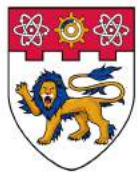# DIGITAL LIFE DURING A PANDEMIC

RESULTS FROM A PANEL STUDY

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | **Centre for Information Integrity and the Internet**
Wee Kim Wee School of Communication and Information

Centre for Information Integrity and the Internet (IN-cube)

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Dr. Goh Zhang Hao
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Editors

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EXECUTIVE SUMMARY

IN-cube tracks internet use in Singapore using a combination of methods. One of these involves a national survey conducted every six months, involving the same group of adult respondents (aged 21 and above) in Singapore. In this report, we are sharing results from a three-wave survey. At least 427 respondents participated in three surveys: December 2020, July 2021, and December 2021. Our surveys measure several key areas spanning different types of internet use: (a) General Internet Use, (b) News Consumption, (c) Fake News, (d) Entertainment, (e) Social Media, (f) Online Shopping, (g) Video Conferencing, (h) Emerging Technologies, and (i) Online Vigilantism.

Several key findings emerged. First, we found high levels of internet use in general. This is not surprising given the efficient internet infrastructure in Singapore, which our respondents are mostly satisfied with. Second, while most aspects of internet use remained stable, such as using it for entertainment, we found an increase in specific uses, such as in the use of video streaming sites and the use of digital wallets. Third, we found that many Singapore residents largely relied on local mainstream news sources—television and online—as they spent significant amounts of time on these channels. On the contrary, there was less reliance on print media as well as messaging and social media apps for news. Fourth, our results also highlighted the potential harms of digital media. For instance, many participants reported coming across fake news online. A vast majority of our participants reported sending and receiving fake news to and from their peers, with some knowingly sending fake news to others. However, although a large majority have used fact-checking sites, only a small number used them regularly. Finally, we found that our participants have high trust in emerging technologies. They also reported being satisfied with internet connectivity and reliability in Singapore.

We also include a supplemental report on the incidence of online vigilantism in Singapore based on a national survey conducted in July 2020. As the number of COVID-19 cases rose and as mask-wearing and safe distancing were required, social media also teemed with images and videos showing those supposedly violating these regulations.

INTRODUCTION

The Centre for Information Integrity and the Internet (IN-cube) was established on 26 January 2021, in the midst of the COVID-19 pandemic. Starting a research centre during the pandemic was challenging, as it meant that the centre needed to adapt very quickly to how work is conducted in the new normal, where all operations (e.g., hiring of new staff, coordinating meetings) had to go fully online. Indeed, the pandemic dramatically changed digital life around the world. The use of videoconferencing platforms zoomed. Visits to video streaming sites skyrocketed. Faced with restrictions on mobility and in-person interactions, many of us turned to social media, messaging apps, and other online platforms to connect with loved ones and friends, to stock up on groceries, and even to go on dates or view properties. IN-cube seeks to track and document how digital life is changing in this new normal.

Starting in December 2020, we have been tracking a group of Singapore residents aged 21 and above through an online survey conducted every six months. Our goal is to monitor and understand internet use in Singapore over time. By tracking the same group of people over time, we can also examine changes in online behaviour and explore what factors may explain such changes, if any. Of course, this presents logistical challenges, and we are grateful to the 427 participants who participated in all of our three surveys (out of an initial 1,606 participants recruited in December 2020), as their inputs have helped us in having a more nuanced understanding of how various aspects of internet use in Singapore may be changing.

While this means that our panel may not be representative of the Singapore population, the findings we share here offer a deeper analysis of the digital life of a particular group of adult residents in Singapore during the pandemic. By comparing the responses of the same set of people across three different time points, we can examine potential changes based on the responses of the same group of people, giving us more confidence in the observed patterns.

We worked with a commercial polling company based in Singapore to conduct three surveys. Wave 1 was conducted in December 2020 and included 1,606 participants. This was around the time when Singapore relaxed its alert level to Phase 3 to allow gatherings of up to eight people in public; this was also around the time when the first shipment of Pfizer vaccines arrived in Singapore [1].

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[1] Source: Channel NewsAsia: https://www.channelnewsasia.com/singapore/first-covid-19-vaccine-shipment-singapore-pfizer-biontech-494691

Wave 2 was done in July 2021 and involved 689 of the original participants. This was around the time when the alert level was raised to Phase 2 following new clusters traced to a KTV bar [2] and the Jurong Fishery Port [3]. Finally, Wave 3 was done in December 2021 and 427 of the original respondents from the two earlier waves completed the survey. This was around the time when threat from the Omicron variant was looming, but also a time when many residents took advantage of Singapore's Vaccinated Travel Lane arrangements with several countries for holiday travels.

Based on all our respondents who took part in all three waves, our final sample is 46.8% female and has an average age of 43.1 (SD = 12.3) years. Most were married (62.1%) and have at least a Bachelor's degree (66.7%). In terms of race, the majority of those who participated across three waves were Chinese (90.2%) while 4.4% were Indian and 4% were Malay.

[2] Source: Channel NewsAsia: https://www.channelnewsasia.com/singapore/ktv-cluster-fnb-pivot-covid-19-nightlife-cruise-2052196
[3] Source: TodayOnline: https://www.todayonline.com/singapore/jurong-fishery-port-workers-mingling-and-not-wearing-masks-believed-have-caused-covid-19

