(b). We used per capita compensating variables (in 10,000 yen) and the population from 20s to 80s (about 100 million people) allocated to each response based on the percentage of respondents who answered the change in each item. However, there were fewer respondents for working hours, total workload, and overall job satisfaction because only respondents who were employed answered these questions.

Overall sense of well-being throughout one's life was minus 326 trillion yen. Individuals rated it higher when it increased, but the number of respondents who answered that it increased was small, so it was negative overall. All individual items were negative, with household income having the largest negative value at minus 158 trillion yen. This was followed by overall job satisfaction, personal income, housework, childcare, and nursing care hours, sleeping hours, and leisure time.

According to newspaper reports, in the first quarter (April to June) of fiscal 2020, GDP fell by about 40 trillion yen. If we multiply this by 4 to derive an annualized value, we get 160 trillion yen. The annualized value of minus 326 trillion yen is the change in compensation for overall well-being, which is about double the 160 trillion yen in absolute terms. Because the questionnaire survey asked about changes in overall sense of well-being, the answers are expected to reflect psychological evaluations. If this is the case, then the damage caused by psychological evaluation

is thought to be about 160 trillion yen.

If we consider that the overall sense of well-being throughout one's life can be broken down into various items such as working hours, then the total of each item excluding household income would be minus 323 trillion yen. Then, because this value is almost equal to the evaluation of overall well-being, the evaluation of overall well-being can be decomposed into the evaluation of housework, childcare, and nursing care hours, sleeping hours, leisure time, personal income, and overall job satisfaction.

Table 7(a) Compensation change per person (10,000 yen per person, annually)

	Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Personal income	Household income	Total workload	Overall job satisfaction	a sense of well-being throughout one's life
Decrease			-354	-732	-599	-689		-997	-1,431
Increase		-308		296	860			982	1,796

Note: The ref has not changed. Statistically non-significant areas are left blank.

Table 7(b) Total compensation change (unit trillion yen, annually)

	Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Personal income	Household income	Total workload	Overall job satisfaction	a sense of well-being throughout one's life
Decrease			-34	-72	-131	-158		-144	-408
Increase		-54		62	20			30	81
Total		-54	-34	-10	-110	-158		-114	-325

Note: The ref has not changed. Statistically non-significant areas are left blank.

4.3 Impact of behavioral changes and changes in consciousness on health

COVID-19 causes the following negative mental health effects: panic attacks, anxiety, and stress. This has been shown by Qiu et al. (2020) who conducted a questionnaire survey of health effects throughout China. In this subsection, we focus on seven items of behavioral and changes in consciousness: working hours, housework, childcare, and nursing care hours, sleeping hours, leisure time, personal income, total workload, and overall job satisfaction. We also examine the impact of these items on health. The estimated equation is shown as follows:

$$Health_i = \alpha + \beta Z_i + \gamma X_i + \varepsilon_i . \qquad (9)$$

Here, subscript i is individual i, $Health_i$ is the health status of individual i, Z_i is the seven items of behavioral changes and changes in consciousness, X_i is the vector of socioeconomic attributes of individual i, β and γ are the coefficients of explanatory variables (γ is a vector), and ε is the error term. The seven items were treated as continuous variables in the estimation, and were not estimated as explanatory variables at the same time, but one by one.

The estimation results are shown in Table 8. The control variables were as follows. For the seven behavioral changes and changes in consciousness (working hours; housework, childcare, and nursing care hours; sleeping hours; leisure time; personal income; total workload; and overall job satisfaction), higher income was associated with better health. In terms of marital status, respondents who were married and those who were divorced were healthier than unmarried respondents in seven behavioral changes and changes in consciousness. Women were healthier than men. Older age was associated with decreased health because of increased risk of disease. Education and employment status had no effect on health. City size had an effect on health. With towns or villages as a reference, seven behavioral and consciousness changes were found to be associated with decreased health in large and mid-sized cities (excluding mid-sized cities with personal income). One possible reason for this decrease is the prevalence of COVID-19 in urban areas.

Among the items of behavioral changes and changes in consciousness, the coefficients for sleeping hours, personal income, and overall job satisfaction were positive at the 1% level. In other words, an increase in these items indicated an increase in the sense of health. This might be due to decrease in stress. The coefficients for working hours and leisure time were positive and significant at the 10% level. Increase in working hours was thought to decrease the sense of health, but in fact the opposite was true, at the 10% significant level. This might be due to the fact that the

increase in working hours might be due to the increase in remote working hours, which reduces commuting time and thus reduces the risk of infection with the COVID-19. Increase in leisure time might also decrease stress, whereas a decrease in social contact might decrease risk of infection with COVID-19.

Table 8 Estimated results: effects of behavioral change and change in consciousness on Health

