Adapting to the New Normal: Behavioural Changes and Personal Attributes in the Wake of COVID-19

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Manuscript received May 7, 2024; accepted August 28, 2024; published May 22, 2025.

***Abstract*—In this study, we explored how the COVID-19 pandemic influenced behavioural changes between 2020 and 2022 and those changes' association with the personal attributes of age, marital status, and gender. The key findings can be summarized as follows: The adoption of telework slightly increased, while the use of public transportation slightly decreased, suggesting a shift towards remote work. Engagement in activities such as visiting restaurants and indoor and outdoor entertainment showed a slight increase, suggesting a gradual return to pre-pandemic behavioural patterns as the initial fear subsided, which may also have influenced the decrease in the practice of gargling. Both in-store and online shopping experienced a minor decline, contrary to expectations that one might increase as a result of the other's decrease. On the other hand, no significant overall change in behaviour was observed between 2020 and 2022, suggesting that the immediate adjustments to the pandemic might have stabilized over time. From the above results, the behaviours that were subject to change due to the pandemic can be categorized into two types: those that reverted to pre-pandemic norms over time, such as the tendency to socialise, and those that became entrenched changes, such as the widespread adoption of telework. After a world-shaking pandemic, the gradual adaptation to these changes and their entrenchment could be said to reflect the height of human intelligence. By adjusting and adapting to the environment post-pandemic, humanity demonstrated its capacity to evolve and accommodate new realities, highlighting the resilience and adaptability inherent in our species.**

***Keywords*—behavioural changes, COVID-19 pandemic, age, gender, marital status**

I. Introduction

The COVID-19 pandemic represented an unprecedented global health crisis. It is thought that this astonishing event not only impacted public health systems but may have also significantly influenced individuals' behaviours and lifestyles, and there are numerous papers on behavioural changes under the pandemic. An example of experimental research on normative behaviour based on hypothetical scenarios is the study by Okada *et al.* [1]. In this study, the impact of normative information on behavioural changes under the COVID-19 pandemic was experimentally investigated. Results showed that descriptive information mainly influenced behavioural change, having more significant influence than injunctive information, and variations in the effects were observed based on participants' risk perception, ages, and trust in experts [1].

Another study found that apparel consumption decreased during the COVID-19 pandemic [2] while other studies discovered that the propensity to travel also decreased [3]. Moreover, existing research shows that medical and nursing students developed depression and anxiety during the pandemic [4], while other research found that stress caused sleep disorders [5]. Kanoh [6] focused on coronaphobia, emphasizing behavioural aspects, while discussing indicators of coronaphobia and the behaviour of university students during the pandemic. In addition, there have been numerous reports of behavioural changes since the time before the pandemic [7–9].

There has been a leap forward in digital transformation (DX) and advancements in digital education, and the term 'new normal' has also become part of our vocabulary, raising the question of how people's behaviours changed across the two years of the pandemic. Thus, it might be speculated that a new lifestyle, termed the 'new normal', is beginning to take root.

Fig. 1 shows the frequency of use of the word 'new normal' using Google Trends. The values on the Google Trends scale range from 0 to 100, where 100 denotes peak popularity as the most searched term and 0 means there was not enough data for that term. Based on this graph, it is evident that the term was not used at all before the COVID-19 pandemic. However, its usage surged during the early stages of the pandemic and has continued to be utilized thereafter.

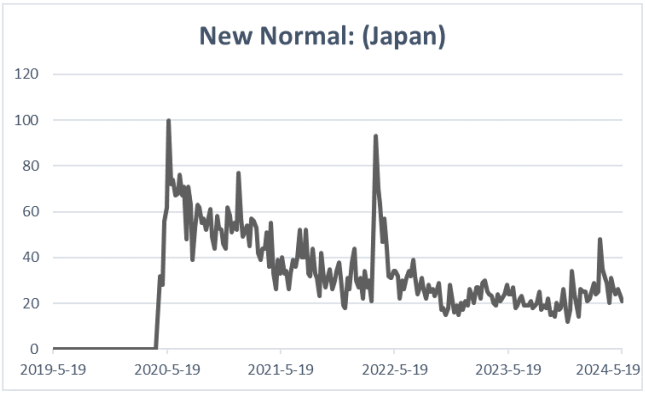

Fig. 1. Google trends for the keyword 'new normal' in 2019–2024.