CHAPTER 1. INTERNET USE
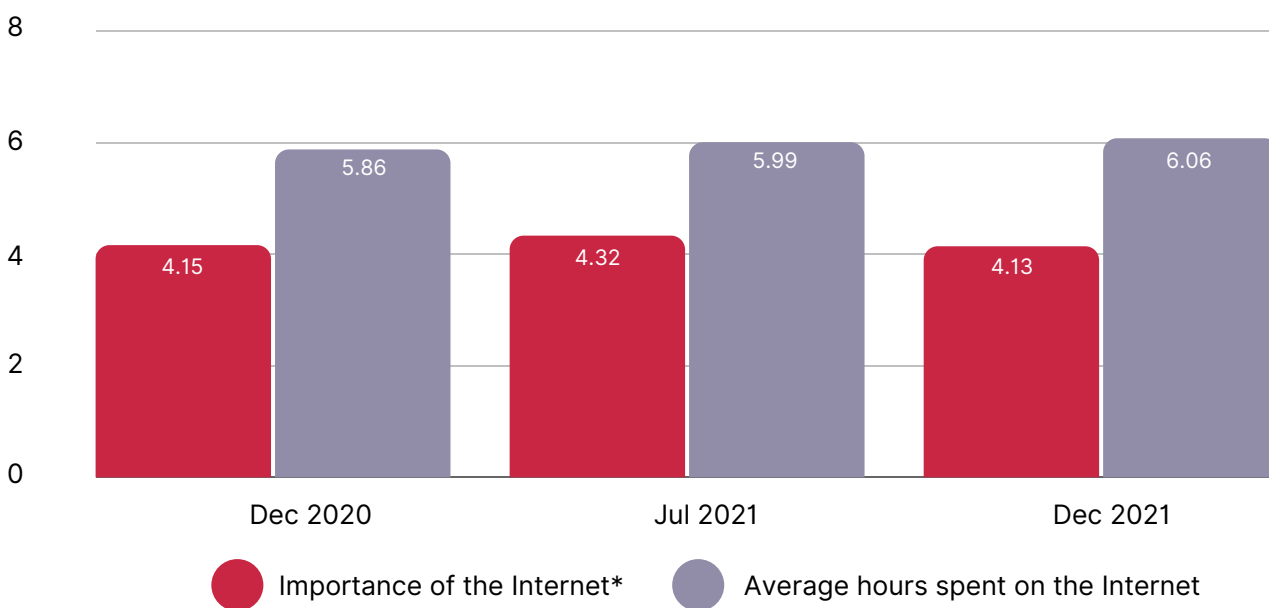## *By Edson C. Tandoc Jr.*

1.1 Introduction

IN-cube tracks general internet use as well as perceptions of the internet infrastructure (e.g., coverage, reliability, speed, and cost) in Singapore, especially since most of our participants also considered the internet as very important in their daily lives. Overall, our participants reported high levels of satisfaction with the internet, especially when it comes to speed and reliability. Most of them also connect to the internet using home wifi or mobile data primarily through their smartphones. The top four reasons for accessing the internet are: to keep track of news; to use search engines; for work or school; and for entertainment.

1.2 General Internet Use

Most participants consider the internet to be of high importance to them personally. On a scale of 1-5 (where 1 = not important at all; 5 = very important), our average panel rating was 4.15 (SD = .73) in December 2020; 4.32 (SD = .91) in July 2021; and 4.13 (SD = .89) in December 2021. Perceived importance of the internet rose in Wave 2, around the time when a new cluster of COVID-19 infections was traced to a KTV bar. But it went back to the same levels in Wave 3, F (2, 828) = 11.26, p < .001.

GENERAL INTERNET USE

	Dec 2020	Jul 2021	Dec 2021
Importance of the Internet*	4.15	4.32	4.13
Average hours spent on the Internet	5.86	5.99	6.06

● Importance of the Internet*   ● Average hours spent on the Internet

Percentage of those who said very important and extremely important.
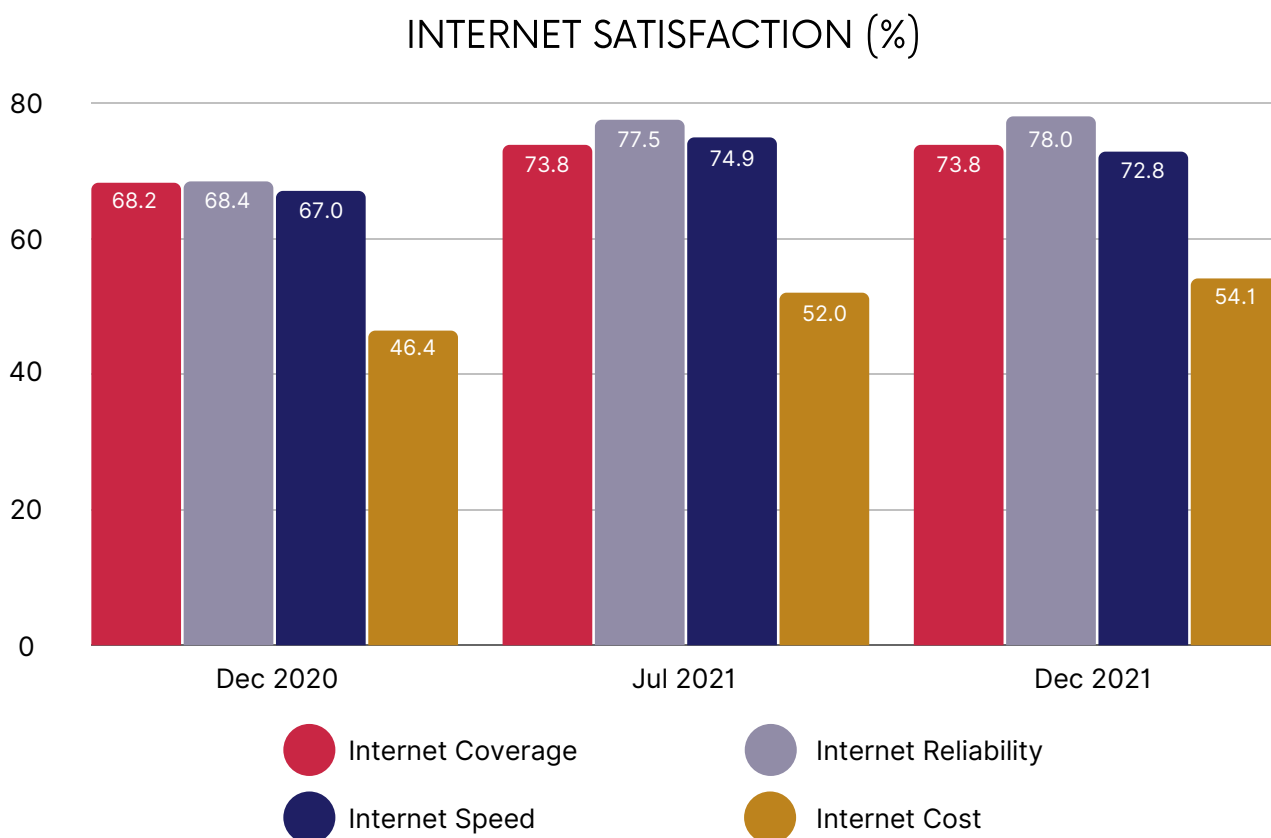*Participants were asked: "The internet has been ＿＿ to me personally"*

Average number of hours spent using the internet in general slightly increased across the three time periods, from 5.86 hours (SD = 3.40) in December 2020 to 5.99 hours (SD = 3.40) in July 2021 to 6.06 hours (SD = 3.60) in December 2021; however, there were no statistically significant differences across the three waves. Internet use remained stable across the three time points.

