

Wearing masks is easy but taking them off is difficult – A situation in Japan during COVID-19 pandemic and after

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ABSTRACT

Background: Masks are well accepted in Japan, where they were already part of daily life even before the COVID-19 pandemic. Unlike many other countries where mask mandates were lifted as soon as the pandemic was under control, Japan was one of the last countries to ease mask-wearing guidelines. Even after the formal announcement to allow masks-off in mid-March 2023, many Japanese still voluntarily wear masks. In this work, possible reasons for this extreme “mask-affinity” of Japanese people were studied by exploring various information sources including tweets (now known as X posts) and subsequent text-analysis, online news, and medical literature.

Methods: An observational study was conducted based on tweets prospectively collected during 5 months from June 26th, 2022 to November 26th, 2022. Tweets with the hashtag “mask (in Japanese)” were collected weekly via the Twitter application programming interface by using R version 4.0.3 to gauge public opinions. The word clouds to allow intuitive understanding of the key words were drawn from the tokenized text.

Results: The data collection period included the 7th flareups of the newly infected cases i.e. “the 7th surge”. In total, 161,592 tweets were collected. Word clouds for 1) before the 7th surge based on 18,000 tweets on June 26th and 2) during/after the 7th surge based on 143,592 tweets between July–November were created with the R package “wordcloud2”. The results indicated that the people wanted to take off masks due to the heat in summer, then shifted again toward mask-wearing along with the 7th surge but with a certainly growing “no-mask” sentiment.

Conclusions: Subsequent review of domestic information sources suggested that various factors, not only well-known peer pressure, may have contributed the public’s mask affinity in Japan. This work revealed an aspect of Japanese struggle toward adaptation to life in an unexpected pandemic by focusing on masks as our closest daily adjunct over the past 3 years of isolation.

Trial registration: not applicable.

1. Background

Masks became part of daily life in many parts of the world with the emergence of the new coronavirus infection named COVID-19. Wearing masks has been a standard method for protection against COVID-19 infections along with hand washing, gargling, and social distancing. It is reported that “by the end of June 2020, nearly 90% of the global population lived in regions that had nearly universal mask use or had laws requiring mask use in some public locations, and community mask

use was recommended by nearly all major public health bodies” [1]. While masks were not favored in many parts of the world and mask-wearing policies were lifted as soon as the COVID-19 outbreak was thought to be controlled along with increasing vaccination rates, many people still wear masks in public areas in Japan – even after the government eased the guidelines drastically in March, 2023. In the updated guideline, the decision to wear a mask was left entirely to the individual discretion [2]. This fact, though rather heuristic, implies the difficulty of de-masking for the Japanese public while the opposite is extremely easy.

Abbreviations: COVID-19, Coronavirus disease of 2019; WHO, World Health Organization.

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Although there is no formal quantitative data to support the mask affinity of the Japanese public, a large on-street research surveying 5000 people conducted by Yomiuri Newspaper in Kyoto on May 30th, 2023 revealed that more than 40% of the surveyed people wore masks in the crowded areas and the mask wearing rate surpassed 70% in the stations and trains [3]. A snapshot taken at Shinagawa station – one of the busiest stations in the Tokyo area – by Aflo Ltd. (Tokyo, Japan) in one day of August showed people still wearing masks in the morning temperature of 30C° (Fig. 1). The mask wearing situation in Japan does not seem to have changed drastically from this time up until now (November, 2023), although mask-wearing practice in fall 2023 may be partially due to an increasing number of influenza cases as well.

Peer pressure is often named as the culprit for this phenomenon in Japan, but the details are still unclear as the majority of the information related to the domestic situation associated with COVID-19 in Japan was available in Japanese and little was translated into other languages. In one study that studied the motivations for the mask wearing habits among the Japanese public before and after the government’s downgrading the classification of COVID-19 in the Infectious Disease Control in May 2023, norm and relief were highlighted as the important motivations besides infection prevention [4]. However, the evidence surrounding this area is still very limited.