II. Research Purpose and Methodology

This study aimed to investigate people's behaviours during the COVID-19 pandemic and clarify the relationship between behaviour and personal attributes (age, marital status, gender, telework and online classes). Specifically, this research aimed to test the following two hypotheses: first, that trends in people's behaviours during the COVID-19 pandemic increased or decreased between 2020 (when the pandemic began) and 2022; second, that the tendency toward various types of behaviour during the COVID-19 pandemic differed depending on age, gender, and marital status. In testing these hypotheses, this study aimed to elucidate the relationship between behaviours during the COVID-19 pandemic and

individual attributes. The results hold social implications for future pandemic preparation and response.

This study utilized exploratory qualitative methods including a survey. People's behaviours during the COVID-19 pandemic were measured using the following items, with answers provided on a seven-point scale.

1) Received a PCR test
2) Gargled with a mouthwash such as Isodine
3) Used public transportation (including commuting to work, school, etc.)
4) Visited a restaurant
5) Teleworked/taught online classes
6) Didn't even leave my house.
7) Availed of indoor entertainment (facilities such as movie theatres and concert halls)
8) Engaged in outdoor recreation, such as nature walks, in environments such as the mountains, the sea, a river, or a park
9) Went to the supermarket or store for shopping.
10) Availed of online shopping

Table 1. Age, marital status and male/female

Attribute	Category	N	%
Age	Under 39 years old	2419	49.60%
	Over 40 years old	2452	50.30%
Single / Married	Single	2024	41.50%
	Married	2849	58.50%
Male / Female	Female	2364	48.50%
	Male	2509	51.50%

We received responses from 4,873 subjects registered with the research company GMO who completed the survey online over two periods (January–March 2020 and January–March 2022). The number of people surveyed is shown in Table 1.

III. Findings

Regarding the analysis of behaviour during the coronavirus pandemic, we conducted a two-tailed t-test to examine the difference between the means of 2020Year and 2022Year. The results of the t-test are shown in Table 2, the mean and standard deviation in Table 3, and the Rate of change in Table 4. The rate of change was calculated as:

$$Rate\ of\ change = \frac{2022\ Year - 2020\ Year}{2020\ Year}$$

Additionally, Table 5 shows Pearson's correlation coefficients for the differences in changes for each item. Looking at the *p* values in Table 2, significant differences were seen in items other than '6) Stay home'.

Looking at the average values for each item in Table 3 between 2020 and 2022, 1) 4) 5) 7) 8) increased slightly, and 2) 3) 9) 10) decreased slightly. Regarding 1) PCR testing, national policies may have had an impact; some countries conducted frequent testing, but in Japan, free testing was not widespread immediately after the pandemic, only beginning to become so 2 years later. It is thought that there was only a slight increase because, when free tests started to become popular, few people voluntarily tried to get tested, and it is assumed that overall, PCR tests were not particularly popular during the period.

Table 2. The results of the t-test and Cohen's d

People's behaviours during the COVID-19 pandemic		t	df	two-tailed *p*-value	Cohen's d
1)	PCR	−4.406	4872	< 0.001	−0.063
2)	Gargle	2.817	4872	0.005	0.04
3)	Public transport	7.386	4872	< 0.001	0.106
4)	Restaurant	−2.481	4872	0.013	−0.036
5)	Telework	−4.252	4872	< 0.001	−0.061
6)	Stay home	1.023	4872	0.306	0.015
7)	Indoor entertainment	−2.878	4872	0.004	−0.041
8)	Outdoor recreation	−1.503	4872	0.133	−0.022
9)	Shopping	6.167	4872	< 0.001	0.088
10)	Online shopping	3.745	4872	< 0.001	0.054