1.3 Internet Satisfaction

Most respondents have positive perceptions of the internet infrastructure in Singapore, from coverage, reliability, to speed. Many were also satisfied with internet cost, even though this group makes up a smaller proportion of the sample. Levels of satisfaction increased over time as more and more of us relied on the internet for various reasons as the pandemic wore on.

When it comes to internet coverage, which refers to being able to connect to the internet in various areas of Singapore, there was a slight increase in the percentage of those who feel satisfied or very satisfied, from 68.2% in December 2020 to 73.8% in December 2021, F (2, 852) = 6.55, p < .01.

When it comes to reliability of connection, which refers to experiencing low frequency of disruptions, there was also an increase in the percentage of those who feel satisfied or very satisfied, from 68.4% in December 2020 to 77.5% in July 2021 and this remained stable at 78% in December 2021, F (2, 852) = 15.06, p < .01.

INTERNET SATISFACTION (%)

Legend:
- Internet Coverage
- Internet Reliability
- Internet Speed
- Internet Cost

Percentage of those who said satisfied or very satisfied.
Participants were asked: "How satisfied are you with the following when connected to the internet?"
Participants responded using a 5-point scale, from 1 (very dissatisfied) to 5 (very satisfied).

Similarly, there was also an increase in the percentage of those who feel satisfied or very satisfied with internet speed, from 67% in December 2020 to 74.9% in July 2021, which remained stable at around 73% in December 2021, F (2, 852) = 9.16, $p < .01$.

The same pattern is observed when it comes to satisfaction with the cost of the internet in Singapore. There was an increase in the percentage of those who feel satisfied or very satisfied with the charges they need to pay for the internet, from 46.4% in December 2020 to 52% in July 2021; this remained stable at around 54% in December 2021, F (2, 852) = 7.50, $p < .01$.

1.4 Connection and Devices

Based on our Wave 3 survey, most participants access the internet using their home wifi (89.5% said they do so often or very often) while 67.2% use their mobile data often or very often. Despite working from home arrangements, about half of our participants reported accessing the internet via their office wifi (53.2%).

INTERNET CONNECTION (%)
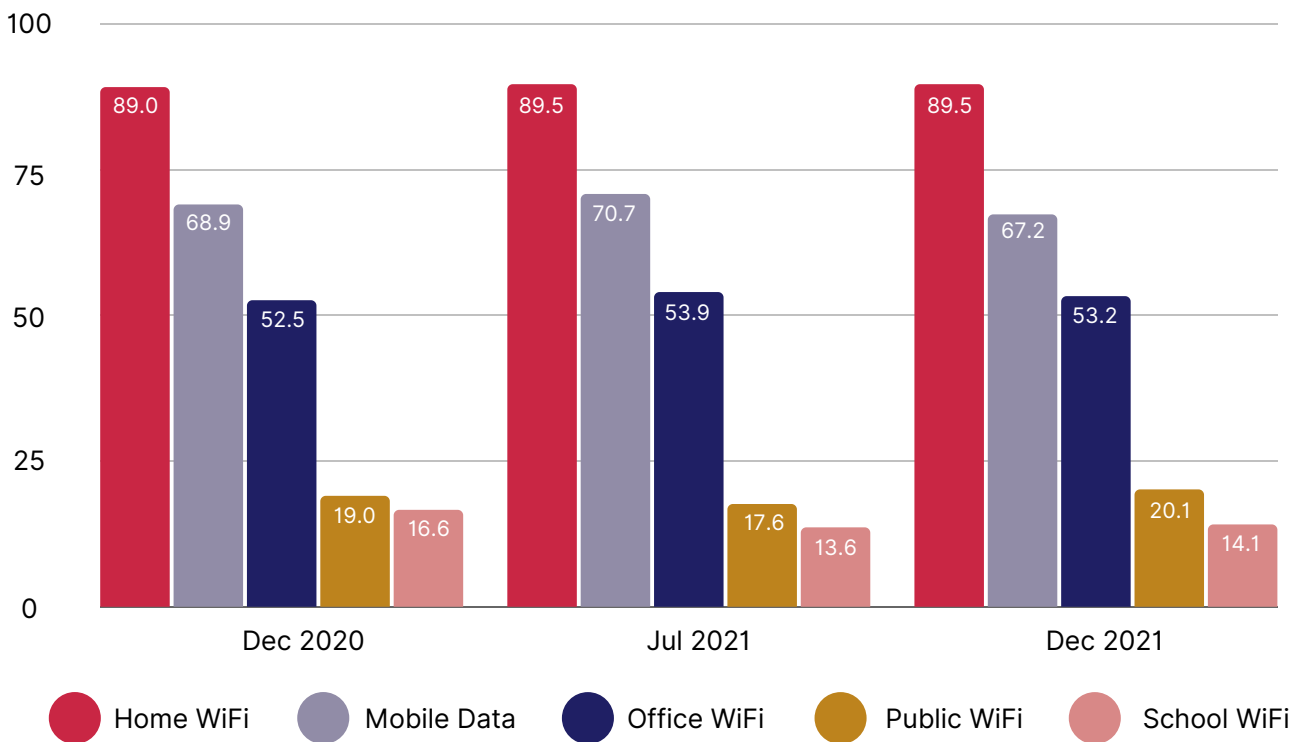
Percentage of those who said often or very often.
Participants were asked: "How often do you connect to the internet using the following?"
Participants responded using a 5-point scale, from 1 (never) to 5 (very often).

In terms of devices, most participants access the internet via their smartphones; in our panel, 85.2% said they access the internet via their smartphone often or very often, based on our December 2021 survey. This was followed by using laptops (72.1%). Accessing the internet via smart watches slightly rose from 22.2% of the participants doing so often or very often in December 2020 to 25.8% doing so in December 2021.