In this study, the factors leading to continued mask wearing by Japanese were explored using the general public’s attitudes expressed in multiple forms of media. Specifically, our main focus was on X posts formerly known as tweets (X formerly known as Twitter Inc, San Francisco CA, <http://twitter.com>) as text analysis of these short text messages enable us to gauge public opinions and follow the transitions of their thoughts.

2. Methods

An observational study was conducted based on prospectively collected tweets. The data collection period was pre-determined between June 26th, 2022 through November 26th, 2022 at the corresponding author’s discretion. R version 4.0.3 (R Foundation for Statistical Computing, Vienna, Austria) was utilized for data retrieval and subsequent analysis of the tokenized text. Approval from the Institutional Board Review was considered unnecessary because the study used information in the public domain. The data usage in this study complied with the Twitter’s Terms of Service at the time the analysis was conducted. Tweets with the hashtag “mask (in Japanese)” were collected weekly using the R package “rtweet” during the data collection period, as the package retrieves tweets from the previous 6-9 days with a

maximum of 18,000 tweets at one time. The method is similar to the one used by the study team previously [5]. The retrieved X posts were tokenized with an R package “RMeCab”, a Japanese-specific tokenizer package available in R (<https://rmecab.jp/wiki/index.php?RMeCab>) which utilizes an open-source text segmentation library called MeCab [6]. RMeCab package contains multiple functions for different purposes. For example, RMeCabC tokenizes “今日は良い天気です” to “今日 (noun)”, “は (postpositional particle)”, “良い (adjective)”, “天気 (noun)”, “です (auxiliary verb)” and RMeCabFreq returns the frequency of those tokenized words in a submitted text file. After tokenization of the collective texts from retrieved tweets with RMeCabFreq, independent nouns, verbs, adjectives, and adverbs were extracted and meaningless words were removed as part of a usual data cleaning process. Combined use of the R packages “RMeCab” and “wordcloud2” allowed analysis of the frequency of word occurrences in text and the results can be seen at a glance as a word cloud. In a word cloud, words that appear with higher frequency in the submitted text are shown in bigger fonts. To Utilize this advantage that could allow an intuitive and visual understanding of the keywords, word clouds were drawn based on the tokenized text from the collected tweets.

A bar plot of newly diagnosed cases per week was created based on the CSV file released for public use by the Japanese Ministry of Health, Labour and Welfare to illustrate the timing of the data collection period in the context of multiple surges Japan experienced [7]. R version 4.0.3 was used to create the bar plot.

Also, a categorization of the tweets was attempted by manually reviewing the collected tweets by the corresponding author to explore the common important themes in the background of those tweets.

3. Results

As the data collection period incidentally included “the 7th surge” (Fig. 2), a dramatic increase in the number of patients infected since July 1st and September 30th, 2022 [8], two separate word clouds were drawn for 1) before the 7th surge based on 18,000 tweets on June 26th (the left panel, Fig. 3) and 2) during/after the 7th surge based on 143,592 tweets between July-November were created with the package “wordcloud2” (the right panel, Fig. 3). The most frequent word “mask” and “COVID-19” were excluded from the left panel (tweets before the 7th surge) and the “mask” was excluded from the right (tweets during/after the 7th surge). There is a very clear difference between these 2 word clouds; the left mainly discussed “taking off” and the right word cloud discussed “wearing”. Instead of “taking off”, however, the word “no” got larger in the right word cloud, which supports the increasing number of tweets



Fig. 1. “Pedestrians walk at a concourse of Shinagawa Station in Tokyo, Japan, August, 31, 2023” (Photo by Naoki Nishimura/Aflo)