Table 3. Mean and Standard Deviation of 10 Items

People's behaviours during the COVID-19 pandemic		Year	M	N	SD
1)	PCR	2020	1.59	4873	1.551
		2022	1.64	4873	1.572
2)	Gargle	2020	2.32	4873	2.204
		2022	2.27	4873	2.145
3)	Public transport	2020	3.49	4873	2.45
		2022	3.35	4873	2.367
4)	Restaurant	2020	2.84	4873	1.844
		2022	2.88	4873	1.821
5)	Telework	2020	2.7	4873	2.232
		2022	2.77	4873	2.238
6)	Stay home	2020	2.91	4873	1.976
		2022	2.89	4873	1.955
7)	Indoor entertainment	2020	1.85	4873	1.597
		2022	1.89	4873	1.62
8)	Outdoor recreation	2020	2.14	4873	1.717
		2022	2.16	4873	1.722
9)	Shopping	2020	4.29	4873	1.896
		2022	4.19	4873	1.911
10)	Online shopping	2020	3.22	4873	1.783
		2022	3.16	4873	1.77

Table 4. The rate of change

People's behaviours	No.	2020		2022		Difference	Rate of change
		N	%	N	%	2022−2020	
PCR	1	4001	82%	3863	79%	-138	-0.03
	2	371	8%	450	9%	79	0.21
	3	37	1%	51	1%	14	0.38
	4	31	1%	44	1%	13	0.42
	5	69	1%	93	2%	24	0.35
	6	147	3%	173	4%	26	0.18
	7	217	5%	199	4%	-18	-0.08
Gargle	1	3244	67%	3240	67%	-4	0.00
	2	375	8%	404	8%	29	0.08
	3	145	3%	154	3%	9	0.06
	4	122	3%	127	3%	5	0.04
	5	146	3%	155	3%	9	0.06
	6	229	5%	260	5%	31	0.14
	7	612	13%	533	11%	-79	-0.13
Public transport	1	1654	34%	1703	35%	49	0.03
	2	778	16%	771	16%	-7	-0.01
	3	380	8%	448	9%	68	0.18
	4	322	7%	340	7%	18	0.06
	5	262	5%	295	6%	33	0.13
	6	282	6%	324	7%	42	0.15
	7	1195	25%	992	20%	-203	-0.17
Restaurant	1	1327	27%	1291	27%	-36	-0.03
	2	1418	29%	1325	27%	-93	-0.07
	3	741	15%	801	16%	60	0.08
	4	494	10%	548	11%	54	0.11
	5	262	5%	287	6%	25	0.10
	6	239	5%	271	6%	32	0.13
	7	392	8%	350	7%	-42	-0.11
Telework	1	2521	52%	2407	49%	-114	-0.05
	2	591	12%	613	13%	22	0.04
	3	324	7%	324	7%	0	0.00
	4	291	6%	318	7%	27	0.09
	5	240	5%	276	6%	36	0.15
	6	243	5%	281	6%	38	0.16
	7	663	14%	654	13%	-9	-0.01
Stay home	1	1580	32%	1579	32%	-1	0.00
	2	1099	23%	1106	23%	7	0.01
	3	627	13%	643	13%	16	0.03
	4	514	11%	494	10%	-20	-0.04
	5	307	6%	330	7%	23	0.07
	6	290	6%	299	6%	9	0.03
	7	456	9%	422	9%	-34	-0.07
Movie theaters and concert halls	1	3148	65%	3120	64%	-28	-0.01
	2	923	19%	859	18%	-64	-0.07
	3	213	4%	263	5%	50	0.23
	4	112	2%	123	3%	11	0.10
	5	118	2%	129	3%	11	0.09
	6	146	3%	186	4%	40	0.27
	7	213	4%	193	4%	-20	-0.09
Nature walks	1	2639	54%	2633	54%	-6	0.00
	2	983	20%	912	19%	-71	-0.07
	3	416	9%	478	10%	62	0.15
	4	248	5%	254	5%	6	0.02
	5	164	3%	163	3%	-1	-0.01
	6	182	4%	204	4%	22	0.12
	7	241	5%	229	5%	-12	-0.05
Shopping	1	509	10%	568	12%	59	0.12
	2	464	10%	478	10%	14	0.03
	3	649	13%	720	15%	71	0.11
	4	1041	21%	1010	21%	-31	-0.03
	5	732	15%	674	14%	-58	-0.08
	6	637	13%	652	13%	15	0.02
	7	841	17%	771	16%	-70	-0.08
Online shopping	1	817	17%	891	18%	74	0.09
	2	1262	26%	1263	26%	1	0.00
	3	1020	21%	981	20%	-39	-0.04
	4	672	14%	665	14%	-7	-0.01
	5	410	8%	396	8%	-14	-0.03
	6	315	7%	360	7%	45	0.14
	7	377	8%	317	7%	-60	-0.16

Regarding the factors behind the slight increase in '5) Telework' and the slight decrease in '3) Public transport', it is thought that immediately after the outbreak of the pandemic, people who were not yet accustomed to using remote tools gradually began using them, and telework thus became widespread, causing a decrease in the use of public transport is thought to have decreased slightly.

