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Paper:

Developing an Assessment Framework of the Recovery Calendar for COVID-19 Calamity: Based on the Data from the June 2021 Survey

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The COVID-19 pandemic continues to pose a global threat. It is considered a CBRNE (chemical, biological, radiological, nuclear, explosive) disaster that has caused not only a public health crisis but also psychological, social, and economic problems. The recovery of social and economic activities remains an urgent issue. This study developed an assessment framework of the "recovery calendar" to visualize the process of people's recognition of recovery from the COVID-19 calamity. Data on this recovery calendar were collected from an online questionnaire survey administered on a total of 449 respondents from 10 groups divided by gender (male or female) and age (20s, 30s, 40s, 50s, 60s, and above). The results showed that the recovery process took place in the following order: recognition of COVID-19's impact on society and of the imposition of a constrained lifestyle, recognition of returning to work or the resumption of local schools, and finally, recognition of the recovery of the household and local economies, although these remained at a low level of activity. Importantly, the recovery progressed slowly. The results also indicated that measures such as the declaration or lifting of the state of emergency, or the "Go To" travel campaign, affected people's recognition of recovery. Moreover, the recognition of recovery depended on social demographics. Men, younger people, and those with a stable life base were more likely to perceive recovery from the disaster. This study discussed the applicability of the assessment framework of the recovery calendar to visualize people's recovery process from the COVID-19 calamity.

Keywords: CBRNE, COVID-19, pandemic, recovery calendar, social demographics

1. Introduction

Since the COVID-19 outbreak caused by a new coronavirus called SARS-CoV-2 was reported in Wuhan, China, in December 2019, as of September 2021, more than 230 million people have been infected and over 4.7 million people have died [1]. Although restrictions have been relaxed in countries with a high level of vaccine coverage, the highly contagious Delta variant is currently spreading, causing the number of infected cases to rise again. In response, some countries have returned to enforcing lockdowns or issued states of emergency [2, 3]. Even after nearly two years since its outbreak, the COVID-19 pandemic has yet to abate and remains a threat. The pandemic is also considered as a type of CBRNE (chemical, biological, radiological, nuclear, explosive) disaster. It is not only a public health risk but also a psychological, social, and economic crisis [4]. Therefore, besides direct response measures such as infection control, social and economic recovery from the COVID-19 calamity remains a major issue.

Reportedly, disaster victims take a long time to achieve psychological recovery, that is, feeling that "they are no longer victims" [5]. A previous study has indicated that experiencing the Hanshin Awaji Earthquake disaster produced negative feelings and adverse health effects, thereby reducing victims' sense of well-being over the long term [6]. Delayed recovery or reconstruction from disasters not only creates socioeconomic problems but also increases society's vulnerability. Thus, we need to strengthen society's overall capacity to respond to COVID-19; that is, increase people's ability to recover from the COVID-19 crisis.

To address this social issue, this study aimed to develop an assessment framework using the COVID-19 recovery calendar to enable the visualization of people's subjective recovery process from the COVID-19 pandemic.

2. Applying the Recovery Calendar to the COVID-19 Calamity

The "recovery calendar" is a method to clarify the life recovery process, specifically, the victim's subjective sense of recovery from natural disasters such as earthquakes, typhoons, and floods [7, 8] (see Section 5). This

Table 1. The milestones of the recovery calendar for natural disasters and the COVID-19 calamity.

The milestones of natural disasters	The milestones of COVID-19 calamity
I understand the extent of the damage.	I understood the impacts of COVID-19 on our society.
I felt safe.	I became used to the presence of COVID-19.
I was prepared to have an uncomfortable life for a while.	I was prepared to have an uncomfortable life for a while.
Business office resumed operation.	My work (or school) resumed.
Problem of housing was finally settled.	I was able to engage in daily infection preventive behaviors.
Disaster does not affect household economy any more.	COVID-19 did not affect the household economy anymore.
Everyday life settled down.	Everyday life settled down.
Local activity has been restored.	Local activities were restored.
I did not define myself as a disaster victim.	I no longer felt uncomfortable living under the COVID-19 calamity.
Local economy was no longer influenced by disaster.	Local economy was no longer influenced by COVID-19.
Local roads have resumed.	Local restaurants resumed normal business hours.
Local schools resumed operation.	Local schools resumed operation.
	It became possible to go shopping as before.
	It became possible to go out as before.
	It became possible to eat out regularly.
	It became possible to travel as before.

calendar is used to assess the degree of recovery using life events that represent recovery milestones plotted against a logarithmic time axis, which is based on a psychological time scale. The recovery calendar has been used to assess the recovery process from various disasters, including the Hanshin Awaji Earthquake, the 2004 Mid-Niigata Prefecture Earthquake [7], the 2016 Kumamoto earthquake [9], the 2011 Kii Peninsula flooding [10], and the 2011 Great East Japan Earthquake and Tsunami disaster [11]. Notably, it has demonstrated its effectiveness as an index to visualize the victims' recovery status from these disasters. In the analysis of the recovery calendar, five stages have been identified in the post-disaster life reconstruction process: grasping the full extent of the disaster, resumption of work activities, settling down of daily life including resolution of household financial and housing issues, ceasing to feel like victims, and the local economy is no longer affected by the disaster [10].