USE OF DEVICES (%)
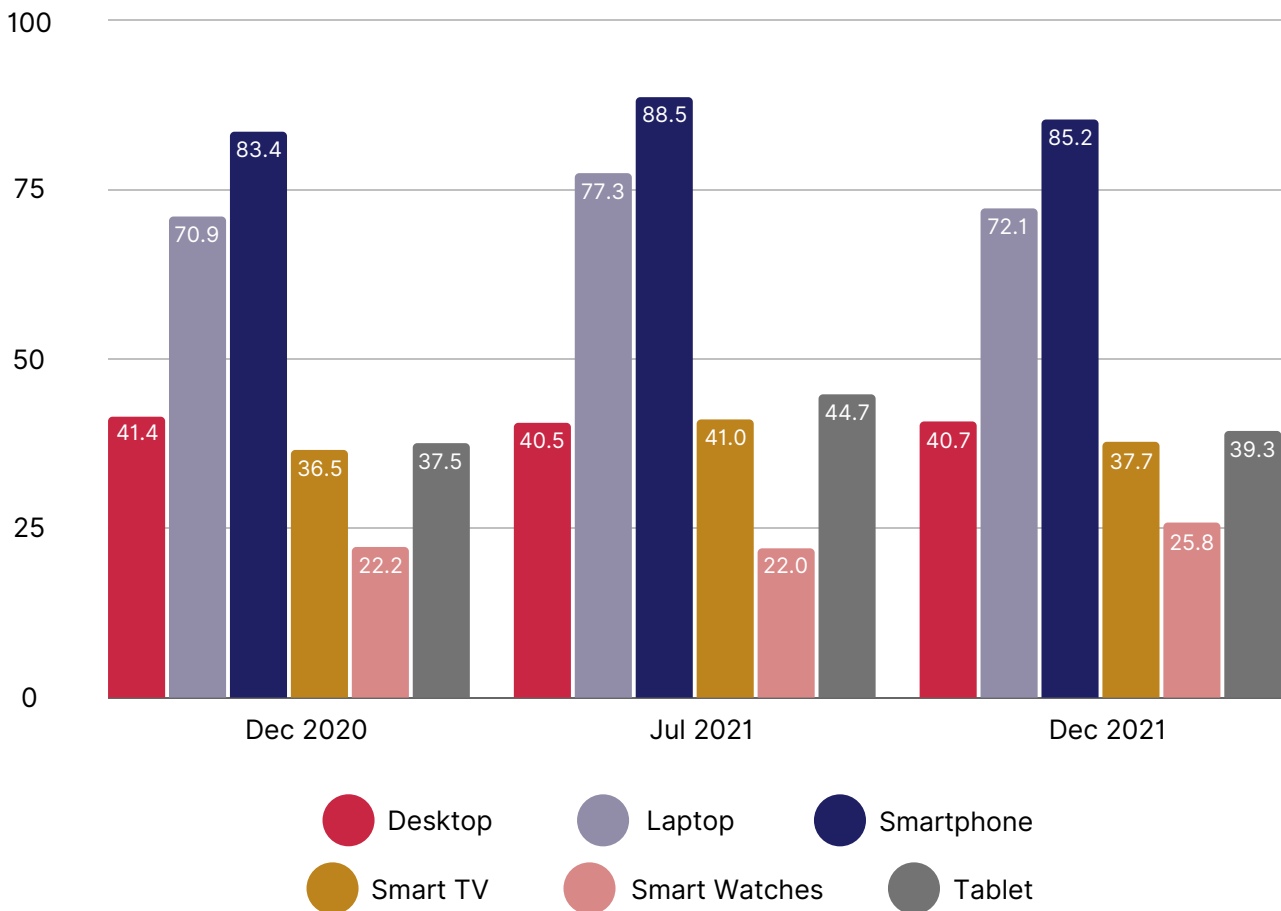
Percentage of those who said often or very often.
Participants were asked: "How often do you use each of the following devices to connect to the internet?"
Participants responded using a 5-point scale, from 1 (never) to 5 (very often).

1.5 Reasons for Internet Use

When it comes to the main reasons for accessing the internet, most of our participants reported using the internet to keep track of the news (81.3% said often or very often) and to use search engines to search for information (78%), based on our Wave 3 survey. Using the internet for news showed a statistically significant, albeit slight, increase between Wave 1 and Wave 3, F (2, 852) = 3.69, p < .05. However, using the internet to use search engines (e.g., Google, Bing) was quite stable across three waves.

Many participants also use the internet for work or school (74.5% at Wave 3), and such use was stable across waves. Following closely is using the internet for entertainment (72.6% at Wave 3), which also showed an increase from Wave 1 to Wave 2, but remained stable from Wave 2 to Wave 3, F (2, 852) = 8.05, p < .001.

Using the internet for navigation (e.g., using Google Maps) displayed a statistically significant decrease from Wave 2 to Wave 3, F (2, 852) = 3.70, p < .05.

REASONS FOR INTERNET USE (%)

	December 2020	July 2021	December 2021
Monetary transactions	61.4	63.9	62.1
Stay informed of latest news	76.3	78.0	81.3
Conduct search using search engines	77.8	80.6	78.0
Find information on directions or for transport	62.1	66.3	61.1
For work or school	70.0	68.9	74.5
Access cloud storage	44.0	42.6	42.4
For entertainment	65.1	68.9	72.6
Access government services	51.8	50.6	49.4
Connect with friends and loves ones	67.9	67.2	67.4

Percentage of those who said often or very often.
Participants were asked: "How often do you connect to the internet _____?"
Participants responded using a 5-point scale, from 1 (never) to 5 (very often).

Edson C. Tandoc Jr. is an Associate Professor and Associate Chair for Research at the Wee Kim Wee School of Communication and Information (WKWSCI) and the Director of IN-cube.

CHAPTER 2. NEWS CONSUMPTION
By Zheng Jingwei

2.1 Introduction

News consumption generally increased across the three time points during the pandemic. Local mainstream news media, including television and online websites, are still the channels people frequently visit and spend the most time on. What is notable is that the consumption of news via WhatsApp has been steadily declining, which is a pattern similar to the decrease in consumption of news via print media. Our participants seem to rely less on messaging and social media apps to acquire news during the pandemic. However, compared with traditional media, news consumption via social media has been more stable across the three waves and less subject to social dynamics.