		Explainer variable (current health condition): 1= not healthy, ... 5 = healthy						
		Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Personal income	Household income	Total workload
Income	Income(10,000yen)	0.0516	0.0548	0.0499	0.0534	0.0533	0.0519	0.0488
		[3.41]***	[4.26]***	[3.92]***	[4.15]***	[4.14]***	[3.42]***	[3.26]***
Marital Status	Unmarried(ref)							
	Married	0.1992	0.2331	0.2584	0.2563	0.2422	0.208	0.197
		[2.68]***	[3.83]***	[4.36]***	[4.26]***	[4.04]***	[2.79]***	[2.69]***
	Divorce	0.2689	0.2376	0.2614	0.2484	0.2456	0.2761	0.2845
		[1.81]*	[1.95]*	[2.17]**	[2.04]**	[2.02]**	[1.85]*	[1.94]*
	Bereavement	0.3418	0.1628	0.1839	0.1788	0.1611	0.3562	0.2817
		[1.09]	[0.97]	[1.11]	[1.07]	[0.96]	[1.14]	[0.91]
Sex	Male(ref)							
	Female	0.1414	0.138	0.1534	0.146	0.1471	0.1424	0.1547
		[1.95]*	[2.41]**	[2.73]***	[2.57]**	[2.59]***	[1.96]*	[2.16]**
Age	Age	-0.0308	-0.0229	-0.0254	-0.026	-0.0251	-0.032	-0.0283
		[-2.21]**	[-2.18]**	[-2.48]**	[-2.50]**	[-2.42]**	[-2.29]**	[-2.06]**
Education	Junior high, High school, etc							
	University, Graduate school	0.0377	0.0349	0.0302	0.039	0.0382	0.0412	0.0244
		[0.55]	[0.66]	[0.58]	[0.74]	[0.72]	[0.60]	[0.36]
	Don't know	-0.0958	-0.5622	-0.5745	-0.5766	-0.6317	-0.0446	-0.0263
		[-0.15]	[-1.05]	[-1.08]	[-1.07]	[-1.18]	[-0.07]	[-0.04]
Employment Status	Management and Executives	-0.0611	-0.1006	-0.1043	-0.0967	-0.0968	-0.0735	-0.0239
		[-0.37]	[-0.61]	[-0.65]	[-0.59]	[-0.59]	[-0.44]	[-0.15]
	Full-time and regular (Ref)							
	.							
	Contracts, temporary staffing etc.	-0.0595	-0.0622	-0.0584	-0.0599	-0.0476	-0.0633	-0.0634
		[-0.67]	[-0.75]	[-0.71]	[-0.72]	[-0.58]	[-0.71]	[-0.72]
	Self-employed	-0.0743	-0.1007	-0.0806	-0.1014	-0.0588	-0.0821	-0.0355
		[-0.63]	[-0.88]	[-0.71]	[-0.89]	[-0.51]	[-0.70]	[-0.31]
	Students		0.1293	0.0283	0.0969	0.0953		
			[0.54]	[0.12]	[0.41]	[0.40]		
	Unemployed		-0.0764	-0.0763	-0.0653	-0.0911		
			[-0.88]	[-0.89]	[-0.76]	[-1.05]		
	Others	0.4425	0.4295	0.4449	0.4175	0.4197	0.4397	0.4014
		[2.03]**	[2.04]**	[2.14]**	[1.98]**	[1.99]**	[2.01]**	[1.86]*
City Size	Large city	-0.2269	-0.1728	-0.1773	-0.1723	-0.1673	-0.2279	-0.234
		[-1.68]*	[-1.67]*	[-1.74]*	[-1.67]*	[-1.62]	[-1.68]*	[-1.75]*
	Middle city	-0.3363	-0.2227	-0.2254	-0.2278	-0.2188	-0.3422	-0.34
		[-2.30]**	[-1.98]**	[-2.03]**	[-2.03]**	[-1.95]*	[-2.34]**	[-2.36]**
	Other city	-0.0935	-0.0601	-0.0653	-0.0644	-0.0567	-0.0975	-0.0843
		[-0.69]	[-0.59]	[-0.64]	[-0.63]	[-0.55]	[-0.72]	[-0.63]
	Towns or villages(ref)							
Items of behavioral change and consciousness change		0.075	0.0592	0.312	0.0639	0.1029	0.019	0.2586
		[1.85]*	[1.31]	[6.90]***	[1.86]*	[2.58]***	[0.47]	[5.70]***
	Constant	3.0935	2.9687	2.245	2.9677	2.886	3.2473	2.5816
		[14.89]***	[15.02]***	[11.88]***	[17.46]***	[16.78]***	[15.67]***	[12.05]***
	Ajusted R^2	0.0341	0.0346	0.0571	0.0355	0.0371	0.0315	0.0572

	Sample size	1200	1944	1944	1944	1944	1200	1200

Note) *, **, and *** are significant at 10%, 5% and 1% levels, respectively. [ ] is a t-value.

Because the mortality rate of COVID-19 is higher among older adults, this population is likely to be more susceptible to health effects. Therefore, we examined those aged 65 years or older and the crossover effects of the seven items of behavioral and consciousness changes. Table 9 shows only the results for age, those aged 65 years or older, and crossover effects. The results for the other explanatory variables were almost the same as in Table 8, so they are omitted in Table 9. The coefficient of age was negative and significant, even when the crossover effect as considered, and the crossover effect between those aged 65 years or older and each behavior change item was positive and significant at the 1% level. Take, for example, the case of sleep duration, as sleeping hours increased, sense of well-being increased in the group aged 65 years or older. A similar interpretation was possible for leisure time, personal income, and overall job satisfaction. However, when the total workload, housework, childcare, nursing care hours, and working hours increased, the sense of well-being in those aged 65 years or older increased, even though in the case where stress was expected, and the sense of well-being decreased. This finding might be due to the fact that people aged 65 years or older refrained from social contact due to the COVID-19 outbreak, thereby reducing the risk of infection, which might in turn have increased the sense of well-being among people in this age group.

Kimura et al. (2020) used data from the Japan Gerontological Evaluation Study (JAGES) to show that contact with others and social activities can cause dementia and functional impairment among older adults amid the COVID-19 pandemic. To prevent these problems, the necessity of practicing social distancing is advocated. Similarly, in the present study, contact with others possibly reduced sense of well-being, suggesting that social distancing is an effective way to maintain well-being while leading a normal life.

Table 9 Crossover effects of seven items among respondents aged 65 years or older

		Explainer variable (current health condition): 1= not healthy, ... 5 = healthy						
		Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Personal income	Total workload	Overall job satisfaction
Age	Age	-0.0468	-0.0463	-0.0464	-0.0438	-0.0481	-0.0475	-0.0444
		[-2.99]***	[-3.62]***	[-3.70]***	[-3.48]***	[-3.81]***	[-3.02]***	[-2.85]***
Behavioral change items	Behavioral change items	0.0663	0.056	0.3011	0.0519	0.0881	0.0111	0.2473
		[1.63]	[1.24]	[6.65]***	[1.50]	[2.20]**	[0.27]	[5.43]***
	Under 65* Behavioral Change Items (Ref)							
	Over 65 years old * Behavioral change items	0.1024	0.0862	0.0797	0.065	0.093	0.0981	0.0962
		[2.21]**	[3.20]***	[2.90]***	[2.51]**	[3.17]***	[2.13]**	[2.19]**
	Constant	3.2183	3.1423	2.4264	3.1286	3.0872	3.3674	2.7175
		[14.97]***	[15.36]***	[12.21]***	[17.24]***	[16.88]***	[15.70]***	[12.20]***
	Adjusted R^2	0.0372	0.0392	0.0607	0.0381	0.0416	0.0343	0.0602
	Sample size	1200	1944	1944	1944	1944	1200	1200

Note) *, **, and *** are significant at 10%, 5% and 1% levels, respectively. [ ] is a t-value.