Here, we applied this approach for assessing the recovery process, based on the recovery calendar as a framework, to measure people's sense of recovery from the COVID-19 pandemic, which is considered to be a CBRNE disaster. Twelve recovery milestones were identified from previous recovery calendars [7, 11]. Some of these milestones were modified to suit the COVID-19 calamity, such as changing "local roads were resumed" to "local restaurants resumed normal business hours" (**Table 1**). In addition, we added four other milestones: "it became possible to go shopping as before," "it became possible to go out as before," "it became possible to eat out regularly," and "it became possible to travel as before;" these represent socioeconomic activities that had been restricted due to the pandemic. Since COVID-19 calamity is still ongoing, it may cause further socioeconomic problems. These additional milestones help us further extend or selectively pick items for assessment purposes, if necessary. In total, we used 16 milestones.

Studies that employ the recovery calendar have used a logarithmic time axis based on the psychological perception of post-disaster changes [12]. However, in this study, it is difficult to use the post-disaster time axis since the COVID-19 calamity is ongoing. Furthermore, there are multiple events that mark psychological changes; for example, the state of emergency has been declared several times. Thus, instead of a logarithmic time axis, we used a monthly time scale. Although the first COVID-19 case in Japan occurred in January 2020 [13], the rate and extent of spread varied widely among prefectures. To minimize regional differences, we set the origin of the calendar's time axis to April 2020, when the state of emergency was declared for the first time. Note that the two months immediately following the spread of COVID-19 (April and May) was a period when various social changes occurred following the first state of emergency; therefore, the time axis corresponding to these two months was divided into half-months to measure the changes in greater detail.

Recent studies have indicated that a timeline-based approach is important for understanding the recovery process from disasters [14, 15]. This study also develops a framework for examining the timeline of the recovery process from the COVID-19 calamity.

3. Study Purpose

This study aimed to develop an assessment framework for the COVID-19 recovery calendar. The COVID-19 pandemic is still in progress, causing various socioeconomic problems, in addition to public health issues. Therefore, it is necessary to develop an assessment framework for the recovery calendar that can be extended in the future when the situation surrounding COVID-19 has further progressed, rather than an assessment method that can be conclusively generalized. To examine this recovery calendar's validity, we take two steps.

First, we adapted the recovery milestones of the con-

ventional recovery calendar to COVID-19 and changed the time axis to a monthly scale. We seek a framework that corresponds to the features of the COVID-19 calamity, where the pandemic has become prolonged and there are several changes marking the road to recovery. Therefore, besides the cumulative share of recovered people, visualized in previous recovery calendars (see Section 5), we also examined the changes in the percentage of recovered people along the time axis (see Section 5). In Japan, the spread of COVID-19 has repeatedly changed its course, and accordingly, various measures have been adopted, including the issuance, lifting, and renewed issuance of the state of emergency, the "Go To" travel campaign, and so on. Essentially, we analyzed the changes in the recovery milestone reactions against the timing of such response measures.

Second, research shows that, in general, the response to risks varies with social demographics such as age and gender [16]. For instance, with respect to disasters, women and older people have a lower perception of recovery than men and younger people, respectively [17]. Reportedly, single people, men, and younger people tend not to adopt infection-preventive behaviors [18]. Other studies also report that COVID-19-prevention behavior is strongly affected by age [19]. Moreover, the risk of COVID-19 infection increases with age. In fact, younger people tend not to be concerned about the possibility of COVID-19 and often do not take preventive actions [20]. Furthermore, resilience and other factors of psychosocial stability reduce COVID-19-related stresses [21, 22], and that the stabilization of the COVID-19 calamity itself affects people's minds and behavior [23]. Since the sense of recovery and responses to COVID-19 are affected by differences in social demographics, we examined how social demographics affect the difference in recovery response for the individual milestones employed in the recovery calendar.

4. Method

4.1. Participants

Participants were recruited from pooled samples registered with iBRIDGE Corporation, an Internet survey company in Japan. The registered individuals are those who have agreed in advance to participate in various research projects conducted by this company. The company has over 4.5 million registered pooled individuals, from whom participants are recruited to form representative survey samples. This study was carried out with a total of 500 participants, divided into 10 groups according to gender (male and female) and age range (20s, 30s, 40s, 50s, 60s, and above), with each group consisting of 50 participants. The survey was implemented on June 11, 2021. After providing informed consent (on the top page), participants expressed their consent via their willingness to enroll in the survey. In total, responses from 449 participants were obtained during the three-day period up to June 13. The social demographics of the participants are presented in **Table 2**.