2.2 Online News Consumption

Participants who frequently or very frequently accessed internet to consume the latest news increased from 76.3% in Dec 2020 to 81.3% in Dec 2021, F (2, 852) = 3.69, p < .05. Quarantine and work from home measures might have contributed to this as more people stayed home, along with higher interest in following news updates about the pandemic.

FREQUENCY IN ACCESSING THE INTERNET FOR LATEST NEWS (%)
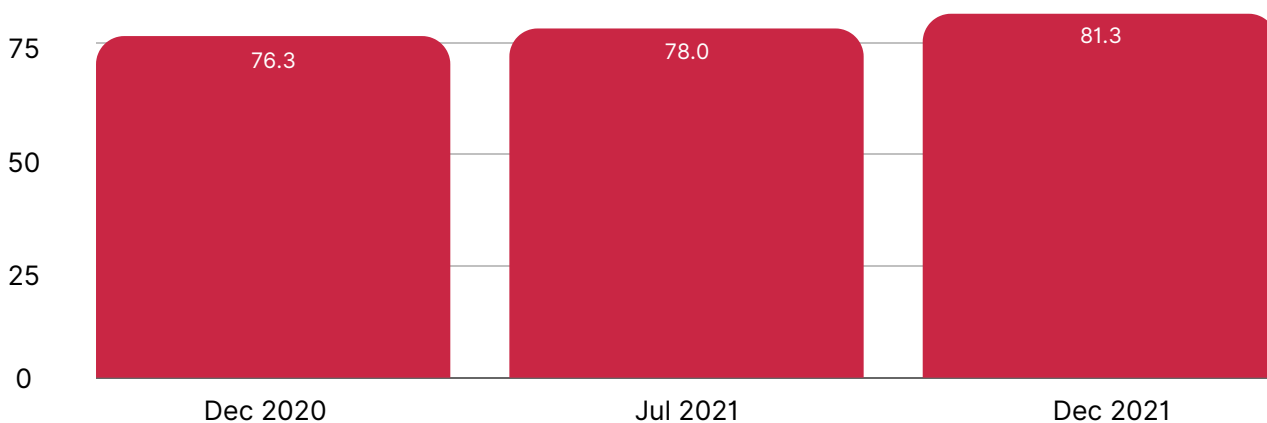
Percentage of those who said often or very often
Participants responded using a 5-point scale, from 1 (never) to 5 (very often).

2.3 Traditional vs Online Platforms

Overall, participants spent around two hours a day reading news from traditional media channels and online websites, including print media, websites, TV, and radio. Our participants spent more time reading the online rather than the print versions of newspapers, magazines, or books. They also spent more time on local TV channels than

cable TV. Our participants also spent around two hours a day consuming news via radio, showing that radio still has a unique role in delivering news for some users (e.g., while driving).

TRADITIONAL VS ONLINE PLATFORMS

	December 2020	July 2021	December 2021
Reading print newspaper, magazine or book	1.67	1.72	1.74
Reading online newspaper, magazine or book	1.89	2.01	2.10
Watching local TV (e.g., Channel 5)	2.11	2.19	2.20
Watching cable TV (e.g., MioTV, Starhub)	1.69	1.88	1.79
Listening to local radio (e.g., Class 95)	2.04	2.25	2.04

Participants were asked: "How many hours in a day do you spend on …?"

2.4 News Across Different Media

A closer look at media outlets revealed a more nuanced pattern of news consumption. Local and mainstream media outlets are the most popular sources of news. The websites of local newspapers, TV stations, and online-only media are most favoured. Traditional media, including print newspapers and local TV channels, still enjoy a considerable share of the local market. Respondents also indicate that they read free news apps much more often than paid news apps.

Most non-social media news consumption increased from December 2020 to July 2021 and decreased from July 2021 to December 2021. Such patterns are observed for local newspaper websites, F (2, 852) = 3.66, p < .05; local TV news websites, F (2, 852) = 3.72, p < .05; online-only local news websites, F (2, 852) = 7.19, p < .05; foreign news websites, F (2, 852) = 5.20, p < .05; local TV, F (2, 852) = 5.42, p < .05; and foreign TV channels, F (2, 852) = 4.51, p < .05. The spike in cases traced to a KTV bar and the Jurong Fishery Port might have increased interest in the news more than usual, hence the increased news consumption in July 2021.

As expected, participants also reported a continuous declining use of print newspapers over time, F (2, 852) = 4.98, p < .05. This is consistent with trends found by news consumption surveys that researchers have conducted at WKWSCI before the pandemic. However, we also observed a slight decline in the use of WhatsApp for news, F (2, 852) = 6.21, p < .05. In our pre-COVID-19 surveys, Facebook and WhatsApp tend to be the most frequently used sources of news, but it is noteworthy that our participants across three waves during the pandemic reported getting news more often from news websites and even local TV. It seems that during a crisis, when unexpected events occur and there is high uncertainty, people turn to mainstream news sources for information.

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NEWS ACROSS DIFFERENT MEDIA

	December 2020 (%)	July 2021 (%)	December 2021 (%)
Read local newspaper websites (e.g., straitstimes.com)	38.9	45.9	43.3
Read local TV news websites (e.g., channelnew24.8sasia.com)	39.8	44.5	41.7
Read mainstream online-only local news websites (e.g., Today.com)	32.6	36.8	33.5
Read alternative online-only local news websites (e.g., theonlinecitizen.com)	25.1	27.6	21.8
Read foreign news websites (e.g., nytimes.com, theguardian.com)	24.8	27.4	24.8
Read print copies of local newspapers (e.g., Straits Times)	31.1	27.4	28.1
Watch news on local TV (e.g., Channel 8, CNA)	41.2	42.4	39.8
Watch news on foreign TV channels (e.g., CNN, BBC)	25.8	30.0	24.4
Listen to local radio news	30.2	33.3	29.5
Read news on Facebook	35.8	36.3	32.3
Read news on WhatsApp	29.7	28.1	26.7
Watch news on YouTube	26.5	27.4	27.2
Read news on Twitter	19.2	16.2	17.1
Read news on Instagram	18.0	20.8	17.6
Get news from TikTok	14.3	16.6	16.4
Read news via a free news app	24.8	26.9	25.5
Read news via a paid news app	17.3	20.6	19.7

Percentage of those who said often or very often
Participants were asked: "In a typical day, how often do you consume news via the following?"
Participants responded using a 5-point scale, from 1 (never) to 5 (very often).