5. COVID-19 and basic income

As a result of imposed economic restraints during the COVID-19 pandemic, economic activities have been greatly reduced, and economic deprivation has worsened, especially among workers in the restaurant, travel, and transportation industries, as well as among those who are economically vulnerable, such as non-regular workers. In the midst of this economic crisis, the Japanese government provided a special flat-rate benefit to all citizens who wished to receive it in FY2020. This special flat-rate benefit was a basic income type of social security policy in the sense that there was no eligibility criteria and all citizens could receive it. Such a fixed amount of payment for all citizens was previously provided in 2009 as an emergency economic measure against the Lehman shock, ranging from 12,000 yen to 20,000 yen per person (for those aged over 65 years and those under 18 years), but the high amount of 100,000 yen per person in FY2020 was extremely unusual. This special flat-rate benefit was important in predicting the feasibility of a basic income and its effects, and was thought to have raised social interest in a basic income.

In this context, this survey included a question about basic income. The question was, “The system in which the government provides a certain amount of income to all citizens is known as basic income. What do you think about this system?” The survey asked respondents to answer according to a 5-point scale (where 1 = they are against and 5 = they are in favor). The results of the survey are shown in Figure 2. For reference, the results of a survey conducted in 2009 in the Tokyo metropolitan area and the Kinki region (sample size: 2,389) are also shown (see Itaba and Shiozu (2011)).

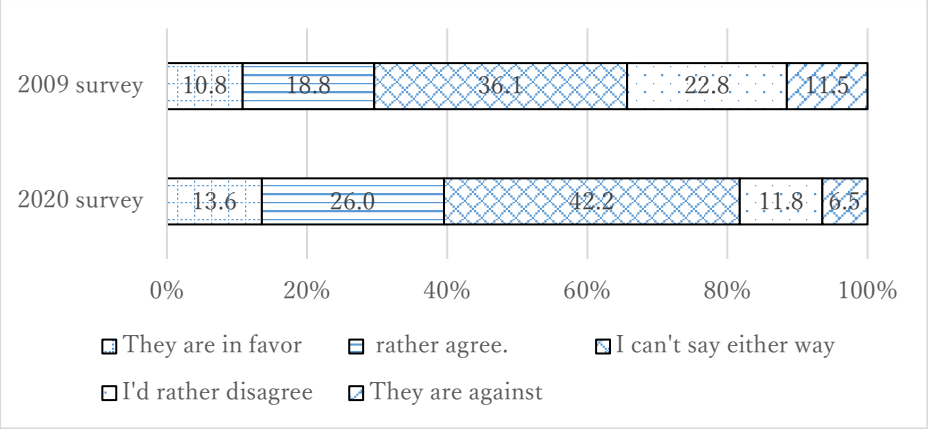
According to the results of the present survey, 39.6% of the respondents were in favor of a basic income, whereas 18.3% were against it. However, the percentage of “undecided” respondents was high at 42.2%. These results might reflect the fact that when the question was asked, it was difficult to determine whether the introduction of a basic income would result in the abolition of existing social security systems, such as welfare, or whether it would result in the use of financial resources. Compared with the 2009 survey, in which the same questions were asked, the percentage in favor of a basic income was slightly higher. It is difficult to confirm whether the reason for the lower percentage in the present study was due to the different regions surveyed or the effects of COVID-19.

We compared the results of an overseas survey with those of the present study in Japan as follows. The results of the overseas survey are shown in Table 10, which was conducted by the European Social Survey (ESS) in 2016. That survey asked participants if they were in favor of or against a basic income, with no “undecided” option. In addition, the question clearly stated that the current social security system will be abolished if a basic income is introduced. The differences between the questionnaires in these countries were analyzed in detail by Vlandas (2021) and Lee (2018). In general, both researchers noted that in countries with poor current unemployment insurance, a larger

percentage of participants were in favor of the introduction of a basic income.

Our analysis of the comparison of the results of the present survey with those of the other countries in the 2016 survey is as follows. Unlike the 2016 survey, the present survey included an “undecided” option, which raises the question of how to handle this option. If all the respondents who answered “undecided” were in favor of the introduction of a basic income, then 81.8% would be in favor; in the opposite scenario, 39.6% would be opposed. In the former case, the percentage would exceed Lithuania’s 80.61%. In the latter case, it falls between Germany and Sweden. If we assume that half of the respondents who answered “undecided” are in favor, the percentage of those in favor would be 60.7%, which is the second highest after Slovenia. Vlandas (2021) and Lee (2018), mentioned above, point out the relationship between conditions of current unemployment insurance benefits and other factors in favor of the introduction of a basic income. International comparisons of unemployment insurance are difficult; however, as an example, we can consider the replacement rate (the ratio of take-home pay when unemployed to take-home pay when employed). The replacement rate in Japan is close to that in Belgium (see Iwai (2013)). Thus, the ratio in favor of the introduction of a basic income is relatively high in Japan.

Figure 2 Preference for a basic income



Source: The results of the present survey and Itaba and Shiozu (2011).

Table 10 Preference for the introduction of a basic income in European countries (%)

	In favor of introduction	Against introduction
Lithuania	80.61	19.39
Hungary	69.51	39.49
Slovenia	65.03	34.97
Belgium	58.62	41.38
Italy	58.58	41.42
Poland	58.51	41.49
Portugal	58.39	41.61
Ireland	56.61	43.39
Finland	55.74	44.26
Czech Republic	52.2	47.8
UK	50.83	49.17
Netherlands	49.8	50.2
Spain	49.56	50.44
France	48.83	51.17
Estonia	46.72	53.28
Iceland	46.02	53.98
Austria	45.96	54.04
Germany	45.75	54.25
Sweden	37.55	62.45
Switzerland	34.74	65.26
Norwegian	33.67	66.33

Source: Based on Figure 1 in Lee (2018).