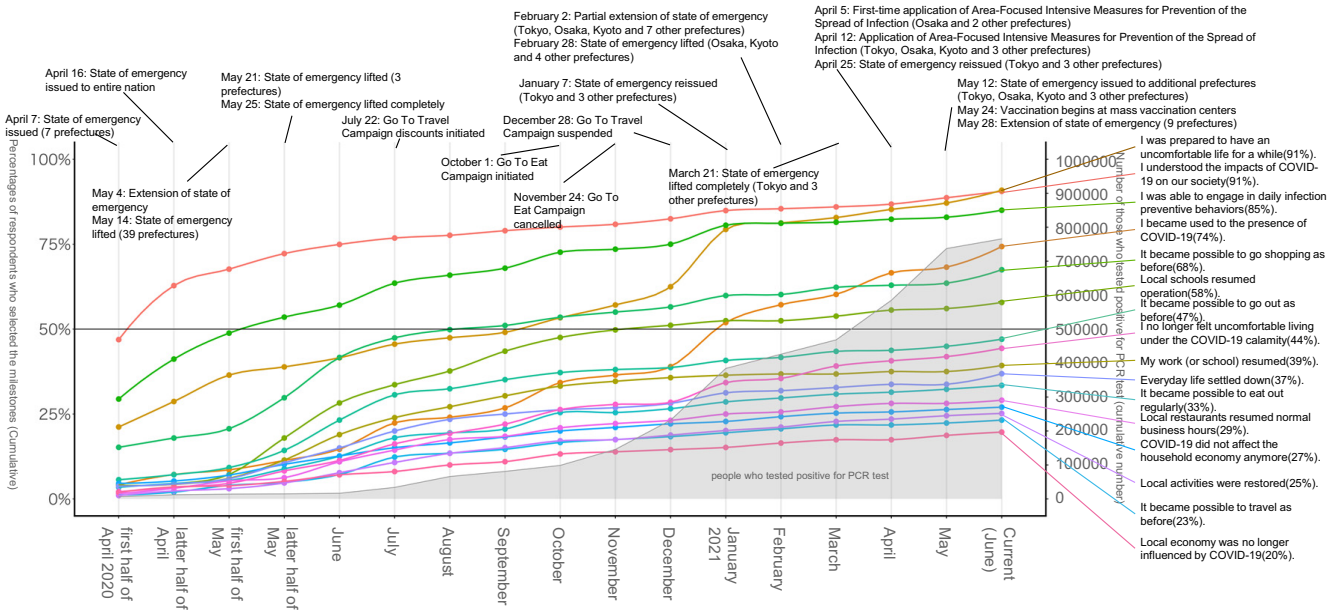
Table 2. Characteristics of social demographics in the samples.

Age	M = 44.84, SD = 13.86 (20s = 22%, 30s = 18%, 40s = 20%, 50s = 21%, 60s or over = 19%)
Gender	
Man	49%
Woman	51%
Marriage	
married	52%
unmarried	48%
Presence of offsprings	
yes	42%
no	58%
Ownership of residence	
self-owned	57%
rental	43%
Yearly income	
under 1 million yen	7%
1–2 million yen	5%
2–3 million yen	12%
3–4 million yen	13%
4–5 million yen	15%
5–6 million yen	13%
6–7 million yen	9%
7–8 million yen	8%
8–9 million yen	5%
9–10 million yen	4%
over 10 miilion yen	9%

4.2. Measurements

4.2.1. Recovery Calendar for the COVID-19 Calamity

The recovery calendar from Kimura [7] was modified and adapted for COVID-19. At the beginning of the survey, we presented the instruction "Please look back and examine how your feelings and actions have changed over time since the state of emergency was first issued (April 7, 2020)." We used the following 16 milestones for the calendar: "I understood the impacts of COVID-19 on our society," "I became used to the presence of uncomfortable life for a while," "my work (or school) resumed," "local schools resumed operation," "I was able to engage in daily infection preventive behaviors," "it became possible to go shopping as before," "it became possible to go out as before," "it became possible to eat out regularly," "it became possible to travel as before," "COVID-19 did not affect the household economy anymore," "everyday life settled down," "local activities were restored," "local restaurants resumed normal business hours," "I no longer felt uncomfortable living under the COVID-19 calamity," and "local economy was no longer influenced by COVID-19." The time axis was divided into "first half of April 2020 (first state of emergency issued on April 7)," "latter half of April (state of emergency issued for entire na-



Note: The number of those who tested positive for the PCR test was compiled by authors from open data released by the Ministry of Health, Labour and Welfare [24]. The number of cases for "Current (June)" is based on data of June 13, 2021.

Fig. 1. Cumulative percentages of respondents who marked milestones in the recovery calendar.

tion on April 16)," "first half of May (extension of state of emergency on May 4)," "latter half of May (lifting of state of emergency on May 25)," "June," "July ("Go To" travel campaign beginning July 22)," "August," "September," "October ("Go to Eat" campaign begins October 1)," "November ("Go to Eat" campaign suspended on November 24)," "December ("Go to" travel campaign suspended December 28)," "January 2021 (reissue of state of emergency January 7)," "February (partial extension of state of emergency February 2)," "March (complete lifting of state of emergency March 21)," "April (state of emergency issued for four prefectures April 25)," "May (state of emergency expanded to six prefectures May 12)," "current (June)," "still not achieved at present," and "do not know or not applicable." From these, respondents chose a particular time for a given milestone. In the analysis, the response "do not know or not applicable" was treated as missing data.