Furthermore, the factors behind the slight increase in 4) Restaurant, 7) Indoor entertainment, and 8) Outdoor recreation, and the slight decrease in 2) Gargle, are thought to be due to the coronavirus pandemic persisting, causing people to be gradually freed from the fear that immediately followed the outbreak, encouraging them to begin going out again.

As for 9) Shopping and 10) Online shopping, Table 3 shows a slight decrease in the average values, while Table 5 shows a moderate correlation. This result was unexpected; it was thought that these results would follow those of going out, and so it was predicted that 9) shopping at physical stores would increase and 10) online shopping would decrease. Alternatively, it was also possible that both of them would increase slightly as activity increases. However, this survey showed a slight decrease in both cases.

Looking at the correlation coefficients shown in Table 5, there was a moderate correlation between changes in the frequency of PCR tests and the frequency of gargling. This is deemed to be a natural phenomenon with little significance.

Looking at the rate of change in Table 4, there is no value exceeding 0.3. Furthermore, the effect size Cohen's d shown in Table 2 shows a value of 0.106 for 3) public transport, and less than 0.1 for the others, while the effect size values for all means are small. In other words, we concluded that there was no significant change in people's behaviours over the two years.

Initially, we predicted that there would be a major change in behaviours between the period immediately following the outbreak of COVID-19 and two years later, but overall, no major differences were observed.

However, upon careful consideration, we can regard this outcome as somewhat expected. We hypothesized that no matter how long and prevalent the COVID-19 pandemic was, if there was a job that people could not afford to miss, they would go to work. Therefore, the results for 2020 and 2022 were combined, used as an index for each item, and compared with age, gender differences, and marital status.

Next, the subjects were divided into two age groups: 39 years or younger and 40 years or older. A one-factor analysis of variance with respect to age was performed on the results of the behavioural index in the first and second periods. The analysis of variance for each condition is shown in Table 6 (age), Table 7 (gender), and Table 8 (marital status).

Looking at the average values in Table 6, the older age group has higher values for items 8) and 9) than the younger group, and for those items, the younger group has higher values than the older group. As evidenced by the *p*-values for items other than 8) being less than 0.001, it can be concluded that these differences are statistically significant. However, the measure labelled as '8' shows a less pronounced, yet statistically significant difference with a p-value of 0.004.

Namely, the data suggests that the older age group tended to engage more frequently in outdoor leisure activities and visit brick-and-mortar stores for shopping than the younger cohort. Conversely, it appears that the younger group was more inclined towards teleworking, online classes, internet shopping, indoor entertainment, dining out, undergoing PCR tests, and gargling.

Table 5. Pearson correlation coefficient

People's behaviours during the COVID-19 pandemic										
	1) PCR	2) Gargle	3) public transport	4) Restaurant	5) Telework	6) Stay home	7) Indoor entertainment	8) Outdoor recreation	9) Shopping	10) Online shopping
1) PCR	–									
2) Gargle	0.511**	–								
3) Public transport	0.297**	0.247**	–							
4) Restaurant	0.315**	0.243**	0.467**	–						
5) Telework	0.292**	0.246**	0.186**	0.266**	–					
6) Stay home	0.331**	0.294**	0.104**	0.154**	0.377**	–				
7) Indoor entertainment	0.331**	0.294**	0.104**	0.154**	0.377**	1.000**	–			
8) Outdoor recreation	0.357**	0.292**	0.279**	0.359**	0.283**	0.290**	0.290**	–		
9) Shopping	0.263**	0.218**	0.263**	0.315**	0.246**	0.221**	0.221**	0.345**	–	
10) Online shopping	0.274**	0.260**	0.218**	0.252**	0.288**	0.304**	0.304**	0.353**	0.495**	–

**: Correlation coefficient is significant (two-tailed) at the 1% level.
*: Correlation coefficient is significant (two-tailed) at the 5% level.