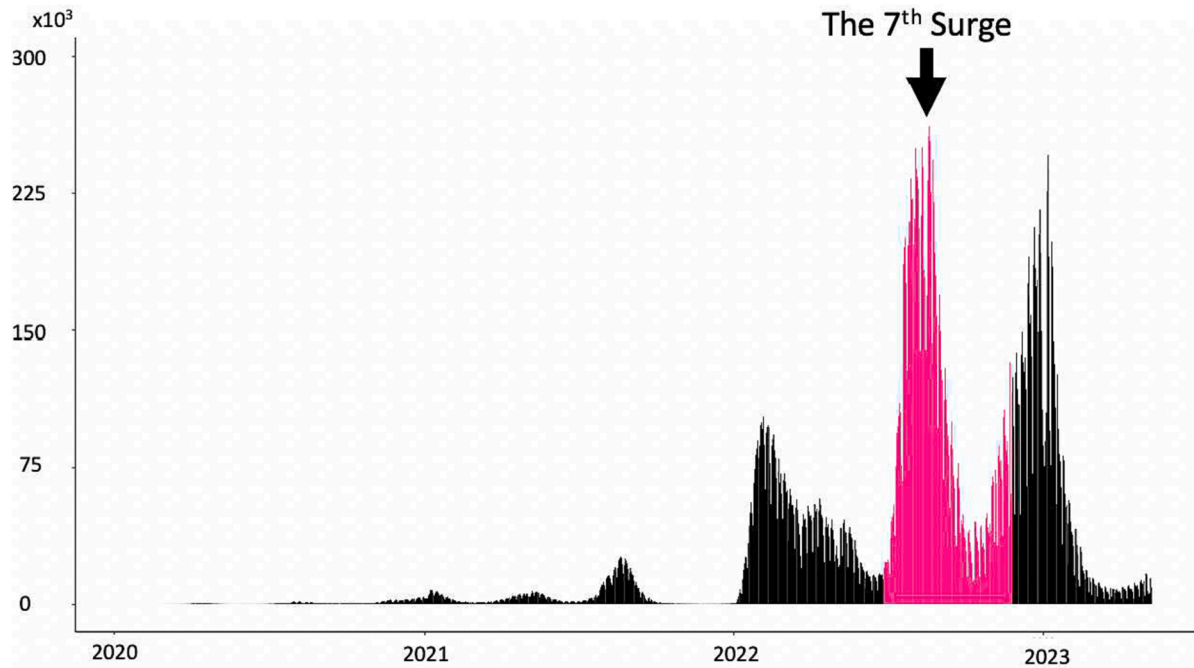
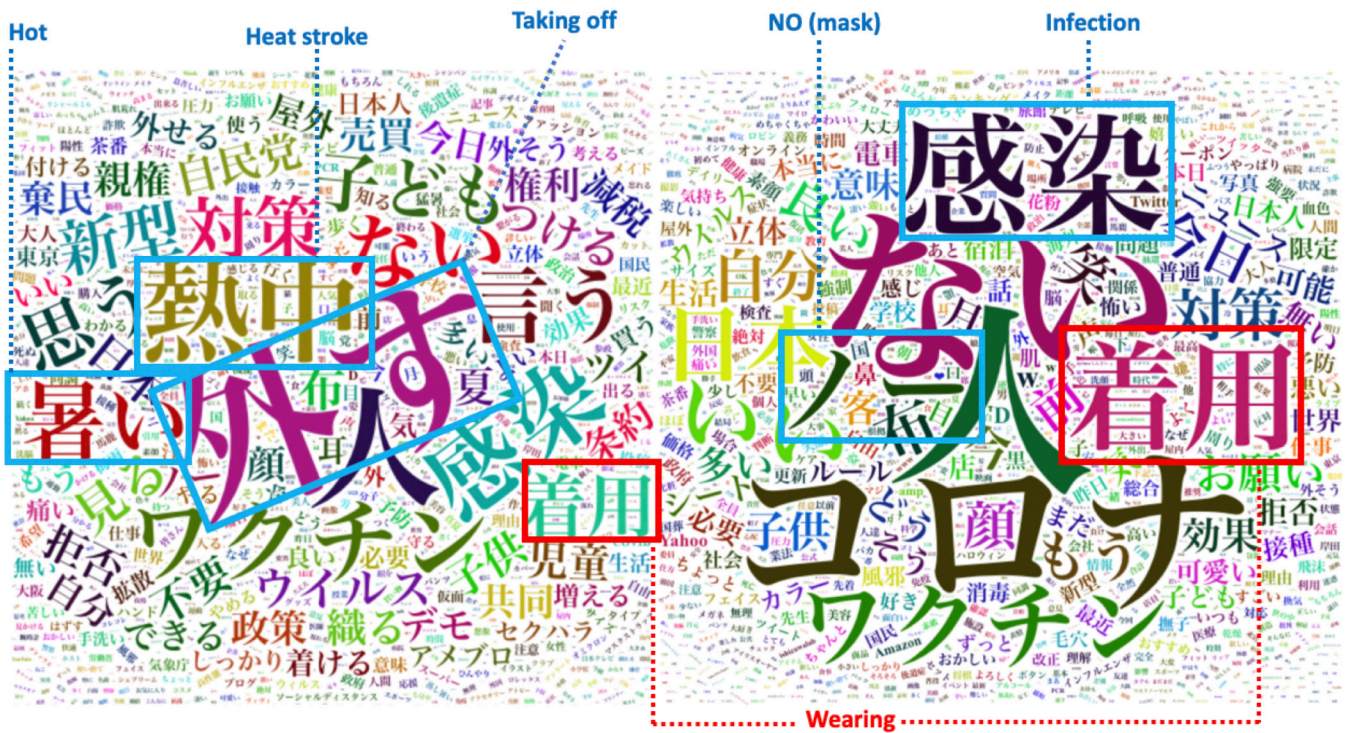