4.2.2. Social Demographics

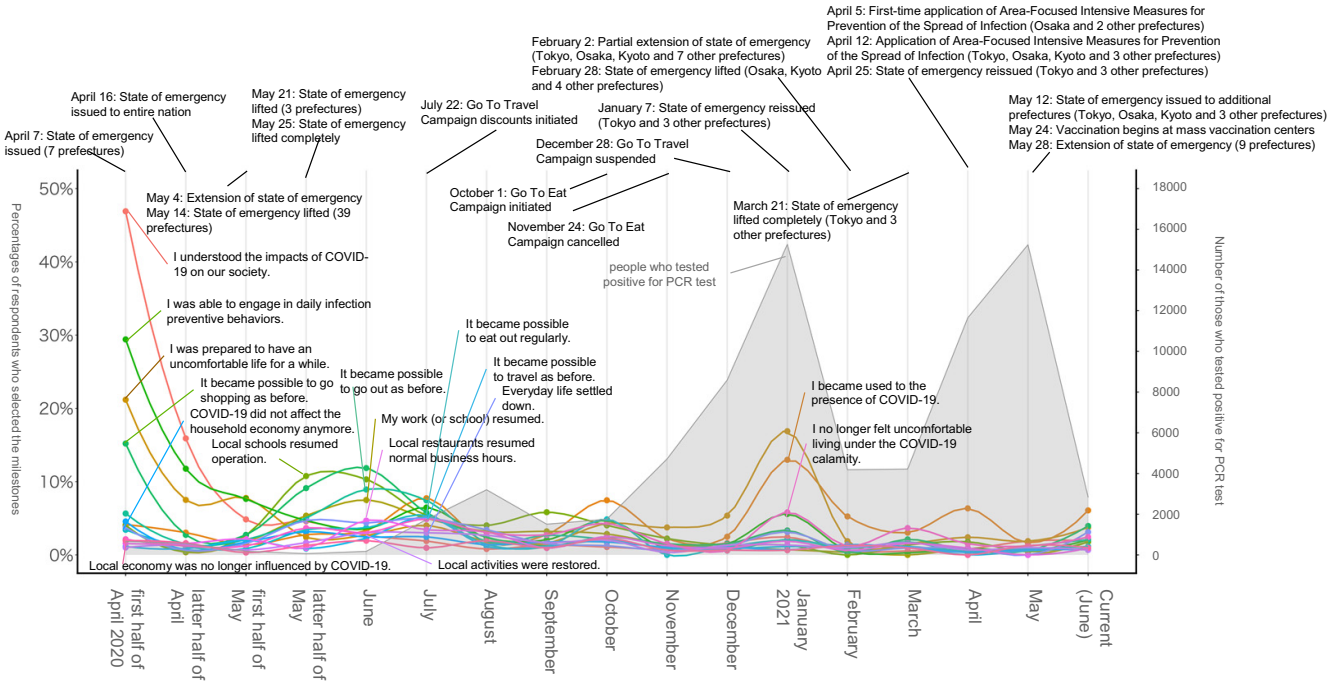
The data on the registered samples include age, gender, yearly income, marital status, presence or absence of offspring(s), and ownership of residence (rental or self-owned).

At the end of the survey, we presented a debriefing to thank the participants for their cooperation and gave them an outline of the survey. The study was conducted in accordance with the ethics regulations of Kanto Gakuin University.

5. Results

5.1. Recovery Calendar for the COVID-19 Calamity

The cumulative percentage of respondents who selected the milestones, which is the conventional format of the recovery calendar, is shown in **Fig. 1**. Similar to the conventional calendar [7], the date on which the number of respondents who selected a particular milestone reached 50% was used as the threshold. The number of respondents who selected "I understood the impacts of COVID-19 on our society" reached 46% in the first half of April 2020, when the state of emergency was declared. This indicates a high recognition rate of the disaster from the beginning. Surely, the number quickly exceeded 50% in the latter half of April. Next, the respondents of the item "I was able to engage in daily infection preventive behaviors" exceeded 50% in the latter half of May. This had been extended and infection-preventive behaviors became a daily necessity. Then, the percentage of those who selected "it became possible to go shopping as before" and "I was prepared to have an uncomfortable life for a while" exceeded 50% in August and September, respectively. These milestones exceeded 50% after some time had already passed since the first state of emergency was lifted. The next milestones to achieve majority were "local schools resumed operation" in November 2020, and "I became used to the presence of COVID-19" in January 2021. These corresponded to the time just before and during the drastic rise in infected cases. The remaining milestones had not exceeded 50% as of June 2021. In particular, the percentage of respondents who selected the following remained low: "COVID-19 did not affect



Note: The number of those who tested positive for the PCR test was compiled by authors from open data released by the Ministry of Health, Labour and Welfare [24]. The number of cases for "Current (June)" is based on data of June 13, 2021.