The increased utilization of internet-related activities such as teleworking, online classes, internet shopping and indoor entertainment (online gaming and watching online videos) may not be limited to the pandemic context and is likely to be more prevalent among the younger generation generally. It could also be posited that the younger group were more conscientious about infection prevention, as indicated by their higher frequency of PCR testing and gargling.

Looking at the average values in Table 7, the male group had higher values for items 5) and 6) than the female group while the female group had higher values for items 9 and 10) than the male group. No significant differences were found for other items.

From this we can infer that the male group tended to telework/attend online classes more than the female group while the female group tended toward higher usage of both physical stores and online shopping than the male group; however, this may not be exclusively due to the pandemic situation but could reflect a general trend.

Observing the mean values in Table 8, it can be inferred that unmarried individuals reported a greater number of days in which they never left their homes compared to their married counterparts, which may suggest that the unmarried group had a higher propensity for teleworking or attending

online classes without the constraints of family obligations. On the other hand, the married group showed higher values for the outdoor leisure activities item, which might be attributed to increased opportunities for family outings such as camping or picnics.

Table 6. Analysis of variance table (Age)

People's behaviours during the COVID-19 pandemic	Age	N	M	SD	F	*p*
1) PCR	Under 39 years old	2419	3.31	2.344	116.298	< 0.001
	Over 40 years old	2452	2.68	1.662		
	Total	4871	2.99	2.054	–	–
2) Gargle	Under 39 years old	2419	3.78	2.614	27.897	< 0.001
	Over 40 years old	2452	3.41	2.297		
	Total	4871	3.59	2.466	–	–
3) Public transport	Under 39 years old	2419	4.87	2.689	29.848	< 0.001
	Over 40 years old	2452	4.47	2.459		
	Total	4871	4.67	2.583	–	–
4) Restaurant	Under 39 years old	2419	4.45	2.296	97.345	< 0.001
	Over 40 years old	2452	3.87	1.846		
	Total	4871	4.16	2.102	–	–
5) Telework	Under 39 years old	2419	4.32	2.637	69.975	< 0.001
	Over 40 years old	2452	3.73	2.267		
	Total	4871	4.03	2.475	–	–
6) Stay home	Under 39 years old	2419	5.18	2.597	27.129	< 0.001
	Over 40 years old	2452	4.8	2.4		
	Total	4871	4.99	2.506	–	–
7) Indoor entertainment	Under 39 years old	2419	4.66	2.396	43.237	< 0.001
	Over 40 years old	2452	4.24	2.037		
	Total	4871	4.45	2.232	–	–
8) Outdoor recreation	Under 39 years old	2419	5.46	2.549	8.52	0.004
	Over 40 years old	2452	5.66	2.259		
	Total	4871	5.56	2.409	–	–
9) Shopping	Under 39 years old	2419	6.37	2.726	32.562	< 0.001
	Over 40 years old	2452	6.8	2.529		
	Total	4871	6.58	2.637	–	–
10) Online shopping	Under 39 years old	2419	4.73	2.333	47.193	< 0.001
	Over 40 years old	2452	4.32	1.862		
	Total	4871	4.53	2.119	–	–

Table 7. Analysis of variance table (Gender)