Fig. 2. The transition of weekly confirmed COVID-19 cases in Japan. Y-axis: the number of new cases. X-axis: year. The data during the Tweet retrieval period highlighted in pink.



Top 10 words in the left panel: 外す take off, 人 people, 熱中 heat stroke, 感染 infection, ワクチン vaccination, 暑い hot, ない no, 言う say, 対策 measures, 思う think
 Top 10 words in the right panel: マスク mask, 人 people, ない no, コロナ COVID-19, 感染 infection, 着用 wearing, ノー no, ワクチン vaccination, いい good/OK, 日本 Japan

Fig. 3. Word clouds based on tweets including “#mask (in Japanese)” for: Left) before the 7th surge and Right) during/after the 7th surge.

mentioning “no-mask” (the relationship between “no” and “no-mask” was evident in the bigram based on the tweets during/after the 7th surge, data not shown).

The categorization of the collected tweets and representative tweets in each category were presented in Table 1.

4. Discussion

In the present study, we attempted to gauge Japanese public opinions on mask-wearing through Tweet analysis in the summer-fall of 2022. The results indicated that the people wanted to take off masks due

Table 1
Representative anonymized tweets and their categorization (corresponding to the sub headings of the Discussion part).

Representative tweets translated in English (Original Japanese in parentheses)	Category
<p>“Even before the COVID-19 outbreak, I was wearing masks though I did not have any cold symptoms.”(コロナがまん延するより前にも、わたしはマスクを着けていました。風邪ではなかったけれど。)</p> <p>“I’ve been used to wearing masks and it’s not hard”(慣れてきて苦でも無いし。)</p> <p>“The TV show says let’s take masks off but please let me alone. I do want to wear masks on my responsibilities”(『マスクを外しましょう』とテレビでは言うけれど、こちらの自己責任でマスクをしたいので、どうぞお気になさらず。)</p>	Wearing masks is easy
<p>“I feel like many Japanese do not want to take off masks for various reasons”(日本ではいろいろな理由から、もう外したくないと思ってる人が多い気がする)</p> <p>“I am confident that I am Japanese! When the government loosened the mask-wearing guideline, I did too. When the online news said we need to wear, then I wore a mask. I am sorry for being such a pathetic Japanese...”(私が日本人である事を確信しました!政府が緩和→私も緩和。ネット記事で→私も着用。情けない日本人でごめんなさい。)</p> <p>“Sad news! The Japanese wear masks under the temperature of 35C”(【悲報】日本人、気温が35°Cでもマスクするwwwwwwwwww)</p>	Taking masks off is difficult
<p>“It is said that it is only Japanese who wear masks around the world”(マスクしてるの世界中で日本だけだとか・・・)</p> <p>“How long should we continue to wear masks, I am jealous of people walking without masks in the other countries”(海外とか見るとノーマスクで羨ましいです。いつまで着けときゃいいんだよ)</p> <p>“We are the world’s best in peer pressure”(同調圧力に関して世界最高峰の我が国)</p> <p>“We wear masks for Sontaku (surmising feeling of others)”(忖度マスク)</p>	Where we are going – are we finally taking off our masks?
<p>“There is no evidence that masks prevent COVID-19”(マスクでコロナ防げるなんて保証ないから。)</p> <p>“Masks cannot even prevent hay fever. Let’s spread this to those who believe masks are effective (in preventing COVID-19).”(マスクは花粉症すら防げない。これマスクに効果があると思い込んでしまってる人に拡散しましょう!)</p>	Scientific evidence for mask wearing
<p>“Why don’t they allow masking-off for children at least?”(せめてさ、子どもたちはやめようよ)</p> <p>“The adverse effects of mask-wearing are immense for growing children”(成長期の子どもの影響が計り知れない)</p> <p>“Mask-wearing in this heat is very dangerous for the elderly”(高齢者が多いのですが、本当に危ないです。)</p>	Different levels of mask tolerance among different age/gender groups