Fig. 2. Temporal change of percentage of respondents marking milestones in the recovery calendar.

the household economy anymore" (27%), "local activities were restored" (25%), "it became possible to travel as before" (23%), and "local economy was no longer influenced by COVID-19" (20%).

The spread of COVID-19 soon became a protracted situation, with the number of infected cases rising at times and falling at others. Various measures, including the declaration of the state of emergency and the "Go To" campaign, were implemented. **Fig. 2** shows how the percentage varied across the various milestones with the passage of time. This allows us to examine how those percentages changed with the constantly changing situation. As of the first half of April 2020, the percentages of those who marked "I understood the impacts of COVID-19 on our society" (47%), "I was able to engage in daily infection preventive behaviors" (29%), "I was prepared to have an uncomfortable life for a while" (21%), and "it became possible to go shopping as before" (15%) were the highest. By the latter half of May, when the state of emergency was completely lifted, those who marked "local schools resumed operation" (11%) had a high share. By June, the share of those who marked "it became possible to go out as before" (9%), "my work (or school) resumed" (8%), and "local restaurants resumed normal business hours" (5%) increased compared to the other periods. As of July, when the "Go To" travel campaign was initiated, the percentage of those who marked "it became possible to eat out regularly" (5%), "it became possible to travel as before" (5%), and "everyday life settled down" (5%) rose relative to the other periods. Finally, by January 2021, when the state of emergency was reissued, the number of those who marked "I became used to the presence of COVID-19" (13%) and "I no longer felt uncomfortable living under the COVID-19 pandemic" (6%) increased. The shares of those who marked the remainder of the milestones remained low throughout the study period [24].

5.2. The Effects of Demographics on the Milestones

To examine the effects of social demographics on the sense of recovery, we assigned dummy variables, with 1 representing a person who had marked the milestone in question to one of the time periods from April 2020 to June 2021, and 0 representing a person who had selected "still not achieved at present." We then implemented a logistic regression analysis with the milestone as the dependent variable and the respondent's age, gender (dummy variable), marital status (dummy variable), yearly income, ownership of residence (dummy variable), and presence or absence of offspring(s) (dummy variable) as the independent variables (**Table 3**). The analysis was performed using R [25].

The logistic regression for the dependent variable "I understood the impacts of COVID-19 on our society" showed that yearly income was a significant variable ($\beta = .176$, Wald $= 2.302$, $p = .021$, odds $= 1.192$ (95% CI $=$ 1.032–1.395)): the higher the income, the greater the tendency to mark this milestone. Age was significant variable for "I became used to the presence of COVID-19" ($\beta = -.035$, Wald $= -3.373$, $p < .001$, odds $= .966$ (95% CI $= .945$–$.985$)) and "my work (or school) resumed" ($\beta = -.026$, Wald $= -2.511$, $p = .012$, odds $= .974$ (95%

Table 3. Results of logistic regression for each milestone.

	I understood the impacts of COVID-19 on our society.					I became used to the presence of COVID-19.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	.902	1.091	2.465	.504	13.073	2.054	3.343***	7.800	2.393	26.782
Age	−.004	−.257	.996	.968	1.025	−.035	−3.373***	.965	.945	.985
Gender (vs. Male)	.328	.869	1.389	.669	2.979	.294	1.151	1.342	.814	2.224
Marriage (vs. unmarried)	.464	.992	1.591	.627	3.961	−.073	−.220	.930	.481	1.776
Yearly income	.176	2.302*	1.192	1.032	1.395	.030	.636	1.030	.940	1.132
Ownership of residence (vs. own)	.420	1.086	1.522	.713	3.280	.232	.874	1.261	.749	2.124
Presence of offsprings (vs. yes)	.088	.176	1.091	.407	2.892	.553	1.542	1.738	.861	3.528
Log likelihood			−110.769					−197.999		
Nagelkerke R^2			.059					.066		

	I was prepared to have an uncomfortable life for a while.					My work (or school) resumed.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	.401	.463	1.493	.280	8.509	−.185	−.310	.831	.254	2.666
Age	.005	.323	1.005	.975	1.036	−.026	−2.511*	.974	.954	.994
Gender (vs. Male)	1.146	2.509*	3.147	1.344	8.268	.101	.380	1.106	.658	1.859
Marriage (vs. unmarried)	1.014	2.014*	2.755	1.031	7.526	.373	1.002	1.452	.706	3.065
Yearly income	.111	1.377	1.117	.959	1.317	.049	1.050	1.050	.959	1.151
Ownership of residence (vs. own)	.251	.602	1.285	.567	2.935	.238	.855	1.268	.737	2.196
Presence of offsprings (vs. yes)	.303	.601	1.354	.498	3.639	.703	1.782	2.020	.943	4.461
Log likelihood			−96.186					−174.162		
Nagelkerke R^2			.104					.053		