Zheng Jingwei is a PhD candidate at the Wee Kim Wee School of Communication and Information (WKWSCI).

CHAPTER 3. FAKE NEWS
## *By Seth Seet Kai*

3.1 Introduction

The spread of COVID-19 was also accompanied by the proliferation of fake news and online falsehoods in Singapore. From home remedies without scientific basis to conspiracy theories about the effects of the COVID-19 vaccines, social media spaces were filled with inaccurate claims about the pandemic, contributing to fear and in some cases, unnecessary panic among some Singaporeans.

We asked our participants about their exposure to fake news, their confidence in discerning the veracity of information they encounter, and their behaviour with regards to fake news. Most of our participants reported seeing lots of fake news; many recognised examples of fake news claims that we listed in our questionnaires, some of which continued to be in circulation for a year during the pandemic. A vast majority of our participants reported sending and receiving fake news to and from their peers, with some knowingly sending fake news to others. The data showed that although a large majority have used fact-checking sites, only a small number used them regularly.

3.2 Perceived Amount of Fake News Online

Majority of participants agreed that there was a large volume of fake news online, although the percentage of those agreeing with this observation decreased over time. In December 2020, 62.1% of our participants indicated they agreed or strongly agreed that there was "so much fake news online." This remained constant in July 2021, with 62.3%, but decreased to 55% in December 2021. This change from July 2021 to December 2021 is statistically significant, $F_{(3, 425)} = 5.107$, $p < 0.01$.

PERCEIVED VOLUME OF FAKE NEWS ONLINE (%)
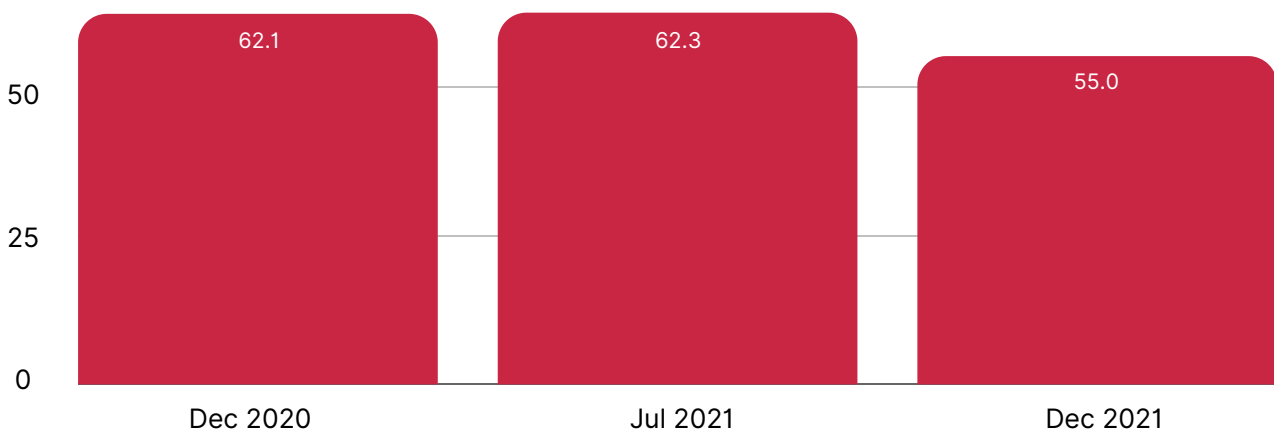
Percentage of those who agreed or strongly agreed
Participants were asked if they agreed with the statement "There is so much fake news online right now."
Participants responded using a 5-point scale, from 1 (strongly disagree) to 5 (strongly agree).

3.3 Seeing and Believing

In December 2020 and July 2021, we also asked our participants if they saw and believed a select number of prominent fake news items circulating online. We showed them four examples of viral fake news in each survey, repeating two examples across both surveys to track the extent to which false claims remain in circulation online.

Most of our participants reported seeing the fake news claims, with the claim that COVID-19 originated in a biowarfare lab seen by 68.1% of our participants in December 2020, and by 79.2% in July 2021. This increase in visibility is statistically significant, $F_{(2, 426)} = 15.139$, $p < 0.001$. The claim that COVID-19 mRNA vaccines alter human DNA was seen by 68.4% of our participants in December 2020, when the mRNA vaccines were announced to be effective; this visibility increased in July 2021, when 78.2% reported seeing the fake news claim as the mRNA vaccines were being rolled out in Singapore, although this change is not statistically significant.

SAW FAKE NEWS (%)

	December 2020		July 2021	
	Seen[1]	Seen often or very often[2]	Seen	Seen often or very often
A newly announced COVID-19 vaccine uses mRNA technology that will alter human DNA	68.4	25.3	78.2	22.5
Scientists have confirmed that the COVID-19 originated from a biowarfare lab	68.1	16.9	79.2	18.5
Data collected through SafeEntry is being sold to companies	58.5	17.8	*Not asked*	*Not asked*
Fruits from the U.S being sold at reduced prices in Asia have been maliciously contaminated with the coronavirus	54.1	15.7	*Not asked*	*Not asked*
COVID-19 vaccines increase the risk of miscarriage	*Not asked*	*Not asked*	65.1	16.6
Doctors in Singapore have confirmed based on studies that vaccines using mRNA technology are ineffective against COVID-19 variants	*Not asked*	*Not asked*	66.7	18.5

[1] Percentage of those who indicated rarely, sometimes, often, or very often
[2] Percentage of those who indicated often or very often
Participants were asked "In the past few weeks, how often would you have heard or come across each of the following claims about COVID-19:" Participants responded using a 5-point scale, from 1 (never) to 5 (very often).