People's behaviours during the COVID-19 pandemic	Gender	N	M	SD	F	*p*
1) PCR	Female	2364	2.96	1.997	0.943	0.331
	Male	2509	3.02	2.107		
	Total	4873	2.99	2.055	–	–
2) Gargle	Female	2364	3.61	2.479	0.127	0.722
	Male	2509	3.58	2.456		
	Total	4873	3.6	2.467	–	–
3) Public transport	Female	2364	4.67	2.544	0.002	0.962
	Male	2509	4.67	2.62		
	Total	4873	4.67	2.583	–	–
4) Restaurant	Female	2364	4.15	2.063	0.039	0.843
	Male	2509	4.16	2.14		
	Total	4873	4.16	2.102	–	–
5) Telework	Female	2364	3.89	2.433	13.436	< 0.001
	Male	2509	4.15	2.509		
	Total	4873	4.03	2.475	–	–
6) Stay home	Female	2364	5.2	2.508	33.799	< 0.001
	Male	2509	4.79	2.488		
	Total	4873	4.99	2.506	–	–
7) Indoor entertainment	Female	2364	4.53	2.192	6.067	0.014
	Male	2509	4.38	2.267		
	Total	4873	4.45	2.232	–	–
8) Outdoor recreation	Female	2364	5.65	2.335	6.216	0.013
	Male	2509	5.48	2.474		
	Total	4873	5.56	2.409	–	–
9) Shopping	Female	2364	7.02	2.613	128.223	< 0.001
	Male	2509	6.17	2.594		
	Total	4873	6.58	2.637	–	–
10) Online shopping	Female	2364	4.66	2.179	17.366	< 0.001
	Male	2509	4.4	2.055		
	Total	4873	4.53	2.12	–	–

Table 8. Analysis of variance table (Marital status)

People's behaviours during the COVID-19 pandemic	Marital status	N	M	SD	F	*p*
1) PCR	Single	2024	3	2.093	0.076	0.783
	Married	2849	2.98	2.027		
	total	4873	2.99	2.055	–	–
2) Gargle	Single	2024	3.54	2.471	1.648	0.199
	Married	2849	3.63	2.463		
	total	4873	3.6	2.467	–	–
3) Public transport	Single	2024	4.77	2.63	4.662	0.031
	Married	2849	4.6	2.548		
	total	4873	4.67	2.583	–	–
4) Restaurant	Single	2024	4.15	2.191	0.012	0.914
	Married	2849	4.16	2.038		
	total	4873	4.16	2.102	–	–
5) Telework	Single	2024	3.99	2.472	0.705	0.401
	Married	2849	4.05	2.478		
	total	4873	4.03	2.475	–	–
6) Stay home	Single	2024	5.2	2.55	24.976	< 0.001
	Married	2849	4.84	2.464		
	total	4873	4.99	2.506	–	–
7) Indoor entertainment	Single	2024	4.48	2.272	0.463	0.496
	Married	2849	4.43	2.204		
	total	4873	4.45	2.232	–	–
8) Outdoor recreation	Single	2024	5.32	2.408	36.177	< 0.001
	Married	2849	5.74	2.395		
	total	4873	5.56	2.409	–	–
9) Shopping	Single	2024	6.5	2.653	3.227	0.072
	Married	2849	6.64	2.625		
	total	4873	6.58	2.637	–	–
10) Online shopping	Single	2024	4.57	2.183	1.506	0.22
	Married	2849	4.49	2.073		
	total	4873	4.53	2.12	–	–

IV. Conclusion

In this study, we examined the changes in people's behaviours under the COVID-19 pandemic and their association with individual attributes such as age, marital status, and gender. Our hypotheses focused on whether there were observable behavioural shifts between 2020 and 2022 and how these changes were influenced by the aforementioned personal attributes. The findings revealed several key insights:

The adoption of telework slightly increased, while the use of public transportation slightly decreased, suggesting a shift towards remote work and reduced reliance on public commuting methods. In other words, people gradually adapted to remote tools, leading to a broader adoption of working from home.

Engagement in activities such as visiting restaurants and indoor and outdoor entertainment showed a slight increase, suggesting a gradual return to pre-pandemic behavioural patterns as the initial fear after the outbreak subsided. Conversely, the practice of gargling decreased slightly, possibly due to the diminishing perceived threat of infection.

Contrary to predictions, both in-store and online shopping experienced a minor decline, contrary to expectations that one might increase as a result of the other's decrease. This outcome suggests a more complex relationship between pandemic behaviours and shopping habits than initially hypothesized.

On the other hand, no significant overall change in people's behaviours was observed between 2020 and 2022, suggesting that the immediate adjustments to the pandemic might have stabilized over time.

Furthermore, older age groups are more engaged in outdoor leisure activities and shopping at brick-and-mortar stores compared to their younger counterparts. Younger groups show a higher propensity for teleworking, online classes, internet shopping, indoor entertainment, dining out, undergoing PCR tests, and practising gargling.