	Local schools resumed operation.					I was able to engage in daily infection preventive behaviors.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	−.067	−.093	.935	.224	3.866	2.107	2.703**	8.225	1.859	39.912
Age	−.028	−2.274*	.973	.949	.996	−.027	−2.077*	.973	.948	.998
Gender (vs. Male)	.476	1.593	1.610	.897	2.902	.506	1.513	1.658	.868	3.238
Marriage (vs. unmarried)	.385	.868	1.470	.621	3.579	.050	.116	1.051	.448	2.424
Yearly income	.064	1.151	1.066	.957	1.189	.039	.617	1.039	.921	1.178
Ownership of residence (vs. own)	.866	2.762**	2.377	1.292	4.430	.764	2.221*	2.146	1.100	4.260
Presence of offsprings (vs. yes)	.815	1.801	2.260	.940	5.612	.046	.103	1.047	.433	2.491
Log likelihood			−132.253					−130.761		
Nagelkerke R^2			.132					.071		

	It became possible to go shopping as before.					It became possible to go out as before.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	1.018	1.726	2.767	.882	8.955	.178	.325	1.194	.407	3.501
Age	−.019	−1.883	.981	.961	1.001	−.025	−2.667**	.975	.957	.993
Gender (vs. Male)	−.075	−.293	.928	.562	1.529	.082	.346	1.085	.682	1.724
Marriage (vs. unmarried)	.107	.320	1.113	.575	2.143	.359	1.115	1.432	.762	2.708
Yearly income	.047	1.008	1.048	.957	1.150	.072	1.681	1.075	.989	1.170
Ownership of residence (vs. own)	.548	2.065*	1.730	1.030	2.923	.361	1.461	1.435	.886	2.337
Presence of offsprings (vs. yes)	.101	.292	1.106	.559	2.181	.077	.228	1.080	.559	2.099
Log likelihood			−190.475					−213.428		
Nagelkerke R^2			.040					.066		

	It became possible to eat out regularly.					It became possible to travel as before.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	.821	1.410	2.273	.726	7.167	.344	.548	1.410	.409	4.828
Age	−.057	−5.371***	.944	.924	.964	−.049	−4.307***	.952	.930	.973
Gender (vs. Male)	.442	1.744	1.556	.948	2.566	.533	1.905	1.704	.989	2.969
Marriage (vs. unmarried)	.182	.509	1.199	.598	2.436	.416	1.071	1.516	.716	3.311
Yearly income	.033	.730	1.034	.945	1.131	−.028	−.566	.972	.880	1.072
Ownership of residence (vs. own)	.417	1.550	1.518	.899	2.590	.123	.422	1.130	.641	2.010
Presence of offsprings (vs. yes)	.636	1.698	1.889	.915	3.996	.528	1.278	1.696	.764	3.893
Log likelihood			−192.781					−174.796		
Nagelkerke R^2			.152					.119		

	COVID-19 did not affect the household economy anymore.					Everyday life settled down.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	.546	.839	1.726	.480	6.214	1.748	2.894**	5.743	1.785	19.188
Age	−.040	−3.424***	.961	.939	.983	−.046	−4.378***	.955	.935	.975
Gender (vs. Male)	.621	2.105*	1.861	1.050	3.346	.268	1.024	1.308	.783	2.193
Marriage (vs. unmarried)	−.020	−.049	.981	.453	2.152	−.217	−.610	.805	.398	1.609
Yearly income	−.031	−.594	.969	.873	1.074	−.024	−.514	.976	.889	1.070
Ownership of residence (vs. own)	.206	.683	1.228	.682	2.229	.158	.583	1.172	.690	2.006
Presence of offsprings (vs. yes)	−.035	−.084	.966	.434	2.187	−.551	−1.502	.576	.279	1.182
Log likelihood			−151.185					−182.395		
Nagelkerke R^2			.096					.144		

*$p < .05$, **$p < .01$, ***$p < .001$. LL95%CI and UL95%CI: Lower and upper limits of 95% CI, respectively.

Table 3. Continued.

	Local activities were restored.					Local restaurants resumed normal business hours.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	.806	1.207	2.238	.603	8.341	.962	1.555	2.618	.781	8.912
Age	−.051	−4.289***	.950	.928	.972	−.053	−4.731***	.949	.927	.969
Gender (vs. Male)	.579	1.947	1.785	1.002	3.228	.499	1.816	1.647	.965	2.841
Marriage (vs. unmarried)	.042	.103	1.043	.470	2.342	−.048	−.128	.953	.453	2.020
Yearly income	.015	.274	1.015	.913	1.127	−.021	−.441	.979	.889	1.076
Ownership of residence (vs. own)	.052	.171	1.053	.582	1.919	.386	1.342	1.471	.841	2.607
Presence of offsprings (vs. yes)	−.179	−.423	.836	.365	1.938	.234	.592	1.263	.586	2.775
Log likelihood	−145.619					−168.816				
Nagelkerke R^2	.149					.131				
	I no longer felt uncomfortable living under the COVID-19 calamity.					Local economy was no longer influenced by COVID-19.				
	B	Wald	odds rate	LL95%CI	UL95%CI	B	Wald	odds rate	LL95%CI	UL95%CI
Intercept	1.758	3.212**	5.799	2.009	17.264	.667	.930	1.949	.475	7.999
Age	−.052	−5.353***	.950	.932	.967	−.059	−4.490***	.942	.917	.966
Gender (vs. Male)	.308	1.312	1.361	.860	2.161	.862	2.640**	2.368	1.263	4.567
Marriage (vs. unmarried)	−.089	−.279	.914	.486	1.713	−.270	−.600	.764	.318	1.871
Yearly income	−.035	−.807	.966	.888	1.050	−.001	−.010	.999	.893	1.117
Ownership of residence (vs. own)	.139	.565	1.149	.711	1.870	.129	.393	1.138	.599	2.188
Presence of offsprings (vs. yes)	.126	.371	1.134	.584	2.219	.152	.329	1.164	.477	2.948
Log likelihood	−172.466					−130.164				
Nagelkerke R^2	.173					.153				