We examined the impact of seven items of behavioral changes and changes in consciousness (working hours, housework, childcare, and nursing care hours, sleeping hours, leisure time, personal income, total workload, and overall job satisfaction) on attitudes toward basic income policies. The estimated equation is given by:

$$BI_i = \alpha + \beta Z_i + \gamma X_i + \varepsilon_i . \quad (10)$$

Here, BI_i is support for basic income (the higher the value, the greater the support), subscript i is individual i, Z_i is the seven items of behavioral and consciousness changes, X_i is the vector of socioeconomic attributes of individual i, β and γ (vectors) are the coefficients of explanatory variables, and ε is the error term. The seven items were obtained using the 5-point Likert method, but were treated as continuous variables in the estimation and were not estimated as explanatory variables at the same time, but one at a time.

The estimation results are as shown in Table 9. When the items of behavioral changes and changes in consciousness were not used as explanatory variables, those who were low-income earners, male sex, and younger were in favor of a basic income. The low-income earners expected that basic income would improve their economic status. The tendency for men to be more in favor of a basic income than women was also found by Itaba and Shiozu (2011). We expected that women would be more likely to be in favor of a basic income because they often take on more family caregiving responsibilities, and/or because they are in a precarious position in the labor market due to marriage and/or childbirth. The risk of unemployment in the labor market is likely to be lower among men than among women. However, those who are dissatisfied with the requirements for receiving unemployment insurance and the amount of benefits in the event of unemployment, are more likely to be in favor of a basic income. Because the latter situation prevails in the present survey, men were considered more likely to be in favor of a basic income.

One reason why those respondents who were young were more likely to be in favor of a basic income is that, as in the case of men, young people face a more difficult labor market and therefore view basic income as a way to avoid risk. We found that marital status, education, employment status, and city size were not statistically significant. There were also no conflicting opinions on the introduction of a basic income among these attributes.

When the items of behavioral changes and changes in consciousness were added to the explanatory variables and estimated, the coefficients of the male dummy become smaller and non-significant in terms of working hours, total workload, and overall job satisfaction. Because these items are larger among men, the coefficient of the male dummy seemed to be overestimated in the estimation equation when these items were not included as explanatory variables. The coefficients for working hours, total workload, and overall job satisfaction were negative and significant. In other words, smaller values for these items indicated that the respondents were favor of a basic income. This can be attributed to the fact that the spread of COVID-19 has reduced working hours and workloads, which has increased the risk of unemployment and other problems, which has in turn led to support for a basic income.

We found that the coefficient for leisure time was positive and significant at 10%. Increase in personal income was observed to lead to a lack of support for a basic income. Increase in personal income was not shown to indicate support for a basic income because an increase in income reduces the need to rely on a basic income. Sleeping hours did not have a significant effect. Thus, it can be argued that the spread of COVID-19 leads to increased support for basic income through increased risk in the labor market.

Table 11 Estimated results: impact on basic income adoption

Explainer variable (support state of basic income): 1 = opposite, ... , 5 = yes									
		No behavioral change items	Working hours	Housework, childcare and nursing care hours	Sleeping hours	Leisure time	Personal income	Total workload	Overall job satisfaction
Income	Income(10,000yen)	-0.0503	-0.0349	-0.0504	-0.0503	-0.0515	-0.0486	-0.0342	-0.0341
		[-4.00]***	[-2.41]**	[-4.01]***	[-3.99]***	[-4.09]***	[-3.87]***	[-2.35]**	[-2.35]**
Marital Status	Unmarried(ref)								
	Married	-0.0962	-0.0446	-0.0894	-0.0963	-0.0871	-0.0905	-0.0564	-0.0583
		[-1.64]	[-0.63]	[-1.50]	[-1.64]	[-1.48]	[-1.55]	[-0.79]	[-0.82]
	Divorce	-0.0542	-0.073	-0.0503	-0.0543	-0.0512	-0.0546	-0.0829	-0.0946
		[-0.46]	[-0.51]	[-0.42]	[-0.46]	[-0.43]	[-0.46]	[-0.58]	[-0.67]
	Bereavement	-0.134	-0.3437	-0.1303	-0.1341	-0.1259	-0.1222	-0.3583	-0.333
		[-0.82]	[-1.15]	[-0.79]	[-0.82]	[-0.77]	[-0.75]	[-1.20]	[-1.12]
Sex	Male(ref)	0.1402	0.0962	0.1357	0.1402	0.141	0.1406	0.1005	0.1048
		[2.52]**	[1.39]	[2.43]**	[2.52]**	[2.54]**	[2.54]**	[1.44]	[1.51]
	Female								
Age	Age	-0.0167	-0.0273	-0.0177	-0.0167	-0.0178	-0.0163	-0.0268	-0.0265
		[-1.64]	[-2.06]**	[-1.72]*	[-1.64]	[-1.75]*	[-1.61]	[-2.00]**	[-2.00]**
Education	Junior high, High school, etc								
	University, Graduate school	-0.0122	0.0101	-0.0109	-0.0122	-0.0109	-0.013	0.0097	0.0104
		[-0.24]	[0.15]	[-0.21]	[-0.23]	[-0.21]	[-0.25]	[0.15]	[0.16]
	Don't know	-0.4891	0.3056	-0.5	-0.4892	-0.4824	-0.4266	0.1971	0.1932
		[-0.93]	[0.51]	[-0.95]	[-0.93]	[-0.92]	[-0.81]	[0.33]	[0.32]
Employment Status	Management and Executives	-0.1041	-0.1708	-0.1043	-0.1041	-0.1001	-0.1094	-0.1553	-0.1723
		[-0.65]	[-1.07]	[-0.65]	[-0.65]	[-0.63]	[-0.69]	[-0.97]	[-1.08]
	Full-time and regular (Ref)								
	.								
	Contracts, temporary staffing etc.	-0.0523	-0.0116	-0.0516	-0.0523	-0.0514	-0.0696	-0.0044	-0.0039
		[-0.65]	[-0.14]	[-0.64]	[-0.65]	[-0.64]	[-0.86]	[-0.05]	[-0.05]
	Self-employed	0.131	0.1501	0.133	0.1309	0.1265	0.0817	0.1547	0.142
		[1.17]	[1.34]	[1.19]	[1.17]	[1.13]	[0.73]	[1.37]	[1.26]
	Students	-0.3655		-0.3708	-0.365	-0.3861	-0.3349		
		[-1.56]		[-1.59]	[-1.56]	[-1.65]*	[-1.44]		
	Unemployed	-0.0814		-0.0789	-0.0814	-0.0755	-0.0558		
		[-0.96]		[-0.93]	[-0.96]	[-0.89]	[-0.66]		
	Others	0.0993	0.1601	0.0958	0.0992	0.0946	0.1031	0.1679	0.1886
		[0.48]	[0.77]	[0.46]	[0.48]	[0.46]	[0.50]	[0.80]	[0.90]
City Size	Large city	0.0482	0.1689	0.0504	0.0482	0.0445	0.0467	0.1782	0.1713
		[0.48]	[1.31]	[0.50]	[0.48]	[0.44]	[0.46]	[1.37]	[1.32]
	Middle city	0.0773	0.1723	0.078	0.0774	0.0713	0.074	0.189	0.1806
		[0.70]	[1.23]	[0.71]	[0.70]	[0.65]	[0.68]	[1.35]	[1.29]
	Other city	0.0473	0.1515	0.0484	0.0473	0.0411	0.0457	0.1634	0.1493
		[0.47]	[1.17]	[0.48]	[0.47]	[0.41]	[0.46]	[1.25]	[1.15]
	Towns or villages(ref)								
Behavioral change items			-0.1512	-0.0299	-0.0016	0.0605	-0.134	-0.0961	-0.161
			[-3.90]***	[-0.68]	[-0.04]	[1.80]*	[-3.44]***	[-2.46]**	[-3.67]***
	Constant	3.6433	3.9158	3.7419	3.6479	3.4653	3.9931	3.7559	3.9403
		[28.06]***	[20.05]***	[19.15]***	[19.89]***	[21.23]***	[24.25]***	[19.33]***	[19.42]***
	Adjusted R^2	0.0153	0.0235	0.0151	0.0148	0.0165	0.0208	0.0159	0.022
	Sample size	1944	1200	1944	1944	1944	1944	1200	1200