<p>“Anti-mask, anti-vaccination”(#反マスク#反ワクチン)</p> <p>“Save the children from vaccination”(#ワクチンから子どもを守れ)</p>	Tolerance of vaccination
<p>“Subsequently, both the teacher and the children can get infected and experience sequelae”(その結果教師も子どもも感染したり後遺症なったりするだろうし)</p>	Tolerance of sequelae

to the heat in June 2022, shifted again toward mask-wearing along with the 7th surge but with a certainly growing “no-mask” sentiment. As the 7th surge was declared soon after the data collection started, our data unexpectedly captured the people’s real-time, emotional fluctuations in the face of the 7th surge. Also, a careful manual review of the collected tweets allowed a categorization of those tweets in the context of people’s thoughts and emotions associated with mask wearing. The categories/themes presented in Table 1 could directly represent the factors that need to be covered when thinking about the de-masking trajectory of Japan. In the following paragraphs, under those themes, the factors that may have hindered the mask discontinuation in Japan will be reviewed by exploring multiple, domestic information sources including online news, articles, and medical literature.

5. Wearing masks is easy – “Mask affinity” of the Japanese

First of all, even before the COVID-19 pandemic, wearing face masks was a daily adjunct for nearly everyone in Japan [9]. In the spring and fall when hay fever affects many people, masks – and even goggles for people with severe symptoms – were a literally indispensable part of daily life to protect oneself from pollen. It was also common for Japanese physicians to wear masks during patient encounters, unlike in many Western countries. Physicians’ masking was considered to be part of self-protection against pathogens and patients were rarely offended by this practice. “Cosmetic use” of masks was also practiced. Japanese women often find a mask as a convenient way to hide their faces without makeup (thus preventing them from feeling embarrassed), to hide acne or facial lesions, to protect their skin from dryness, and other non-disease related reasons. Most Japanese people rapidly accepted wearing masks when the government encouraged them to do so. In Japan, the government cannot make such a mandate by law due to limitations on government action delineated in the national constitution. Second, the fear of COVID-19 was significant among the public, especially when the WHO declared the COVID-19 pandemic in March 2020. A famous Japanese comedian died from COVID-19 during the first surge, which encouraged people to take any measures possible to avoid this life-threatening condition. Masks are one of the easiest measures to use to limit exposure along with handwashing and gargling. Third, as referred to elsewhere when talking about Japanese society, peer pressure plays a major role in the extreme “mask affinity” of Japanese people. When a Japanese person was in an environment where all the other people were wearing masks, there is no other choice than to do what everyone does – wear a mask regardless of any one person’s will or thoughts.