The increased use of internet-related activities such as teleworking, online classes, and internet shopping by the younger generation suggests a trend that extends beyond the pandemic context. The younger group appear to be more conscientious about infection prevention, as evidenced by their higher frequency of PCR testing and gargling.

The male group is more likely to have teleworked or attended online classes and spent days without leaving home compared to the female group, indicating a greater adoption of remote work among the male group, while the female group reported higher usage of both physical stores and online shopping, a trend that may not solely be attributed to the pandemic but could reflect broader societal patterns.

Unmarried groups were more likely to spend days not leaving their homes, suggesting a higher likelihood of teleworking or attending online classes without family obligations, whereas married individuals participated more in outdoor leisure activities, likely due to family outings.

From the above, people's behaviours altered by the pandemic can be categorized into two types: those that reverted to pre-pandemic norms over time, such as the tendency to go out, and those that became entrenched changes, such as the widespread adoption of telework. After a world-shaking pandemic, the gradual adaptation to these changes and their entrenchment could be said to reflect the height of human intelligence. By adjusting and adapting to the environment post-pandemic, humanity demonstrated its capacity to evolve and accommodate new realities, highlighting the resilience and adaptability inherent in our species.

CONFLICT OF INTEREST

The author declares no conflict of interest.

REFERENCES

[1] I. A. Okada, I. Yanagi, Y. Kubo, and H. Kikuchi, "Descriptive, injunctive, or the synergy of both? Experimenting normative information on behavioral changes under the COVID-19 pandemic," *Frontiers in Psychology*, vol. 13, 2022. https://doi.org/10.3389/fpsyg.2022.1015742

[2] E. Kempen and R. J. Tobias-Mamina, "Applying behavioral reasoning theory to South African female consumers' emerging apparel-shopping behavior during COVID-19," *Journal of Global Fashion Marketing*, vol. 13, no. 3, 2022. https://doi.org/10.1080/20932685.2022.2033632

[3] Y. Hara and H. Yamaguchi, "Japanese travel behavior trends and change under COVID-19 state-of-emergency declaration: Nationwide observation by mobile phone location data," *Transportation Research Interdisciplinary Perspectives*, vol. 9, 2021. https://doi.org/10.1016/j.trip.2020.100288

[4] S. R. M. Arifin, S. M. S. Azmi, K. H. A. Abdullah, *et al.* "Depression, anxiety, and behavioural changes during the COVID-19 pandemic among medical and nursing students," *International Journal of Mental Health Promotion*, vol. 24, no. 5, 2022. https://doi.org/10.32604/ijmhp.2022.020972

[5] S. Uccella, E. De Grandis, F. De Carli, *et al.* "Impact of the COVID-19 outbreak on the behavior of families in Italy: A focus on children and adolescents," *Frontiers in Public Health*, vol. 9, 2021. https://doi.org/10.3389/fpubh.2021.608358

[6] H. Kanoh, "The Japanese students' behavioral coronaphobia," *Pedagogy for Online Learning Theory and Practice*, pp. 57–71, 2022.

[7] C. L. Lin, Y. Q. Jin, Q. Zhao, S. W. Yu, and Y. S. Su, "Factors influence students' switching behavior to online learning under COVID-19 pandemic: A push-pull-mooring model perspective," *Asia-Pacific Education Researcher*, vol. 30, no. 3, 2021. https://doi.org/10.1007/s40299-021-00570-0

[8] L. Morgan, A. Protopopova, R. I. D. Birkler, *et al.* "Human-dog relationships during the COVID-19 pandemic: Booming dog adoption during social isolation," *Humanities and Social Sciences Communications*, vol. 7, no. 1, 2020. https://doi.org/10.1057/s41599-020-00649-x

[9] J. Ogawa, H. Yamaguchi, R. Honda, R. Inahara, and S. Nakayama, "Time-series analysis of behavioral change in Kanazawa City under COVID-19 pandemic," *Journal of Japan Society of Civil Engineers, Ser. D3 (Infrastructure Planning and Management)*, vol. 77, no. 5, 2022. https://doi.org/10.2208/jscejipm.77.5_i_649