Note)* ,**and*** indicate significant at 10%, 5% and 1% levels, respectively. [ ] is a t-value.

6. Support for or disapproval of the Swedish strategy and awareness of infection prevention

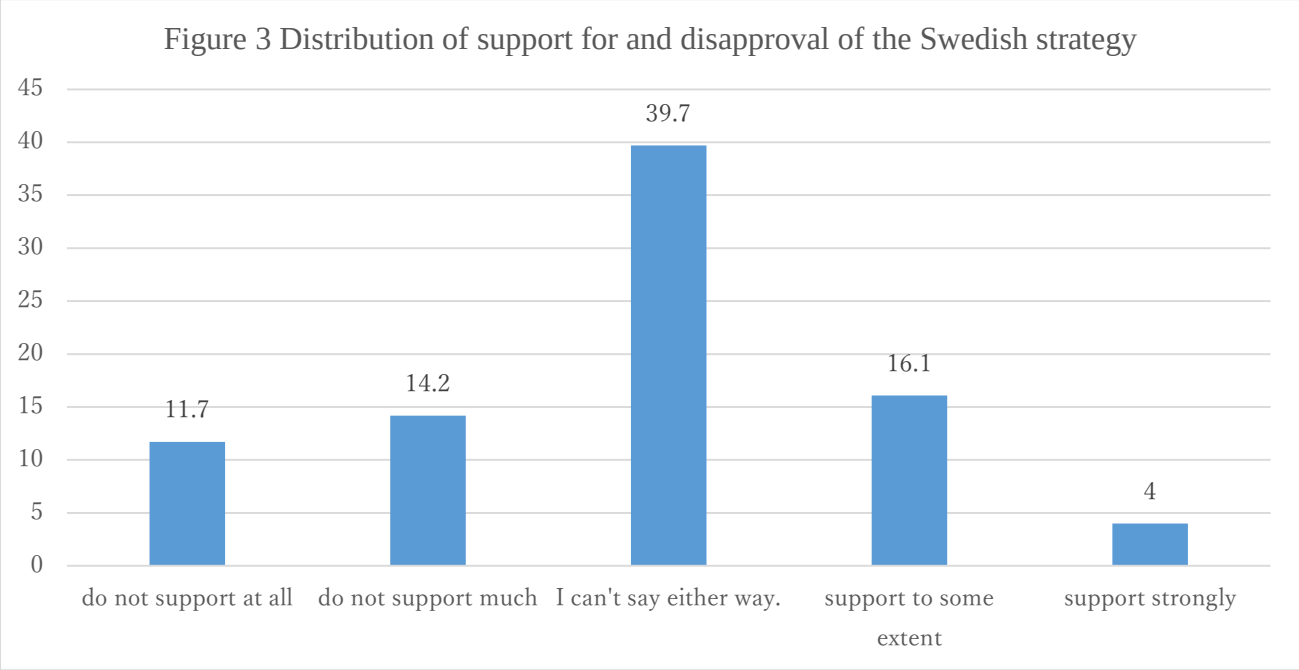
6.1 Definition of the Swedish strategy

According to Kamerlin and Kasson (2020), the Swedish strategy is a strategy to prevent the spread of infection by ensuring social distancing without lockdown. It does not force cafes and restaurants to refrain from operating, but they are required to ensure social distancing on their premises. The Swedish measures are not necessarily aimed at achieving herd immunity, but rather at isolating older adults while maintaining social distancing to avoid collapse of the health care system. The Swedish strategy is based on the assumption that it will take time to achieve herd immunity, and that long-term sustainable countermeasures against infectious diseases can be taken without stopping economic activities.

The Swedish strategy is a way of thinking that prioritizes living a normal life as much as possible without requesting excessive self-restraint and taking only appropriate countermeasures against infection. Thus, it can be concluded that it has the potential to increase the sense of well-being by reducing stress and improving quality of life. In the present study, we confirmed whether or not this hypothesis was actually true, and we clarified the factors that cause differences in attitudes toward preventing the spread of COVID-19 between those who support the Swedish strategy and those who do not. This clarification helps us to understand how individuals perceive COVID-19 differently and is expected to provide important information for considering measures to increase the effectiveness of infection control.

First, we considered the ratio of support for and disapproval of the Swedish strategy, as shown in Figure 3. The ratio of those who did not support the Swedish strategy was 25.9%, including “do not support at all” and “do not

support much," whereas the ratio of those who did support the Swedish strategy was 20.1%, including "support to some extent" and "support strongly."