6. Taking masks off is difficult

There are many factors to explain why many Japanese still wear masks in November 2023, in addition to peer pressure, that contribute to the very high level of mask compliance in Japan, but potentially the most important factor was the 7th surge. In May 2022 just before the 7th surge started, the government slightly relaxed the mask-wearing policy, and mask-wearing outside was not necessary as long as one is two meters apart from others. Unfortunately, this change was not well recognized by the public and as many as 58% answered they were not aware of the relaxed policy in a November 2022 survey [10]. The television news, and newspapers at that time were welcoming life without masks again, especially when the notoriously hot and humid summer season in Japan was approaching. The subsequent 7th surge, however, was the most severe surge since the pandemic was declared and Japan had the world’s worst record for 10 consecutive weeks during July and September 2022 according to the WHO report [11]. This surge frightened people and they voluntarily continued to practice masking, though the government mask-wearing policy was left relaxed during the 7th surge.

Other than the 7th surge, extreme mask affinity which could be referred to as “mask dependence” developed after 3 years of daily masking practice is also a contributing factor. In a poll conducted by

Yomiuri newspaper (Tokyo) in December 2022, as many as 80% of the respondents answered that they were willing to continue to wear masks to some extent and only 15% answered “not willing to wear masks” [12]. Another poll conducted by Nippon Information Incorporated, 54.5% answered that they were willing to wear masks, which was greater by +15.9% compared to the same survey conducted in September 2021 [13]. In the survey, women in their 20-30’s were most willing to wear masks compared to any other demographic. In this age group “can save makeup” ranked as the second most common reason following “protection against infection”, which implies strong internal/external pressure on appearance shared among young Japanese women. Among young women, including adolescents whose self-esteem could easily be affected by evaluation of their appearance, masks are now occasionally referred to as “facial panties” [14,15]. This striking word means that masking off is as embarrassing as taking off one’s panties in the public – raising concerns about a growing dependence on masks among young Japanese women.

7. Where we are going – are we finally taking off our masks?

After the recent World Cup competition in Qatar in December, 2022, where the majority of players and audience were no longer wearing masks, was broadcast, the “mask-off” discussion again started to gain momentum in Japan [16,17,18]. At that time, we faced with a few socially important questions such as: Where are we going from here? Abandon masks as other countries have done? Or keep the mask requirement indoors? Four key decision points will be reviewed in this section.

7.1. Scientific evidence for mask wearing

One key was education regarding the effectiveness of wearing masks to prevent COVID-19 infections. Since the 7th surge when masking was almost universally practiced in Japan but still too many new cases developed, the effectiveness of masks has been questioned especially among those who support “#nomask (in Japanese)”. This question seems reasonable but two important factors need to be recognized in interpreting the high infection rate in Japan during the 7th surge: 1) a low immunity toward omicron variants among the general public and 2) super virulence and strong transmissibility of the omicron variant. The cases/deaths in Japan were low during the earlier surges probably because of the combination of various protective measures including universal masking/hand washing/gargling/social distancing, which also means that people did not have the opportunity to get immunized from infection. In terms of vaccinations, 80% of the population is fully vaccinated and 67.4% received a booster dose as of 12/15/2022 [19]. Anti-N-antibody was positive only in 4.3% in the survey of February 2022 (which indeed increased to 26.5% as of December 2022 [20]), much lower, compared to 57.7% in the United States in February 2022 [21]. Within this background and the strong transmissibility of the omicron variant BA.5, this information is used to explain why Japan experienced such a significant rise in the number of cases during the 7th surge.