*$p < .05$, **$p < .01$, ***$p < .001$. LL95%CI and UL95%CI: Lower and upper limits of 95% CI, respectively.

CI = .954–.994)). Younger respondents were more likely to mark these milestones. The result for "I was prepared to have an uncomfortable life for a while" indicated that gender ($\beta = 1.146$, Wald = 2.509, $p = .012$, odds = 3.147 (95% CI = 1.344–8.268)) and marital status ($\beta = 1.013$, Wald = 2.014, $p = .044$, odds = 2.755 (95% CI = 1.031–7.526)) were significant variables. Men were more likely than women and single persons more likely than married ones to mark this milestone.

The result for "local schools resumed operation" showed that age ($\beta = -.028$, Wald = −2.274, $p = .023$, odds = .973 (95% CI = .949–.996)) and ownership of residence ($\beta = .866$, Wald = 2.762, $p = .006$, odds = 2.377 (95% CI = 1.292–4.430)) were significant variables. Younger respondents and those who owned their own houses were more likely to mark this milestone. The result for "I became able to engage in daily infection preventive behaviors" also showed that age ($\beta = -.027$, Wald = −2.077, $p = .038$, odds = .973 (95% CI =.948–.998)) and ownership of residence ($\beta = .764$, Wald = 2.221, $p = .026$, odds = 2.146 (95% CI = 1.100–4.260)) were significant variables. Younger respondents and owners of their own residences were more likely to mark this milestone. The result for "it became possible to go shopping as before" showed that ownership of residence ($\beta = .548$, Wald = 2.065, $p = .039$, odds = 1.730 (95% CI = 1.030–2.923)) was a significant variable. Those who owned their residences were more likely to mark this milestone.

Age was a significant variable for "it became possible to go out as before" ($\beta = -.025$, Wald = −2.667, $p = .008$, odds = .975 [95% CI = .957–.993)); "it became possible to eat out regularly" ($\beta = -.057$, Wald = −5.371, $p < .001$, odds = .944 (95% CI = .924–.964)); and "it became possible to travel as before" ($\beta = -.049$, Wald = −4.307, $p < .001$, odds = .952 (95% CI = .930–.973)). Younger respondents were more likely to mark these milestones. The result for "COVID-19 did not affect the household economy anymore" showed that age ($\beta = -.040$, Wald = −3.424, $p < .001$, odds = .961 (95% CI = .939–.983)) and gender ($\beta = .621$, Wald = 2.105, $p = .035$, odds = 1.861 (95% CI = 1.050–3.346)) were significant variables. Younger respondents, rather than older ones, and men, rather than women, were more likely to mark this milestone.

Age was a significant variable for "everyday life settled down" ($\beta = -.046$, Wald = −4.378, $p < .001$, odds = .955 (95% CI = .935–.975)); "local activities were resumed" ($\beta = -.051$, Wald = −4.289, $p < .001$, odds = .950 (95% CI = .928–.972)); "local restaurants resumed normal business hours" ($\beta = -.053$, Wald = −4.731, $p < .001$, odds = .949 (95% CI = .927–.969)); and "I no longer felt uncomfortable living under the COVID-19 calamity" ($\beta = -.052$, Wald = −5.353, $p < .001$, odds = .950 (95% CI = .932–.967)). Younger respondents tended to mark these four milestones more often than older respondents. The result for "local economy was no longer influenced by COVID-19" indicated that age ($\beta = -.059$, Wald = −4.490, $p < .001$, odds = .942 (95% CI = .917–.966)) and gender ($\beta = .862$, Wald = 2.640, $p = .008$, odds = 2.368 (95% CI = 1.263–4.567)) were significant. Younger respondents were more likely than the older ones and men were more likely than women to mark this particular milestone.

6. Discussion

6.1. The Recovery Process from the COVID-19 Calamity

In the recovery process from the COVID-19 calamity up to June 2021, the social impacts of COVID-19 and the restrictions placed on daily life were recognized in the very first stages. This is similar to how the overall perspective of the disaster and its effect on daily life were recognized in the first stage of the conventional recovery calendar [7, 11]. The subsequent pattern, whereby the more respondents marked milestones signaling the resumption of work or local schools, is also similar to the second stage of conventional recovery calendars [7, 11]. However, subsequent milestones representing the effect on the household economy or recovery of the local economy, which are recognized in the third stage and thereafter in the conventional calendar, remained at low recognition rates compared to the other milestones. While the phase-wise process to recovery is similar to the conventional recovery process following natural disasters [7, 11], the recovery itself displays slow progress.