In the following subsections, we analyze the characteristics of attributes, differences in economic environment, differences in satisfaction and happiness, differences in information access routes, differences in attitudes toward infection control, and differences in reasons for behavioral changes by support or disapproval of the Swedish strategy. We also clarify the factors that determine people's behavioral changes.

6.1 Characteristics of personal attributes by support or disapproval of the Swedish strategy

We considered the level of risk aversion according to support for and disapproval of the Swedish strategy (Figure 4). We found that there were relatively more people who supported the Swedish strategy in the relatively low risk aversion group (1 to 5), and relatively more people who did not support the Swedish strategy in the relatively high-

risk aversion group (6 to 9). This result suggests that people who are able to accept some degree of risk tend to support the Swedish strategy.

Next, we compared health status between those who supported and disapproved of the Swedish strategy (Figure 5). The figure shows that many people who support the Swedish strategy are not necessarily, suggesting that the hypothesis that people support the Swedish strategy because they are confident in their health is not valid.

Figure 4 Risk aversion

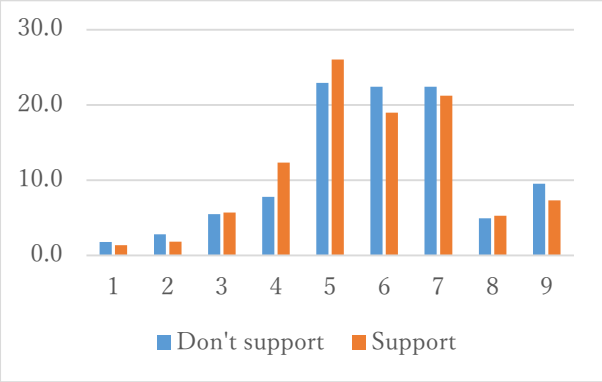
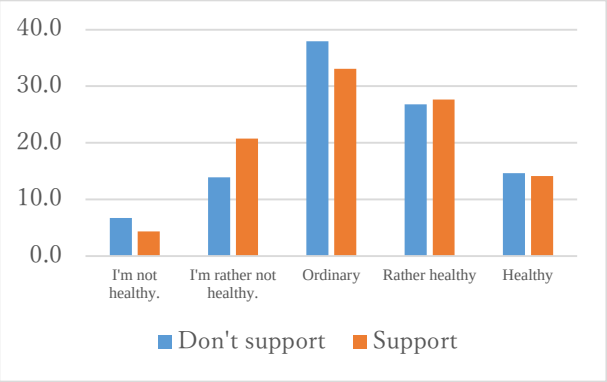


Figure 5 Health condition



6.2 Differences in changes in the economic environment by support for and disapproval of the Swedish strategy

Figure 6 shows the change in working hours according to support for and disapproval of the Swedish strategy. The percentage of respondents whose working hours had decreased significantly was higher in the group that supported the Swedish strategy, but the difference between the percentage of respondents whose working hours hade decreased and of those whose working hours had increased was not large in the group that did not support the Swedish strategy. Figures 7, 8, and 9 show that differences in personal income, workload, and job satisfaction were not significantly different between supporters and non-supporters, indicating that differences in the economic environment determined neither support nor non-support for the Swedish strategy. However, the percentage of respondents who answered that there was no change was lower in the support group, suggesting that the percentage

of those affected by the economic environment was slightly higher among supporters of the Swedish strategy.

Figure 6 Working hours

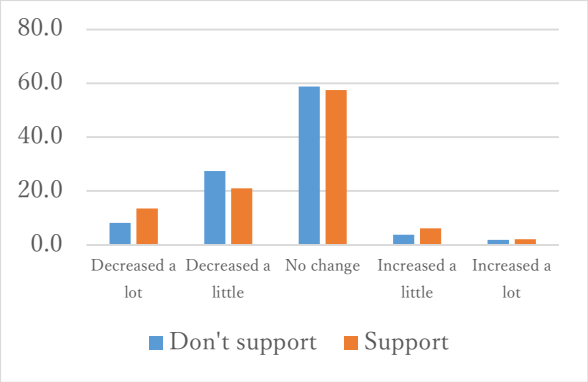


Figure 7 Personal income

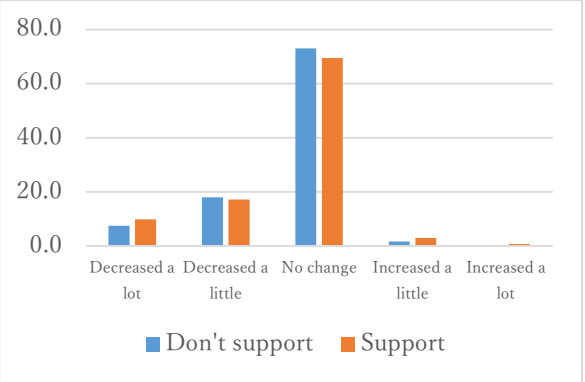


Figure 8 Amount of work

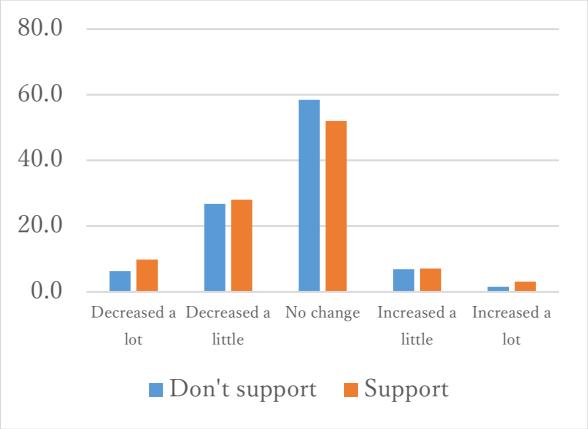
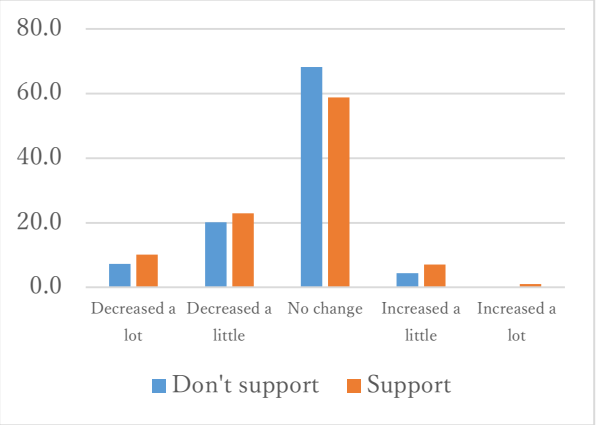


Figure 9 Job satisfaction



6.3 Differences in satisfaction and happiness by support for and disapproval of the Swedish Strategy

Figure 10 shows the differences in change in life satisfaction by support for and disapproval of the Swedish strategy. This figure shows that there is no significant difference in change in life satisfaction between the groups that support and do not support the Swedish strategy, and that the percentage of respondents who indicated that their satisfaction had increased was slightly higher in the support group.