The effectiveness of mask-wearing was initially questioned but after the WHO changed its stance to recommend wearing masks in June 2020 [22], many health agencies in numerous countries followed the WHO’s guidance on mask-wearing. There is indeed plenty of evidence to support the effectiveness of mask-wearing as part of a program of infection prevention against COVID-19 [1,23,24]. Recently, a study that compared the incidence of COVID-19 in two United States school districts, one sustaining a mask requirement and the other which lifted the masking requirement, revealed that lifting the mask requirement was associated with an increase in the number of infected people [25]. It is possible that based on these study results and during seasons when the burden of other respiratory diseases such as influenza, and RSV, is also high, masking strategies and mandates may change [26]. It must be

conveyed to the general public in Japan that masks are still effective as a method of infection control and wearer protection (and of course, even better if practiced with hand washing and gargling) [27]. Knowing the effectiveness of masks, the next decision nodes will be tolerance to mask-wearing, to vaccination, and to sequelae of infection.

7.2. Different levels of mask tolerance among different age/gender groups

In Japan, the younger generation is likely to be blamed when the number of infected people increases, while the responsibility of the elderly is seldom discussed due to Confucianism being deeply rooted in the culture. Indeed, imposing behavior restrictions on the younger generation has been recently discussed expecting future surges with their devastating psychological impact on the younger generation during the long lock-down being ignored [28,29], as it is believed that asymptomatic young people would be a source of infection that threatens the vulnerable health of the elderly. Interestingly, however, one study from Hiroshima, Japan reported that only 37.5% of people aged >60 years surveyed were wearing masks, which was much lower than 51.4% for those aged 0-19 and 63.2% in the 20-59 age group [30]. Another poll conducted in May 2022 by Fuji News Network (FNN) reported that men in their 70’s answered “yes” the most to the question “the government’s mask-wearing policy should be relaxed” with a 58.1% “yes” rate in contrast to the lowest rate of 36.9% for people in their 20’s [31]. When these findings were combined with the earlier clusters from karaoke parties and other events held by some elderly groups [32], it implied that the elderly in Japan might be less tolerant of mask-wearing for some reasons (it is not known if this is due to less situational awareness or just intolerance, some may be due to cognitive impairment). It must be emphasized that excessive mask tolerance, such as that seen in young women as discussed above, is not necessarily healthy either, as it may be associated with other psychopathology such as a poor self-image. People are not born to live with masks and at some point, people should be allowed to live without masks with the condition that the society accepts the risks.

7.3. Tolerance of vaccination - after being fully vaccinated

It was repeatedly emphasized during the 7th surge in the media that the vaccination rates among the younger generation were low compared to the elderly, which was blamed as one reason for increased infection rates [33,34]. The most recent data on vaccination rates among the different age groups released by the government as of December 19, 2022, however, showed reasonable vaccination rates among the younger generation: 74.2% in ages 12-19, 81.5% in 20’s, and 81.1% in 30’s with a booster received in 44.5%, 54.9%, and 58.0%, respectively [35]. Although the numbers are lower compared to people age 60 years and over, where more than 90% received full doses and more than 80% received at least a single booster dose, the vaccination rates among the younger generation in Japan should still be considered as high in international settings [36,37]. It seems that the younger generation is more afraid of the adverse effects of vaccinations than the disease itself [38], which is an understandable concern for those who have a longer life expectancy and in a situation where the late complications of the vaccine are not well known. While education regarding the risks and benefits should continue, those sentiments/concerns need to be respected as the forceful vaccination encouragement beyond a certain level of community protection could involve important ethical issues [39,40].