Some 1 out of every 5 participants also believed in these fake news items. For example, in December 2020, at least 19.9% thought the claim that mRNA vaccines alter human DNA was probably or definitely true; this proportion was stable at 20.2% in July 2021. The conspiracy theory about COVID-19 originating in a biowarfare lab also convinced several participants: In December 2020, 19% thought it was true, and this increased to 22.7% in July 2021. However, this change is not statistically significant.

BELIEVED IN FAKE NEWS (%)

	December 2020	July 2021
	Believed the fake news	Believed the fake news
A newly announced COVID-19 vaccine uses mRNA technology that will alter human DNA	19.9	20.2
Scientists have confirmed that the COVID-19 originated from a biowarfare lab	19.0	22.7
Data collected through SafeEntry is being sold to companies	16.9	*Not asked*
Fruits from the U.S being sold at reduced prices in Asia have been maliciously contaminated with the coronavirus	14.7	*Not asked*
COVID-19 vaccines increase the risk of miscarriage	*Not asked*	17.1
Doctors in Singapore have confirmed based on studies that vaccines using mRNA technology are ineffective against COVID-19 variants	*Not asked*	18.7

Percentage of those who indicated "probably true" or "definitely true"
Participants were asked "please indicate whether you think each of the following claims is true or false:"
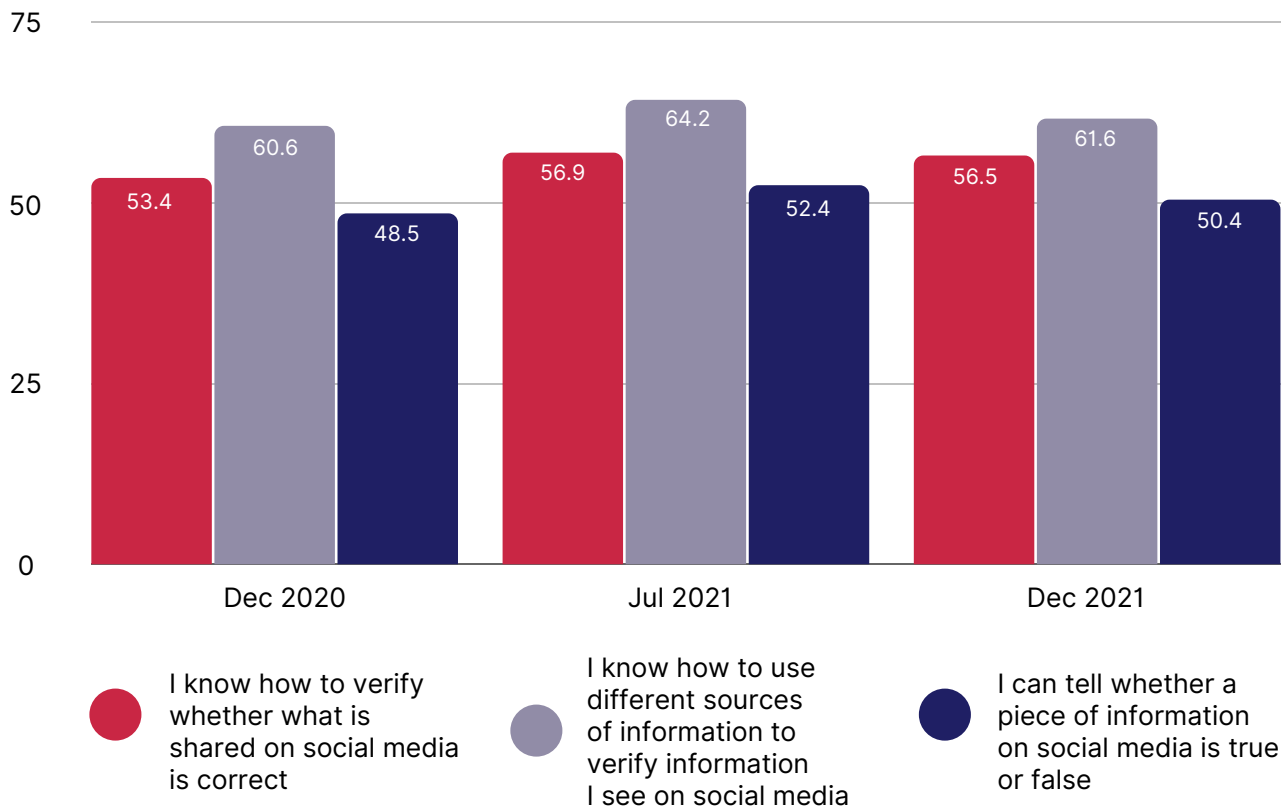*Participants responded using a 5-point scale, from 1 (definitely false) to 5 (definitely true).*

3.4 Confidence in Discerning Fake News

Majority of our participants were somewhat confident that they could discern the veracity of information they encounter on social media. The proportion of those who agree that they know how to verify that information on social media is correct was stable at 53.4% in December 2020; 56.9% in July 2021; and 56.5% in December 2021.

A higher proportion of our participants agreed that they know how to use different sources of information to verify information on social media: 60.6% in December 2020; 64.2% in July 2021; and 61.6% in December 2021.

When asked whether they can tell whether a piece of information on social media is true or false, 48.5% agreed with this in December 2020; 52.4% in July 2021; and 50.4% in December 2021. These changes, however, are not statistically significant.

CONFIDENCE IN DISCERNING FAKE NEWS (%)

Percentage of those who agreed or strongly agreed with each statement.
Participants responded using a 5-point scale, from 1 (strongly disagree) to 5 (strongly agree).

3.5 Interaction with Fake News

An overwhelming majority of participants claimed to have received fake news articles from their friends and family, while a large majority admitted to sharing a fake news article to others, both knowingly and unknowingly.

In December 2020, 89% of our participants indicated they have received fake news from their family, which increased to 93% in July 2021, and decreased to 88.5% in December 2021. These changes are statistically significant, F (3, 425) = 7.299, p < 0.01.

Likewise, 92% of our participants indicated they have received fake news from their friends in December 2020, which increased to 94.6% in July 2021, and decreased to 87.6% in December 2021. These changes are also statistically significant, F (3, 425) = 14.072, p < 0.001.