Figure 11 shows the difference in sense of well-being by support for and disapproval of the Swedish strategy. This figure shows that the percentage of people with relatively low happiness (1–5) was smaller in the group that supported the Swedish strategy. The percentage of people with the highest sense of well-being was also higher in the group that supported the Swedish strategy. These results indicate that the group that supported the Swedish strategy had, on

average, a higher sense of well-being. This finding suggest that, among supporters of the Swedish strategy, fear of COVID-19 infection is lower and the risk of the COVID-19 pandemic is judged relatively calmly.

Figure 10 Life satisfaction

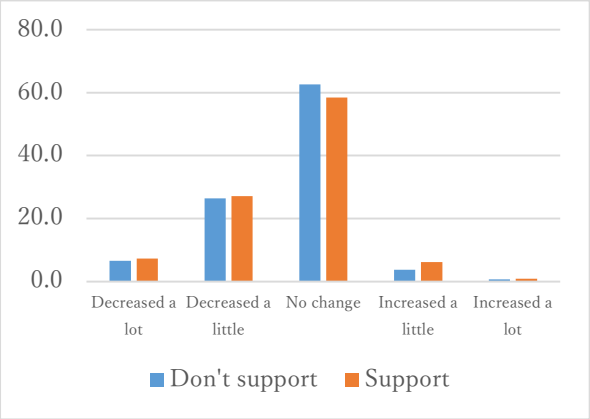
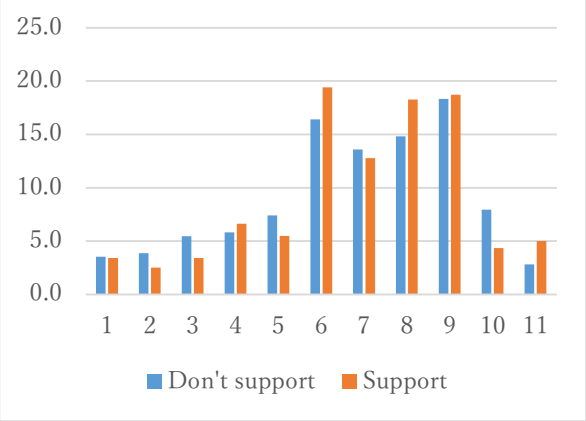


Figure 11 Happiness



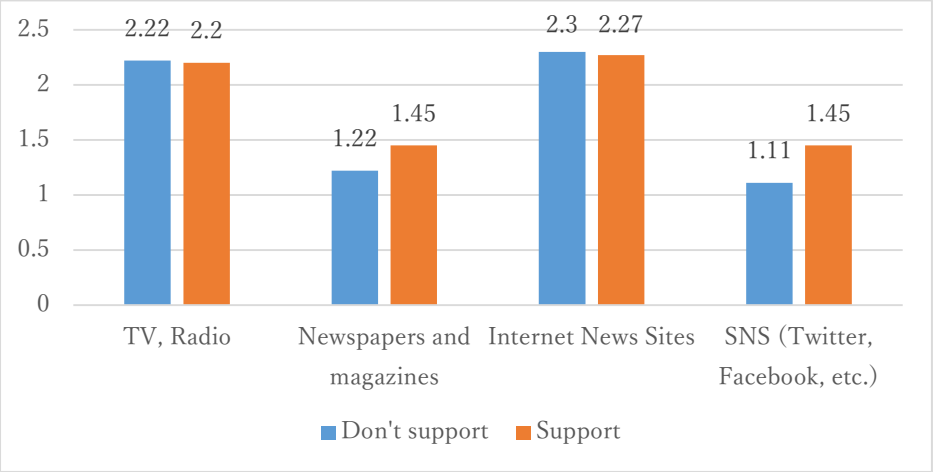
6.4 Information media type by support for or disapproval of the Swedish strategy

Figure 12 shows information media viewing time by support for or disapproval of the Swedish strategy. In judging whether to support the Swedish strategy or not, we found that information about COVID-19 infection and about prevention of the spread of infection had a great influence. The results showed that there was no statistically significant difference in the amount of time spent watching TV and radio and the amount of time spent on Internet news sites. However, the amount of time spent reading newspapers and magazines, and on social networking sites (SNS) was significantly longer in the group that supported the Swedish strategy, indicating that this group obtained information from more diverse news sources.

The abovementioned results suggest that support for the Swedish strategy tends to become stronger when people are able to make decisions from a broader perspective by obtaining information from a variety of news sources and from different perspectives. In particular, TV and other media were judged to be biased toward infection prevention rather than as balanced reporting between strengthening immunity and infection prevention actions. Also, it can be interpreted that obtaining information on a comprehensive infection prevention system including the immune system

through SNS and other media will result in a tendency to support the Swedish strategy.

Figure 12 Media viewing time by support for and disapproval of the Swedish strategy



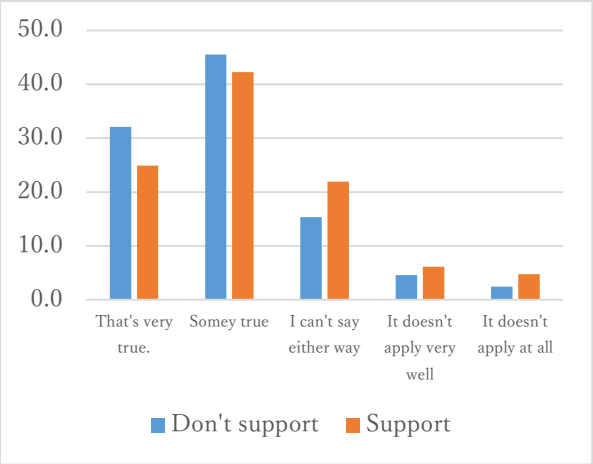
Note: Newspapers, magazines, and social networking sites (SNS) are significant at the 1% level.