Furthermore, unlike the recovery process following natural disasters such as earthquakes, typhoons, or floods, which are examined in conventional recovery calendars, the COVID-19 pandemic is ongoing. In addition, although the pandemic does not induce property damage, such as housing damage, it is a global disaster that is happening throughout the world rather than in specific regions [1]. Therefore, the COVID-19 recovery calendar has features that differ from those of the conventional calendar for natural disasters. For example, the percentage of respondents who selected milestones as of June 2021, which corresponds to the survey date, are low for most milestones; however, the selection of milestones that indicate coexistence with the COVID-19 calamity, such as daily infection preventive behaviors, regular shopping, or habituation to the presence of COVID-19, is relatively high. This suggests that life under COVID-19 has become a daily reality for many people. Some studies have noted that the prolongation of the COVID-19 pandemic has led to a high incidence of people undertaking infection-preventive actions [23], which points to the adoption of new lifestyles. In contrast, relatively fewer people marked recovery in the household economy, local activities, and the local economy. As the COVID-19 calamity continues and it remains uncertain when it will come to an end, we still appear to be far from a decisive turn toward recovery.

Some milestones displayed fluctuations in response to social events. The recognition that local schools resumed classes might have been triggered by the lifting of the state of emergency. Meanwhile, going out, eating out, one's work (or school), the use of local restaurants, and travel all increased around the time of the "Go To" travel campaign. Furthermore, relatively more people noted both becoming habituated to the presence of COVID-19 and the disappearance of discomfort in life under COVID-19 in January 2021, when infected cases rose drastically and the state of emergency was reissued. This suggests that when people were confronted with a situation in which COVID-19 posed a renewed threat, instead of showing signs of abating, people adjusted their perceptions to recognize the unusual as the commonplace.

6.2. The Effects of Social Demographics

Different responses were displayed in the recovery milestones according to social demographics: men were more likely than women and younger people were more likely than older people to show adaptation to life under the COVID-19 calamity and recognize that society, consumer activities, and the local economy had recovered to former levels. Previous studies indicated that in general, women tend to display greater anxiety in risk events than men [16] and that during disaster reconstruction, younger people tend to move toward recovery earlier than older people [17]. In the case of COVID-19, in particular, the infection risk is higher for older individuals, thereby restricting their social activities. Reportedly, during the COVID-19 pandemic, younger people have been less concerned about being infected and tend to engage in activities without observing restrictions [20].

Furthermore, we found that yearly income, ownership of residence, and marital status affected some of the recovery milestones. This suggests that a stable base for living affected the recognition of recovery. Research indicates that in the disaster reconstruction process, those who display high resilience and stability tend to recover faster [17]. Furthermore, the psychological effects of COVID-19 seem lesser among those who are highly resilient [21, 22]. Thus, the effects of the COVID-19 calamity are less felt among those who have a stable living environment, which results in a heightened recognition of recovery.

6.3. Limitations and Further Directions

This study has several limitations. We conducted the survey in June 2021 to develop the COVID-19 recovery calendar. However, a state of emergency was issued in Tokyo and several prefectures in July 2021, showing that the spread of COVID-19 had worsened than at the time of the survey. Therefore, the perception of recovery may have changed since the survey. Hence, our findings on the recovery stages may not be directly generalizable to the current situation.

Next, for the recovery process following a natural disaster, studies have used a logarithmic scale to represent the time axis of recovery [7]. Nearly two years after its outbreak, the COVID-19 pandemic is still ongoing, with repeated increases and decreases in the number of infected cases. Therefore, in this study, it was difficult to adopt a psychological time axis based on a logarithmic scale. The particular scale for the recovery time axis is something that requires further examination.

In addition, there are geographical and temporal variations in the COVID-19 pandemic situation, and thus, in

the progress of recovery. Further studies are needed to improve the validity of the recovery calendar by comparing different regions and points of time with different situations.

Although the above limitations still need to be addressed, we were able to develop an assessment framework that can be used for the COVID-19 recovery calendar. By applying the calendar to COVID-19, we visualized people's recovery stages and the specific features of these stages. The calendar showed that the perception of recovery varied according to response measures, such as the issuance of the state of emergency or the "Go To" travel campaign. In this manner, the recovery calendar framework can be applied to assess the validity of government responses to COVID-19 or policies to stimulate the economy. Further studies are needed to develop the COVID-19 recovery calendar and extend it to enable the visualization of the recovery process once the COVID-19 pandemic has settled down, and apply it to assess government measures and policies.

7. Conclusions

This study developed a recovery calendar for the COVID-19 calamity. The formation of this calendar showed a similar process to the conventional recovery calendars of natural disasters. In addition, social demographics influenced the response of recovery milestones. This study demonstrated the validity of the recovery calendar as a framework for examining the recovery process from COVID-19 calamity. Moreover, visualizing the recovery process enables the evaluation of the impact of COVID-19 calamity on socioeconomic activities.

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