7.4. Tolerance of sequelae

The important characteristic of COVID-19 which clearly delineates it from other transmissible respiratory diseases is the occurrence of sequelae, collectively referred to as “long-COVID”. The constellation of reported symptoms includes but is not limited to fatigue, malaise,

dyspnea, memory deficits, decreased concentration [41,42], and cardiovascular presentations as well [43]. Although those may not be life-threatening, these symptoms affect one's quality of life and it has been reported that the sequelae have prevented people from returning to their normal daily activities [44,45]. It should be acknowledged that some people are less tolerant to life with these sequelae.

Tolerance to masks, vaccinations, and disease sequelae differ depending on age/gender groups, presence of comorbidities, and personal or cultural values. There was no single, correct answer to the question "should we continue to wear masks or not?" at the end of 2022 when the first version of this manuscript was prepared. Probably in the situation where the disease is no longer life-threatening in most previously healthy people, the ideal answer might be "Decide on your own" depending on the situation one is in. What makes decision-making on an individual basis difficult in Japan, however, is the deep culturally-rooted fear of peer pressure that drives people to be part of the majority (especially when the government practices nationwide infection control). As we depicted in our previous work, there are certain levels of fears for ostracism as a penalty for a community member who committed a social crime i.e. contracting the disease specifically in the rural areas [5]. Not only an infection control measure, masks now serve as a placard to convey that one is not antisocial. The only solution to deal with this fear was thought to be a clear "masks-off" announcement from the government. Although the time with masks was felt to be never-ending, the Japanese government suddenly announced the easing of the mask-wearing guideline on March 13, 2023. With this change, the decision on mask-wearing was left up to each individual's "choice" [46]. However, many people still wear masks - not solely due to hay fever or influenza. An online survey of Tokyo residents conducted by the government 3 days after the announcement revealed that more than 70% of the surveyed residents would continue to wear masks for infection prevention [47]. This could be viewed as another example of the Japanese' fear for peer pressure, but in another sense, this may be viewed as a barometer of how much the general public have been hurt. So many people were socially hurt and criticized for contracting the illness during the past 3 years on top of the isolation they needed to experience, which might have made them overly dependent on masks to avoid these criticisms.

We still do not know where we are going but from what we observed above, it may be reasonable to conclude that the majority of the Japanese public may continue to live with masks. In this work, we attempted, through a discussion of masks, to depict one Asian country's ongoing, real-world struggle to adapt to life with a new health crisis. And we hope, through our attitude toward masks as a mirror of our collective fear, we may find our healing process from this unprecedented health and human-bond crisis.

7.5. Limitations

There are certain limitations to this work. First, selection bias is an inherent risk as not all the citizens in Japan utilize Twitter (X). Second, a word cloud is a qualitative way of data presentation and may not be necessarily preferred as an outcome for scientific research. However, as we believed that word clouds are the best way to facilitate an intuitive understanding of the general public emotions and opinions, we chose word clouds as the method for data presentation. Third, the scarcity of previous data to support our discussion should be acknowledged as the topic was not well studied in the past. Fourth, the categories the representative tweets were classified in Table 1 were inductive and not based on a sophisticated text analysis. Lastly, this "mask-affinity" phenomenon in Japan might not translate well into other regions with different cultural backgrounds. However, by revealing the pathophysiology behind the mask affinity aka high mask compliance in Japan, we hope our work adds a layer on the groundwork of public health specifically in the context of infection control.

8. Conclusions

A high mask-wearing rate among the Japanese public are multifactorial, though it certainly is driven by peer pressure. This study featuring the public emotions gauged from Tweet (X) analysis in one Asian country snapshotted the process of adjustment to an unprecedented health crisis at the public level.

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CRediT authorship contribution statement

Reina Suzuki: Writing – original draft, Formal analysis, Data curation, Conceptualization. **Yusuke Iizuka:** Writing – review & editing, Resources, Conceptualization. **Hitoshi Sugawara:** Writing – review & editing, Conceptualization. **Alan Kawarai Lefor:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The dataset generated during the current study is available upon a reasonable request to the corresponding author RS. Competing interests: The authors declare that they have no competing interests.

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