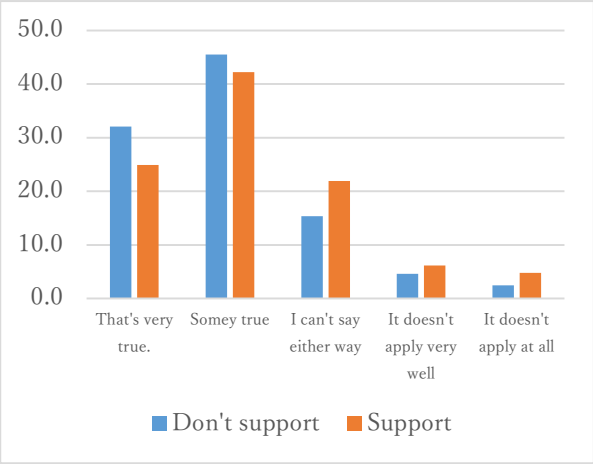
6.5 Judgment in support of stay-at-home and lockdown by support for or disapproval of the Swedish strategy

The negative position of Swedish strategy supporters in terms of the effectiveness of stay-at-home orders and lockdown is illustrated in Figures 13 and 14. The group that supported the Swedish strategy was less supportive of stay-at-home orders than the group that did not support it. Figure 14 shows that the percentage of respondents who did not support lockdown at all was higher in the group that supported the Swedish strategy than in the group that did not support the Swedish strategy. These results can be interpreted as a balanced judgment informed by a variety of news sources, allowing for relatively accurate assessment of the costs of stay-at-home orders and lockdown, and the decision to not support excessive infection control.

Figure 13 Stay-at-home orders

Figure 14 Lockdown



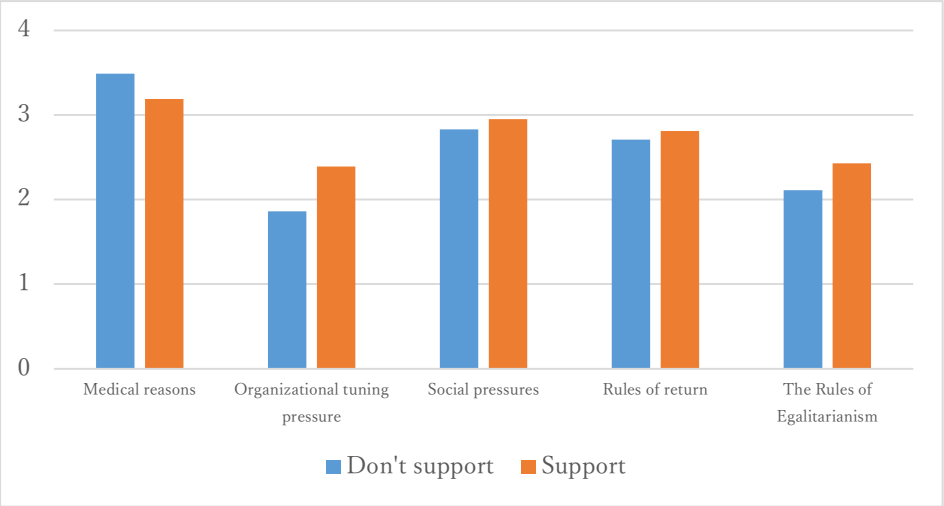


6.6 Reasons for wearing masks by support for or disapproval of the Swedish strategy

Figure 15 shows the reasons for wearing a mask by support or disapproval of the Swedish strategy. The percentage of respondents who wore masks for medical reasons was lower in the group that supported the Swedish strategy at the 1% level of significance. The proportion of respondents who abided by organizational peer pressure and the rule of human egalitarianism was significantly higher in the group that supported the Swedish strategy at the 1% level of significance. The ratio of those who succumbed to social pressure was significantly higher in the group that supported the Swedish strategy at the 5% of level significance. However, among those who followed the rule of return, the difference between the two groups was not significant.

Our interpretation of these results is that, in the group that supported the Swedish strategy, the decision-making process regarding the disadvantages of wearing masks was influenced by various sources. Also, and the proportion of those who wore masks for medical reasons was smaller. In practice, the current situation does not allow for people to refuse to wear masks, which indicates that even those who do not wear masks for medical reasons continue to wear them for reasons such as abiding by organizational peer pressure, the rule of human egalitarianism, and social pressure.

Figure 15 Reasons for wearing masks by support for and disapproval of the Sweden strategy



Note: Differences in the mean for medical reasons, organizational peer pressure, and the rule of human egalitarianism are statistically significant at the 1% level. That for social pressure is statistically significant at the 5% level.

7. Conclusion

Examination of what policies should be pursued in the event of a pandemic is an extremely important issue in the world of the future. The disruptions and economic stagnation brought about by the COVID-19 pandemic have had a serious impact on people through various routes. The serious impact has not only been realized through the channel of fear of infection, but also through the channel of mental distress associated with isolation and economic deprivation, leading to an increase in suicides as well as deaths from infectious diseases. To achieve an optimal balance between the prevention of the spread of infection and economic losses, it is necessary to analyze people's behavioral change patterns, accurately understand the changes in social welfare and social costs associated with policies, and conduct evidence-based policy evaluation. In addition, in a pandemic, important policy choices need to be made, such as whether to adopt the Swedish strategy or the lockdown strategy. In this study, we proceeded with our analysis with the aim of accumulating evidence for these important policy decisions.

The results of our analysis show that awareness of policy choices differs greatly depending on individual attributes,

suggesting the importance of formulating detailed policies. In the future, it will be important to evaluate policies in the event of a pandemic from a variety of perspectives, accumulate more accurate evidence, and accumulate knowledge that will enable more precise policy decision-making.

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