RECEIVING FAKE NEWS

	December 2020		July 2021		December 2021	
	Have Received[1]	Received regularly[2]	Have Received	Received regularly	Have Received	Received regularly
Receiving Fake News from Family	89.0	17.4	93.0	20.1	88.5	18.7
Receiving Fake News from Friends	92.0	16.8	94.6	22.0	87.6	17.1

[1] Percentage of those who indicated rarely, sometimes, often, or always
[2] Percentage of those who indicated often or always
Participants were asked how often they "Receive fake news articles from your family (friends)." Participants responded using a 5-point scale, from 1 (never) to 5 (always).

When asked about sharing fake news articles, 70.7% indicated they have unknowingly shared fake news articles, based on the December 2020 survey. This increased to 75.4% in July 2021 but decreased to 69.3% in December 2021. The drop from July to December 2021 is statistically significant, $F(3, 425) = 6.22$, $p < 0.005$.

Some 56.9% admitted to sharing fake news articles they knew was false in the December 2020 survey. This increased to 60% in July 2021 but decreased to 51.1% in December 2021. The drop from July to December 2021 is statistically significant, $F(3, 425) = 7.678$, $p < 0.005$.

SHARING FAKE NEWS

	December 2020		July 2021		December 2021	
	Have Sent[1]	Sent regularly[2]	Have Sent	Sent regularly	Have Sent	Sent regularly
Unknowingly Sharing Fake News	70.7	15.6	75.4	16.9	69.3	15.4
Knowingly Sharing Fake News	56.9	14.1	60.0	17.3	51.1	15.2

[1] Percentage of those who indicated rarely, sometimes, often, or always
[2] Percentage of those who indicated often or always
Participants were asked how often they "Share an article that turned out to be fake news," and "Share an article that you knew was fake news." Participants responded using a 5-point scale, from 1 (never) to 5 (always).

A similar trend is found when we asked if our participants had been called out for sharing fake news. In December 2020, 54.8% indicated that they were called out for doing so, which increased to 60% in July 2021, but decreased to 50% in December 2021. The change from July 2021 to December 2021 is statistically significant, $F(3, 425) = 9.905$, $p < 0.001$.

CALLED OUT FOR SHARING FAKE NEWS

	December 2020		July 2021		December 2021	
	Called out before[1]	Called out regularly[2]	Called out before	Called out regularly	Called out before	Called out regularly
Called out for sharing fake news	54.8	14.0	59.9	17.1	50.0	14.7

[1] Percentage of those who indicated rarely, sometimes, often, or always
[2] Percentage of those who indicated often or always
Participants were asked how often they were "called out by others for sharing fake news." Participants responded using a 5-point scale, from 1 (never) to 5 (always).

This increase and subsequent decrease in sharing and receiving fake news is parallel to our participants' use of fact-checking sites. In December 2020, 79.9% indicated they at least use fact-checking sites; this increased to 84.1% in July 2021, but decreased to 79.4% in December 2021. The change from July 2021 to December 2021 is statistically significant, $F_{(3, 425)} = 4.06$, $p < 0.05$. However, only about a quarter of our participants use fact-checking sites often or very often, despite the availability of these resources.

USE OF FACT-CHECKING SITES

	December 2020		July 2021		December 2021	
	Used before[1]	Used regularly[2]	Used before	Used regularly	Used before	Used regularly
Use of fact-checking sites	79.9	27.0	84.1	23.4	79.4	22.7

[1] Percentage of those who indicated rarely, sometimes, often, or always
[2] Percentage of those who indicated often or always
Participants were asked how often they "use fact-checking sites." Participants responded using a 5-point scale, from 1 (never) to 5 (always).

Seth Seet Kai is a Project Officer at IN-cube. He graduated from National University of Singapore with a Bachelor of Social Science (Hons) in Political Science. His research includes fake news, misinformation, and fact-checking.

CHAPTER 4. SOCIAL MEDIA
By Zhang Langcheng

4.1 Introduction

While Facebook and WhatsApp remained popular during the pandemic, newer platforms, such as videosharing app TikTok and messaging app Telegram made significant gains in the last two years in terms of number of users.

4.2 Outlook for Platforms

In general, social media usage remains dominant in our participants' daily lives. WhatsApp remained the most used messaging app in Singapore (used by 93% of our participants as of December 2021). Telegram, however, has become more and more popular, with the percentage of users increasing from 34% in December 2020 to 42.6% in December 2021.

SOCIAL MEDIA USAGE (%)

	December 2020	July 2021	December 2021
Facebook	83.1	83.1	85.2
WhatsApp	94.1	93.0	93.0
Instagram	53.2	56.2	56.0
TikTok *	13.6	24.4	25.3
YouTube	80.6	79.6	79.2
Twitter *	19.4	22.5	27.9
Telegram *	34.0	41.5	42.6
LinkedIn	31.4	34.4	34.0
Tinder	3.0	3.7	3.3

refers to statistically significant increase.
Percentage of those who use each platform.
Participants were asked: "What social media platforms are you currently using? Tick those that apply."

Of the social media platforms, Facebook is the most dominant with 85.2% of our participants using it based on our December 2021 survey. While the number of Twitter users in Singapore has remained small, it has increased steadily, from 19.4% in December 2020, to 22.5% in July 2021, and to 27.9% in December 2021.

As for video platforms, around 80% of our participants reported using YouTube. This was quite stable across the two years. TikTok has gained popularity in Singapore during the pandemic: from 13.6% of our participants saying they use it in December 2020, to 25.3% in December 2021. The main users of TikTok are from young and middle-age groups (21-50), which make up 79% of the total Tiktok users in our sample. Some 3% of the participants reported using the dating app Tinder.

4.3 Frequency of Social Media Use

We also asked our participants how much time they spend on messaging apps and social media platforms in general. Overall, we found that the use of messaging apps and social media were at similar levels across time.

When it comes to social media platforms like Facebook, the average time spent was 2.5 hours in December 2020, 2.7 hours in July 2021, and 2.6 hours in December 2021. The use of social media remained relatively stable throughout the three waves.

When it comes to messaging apps like WhatsApp, the average time spent was 2.7 hours in December 2020, 2.9 hours in July 2021, and 2.9 hours in December 2021. Similarly, the use of messaging apps remained relatively stable.

AVERAGE HOURS SPENT ON SOCIAL MEDIA PER DAY
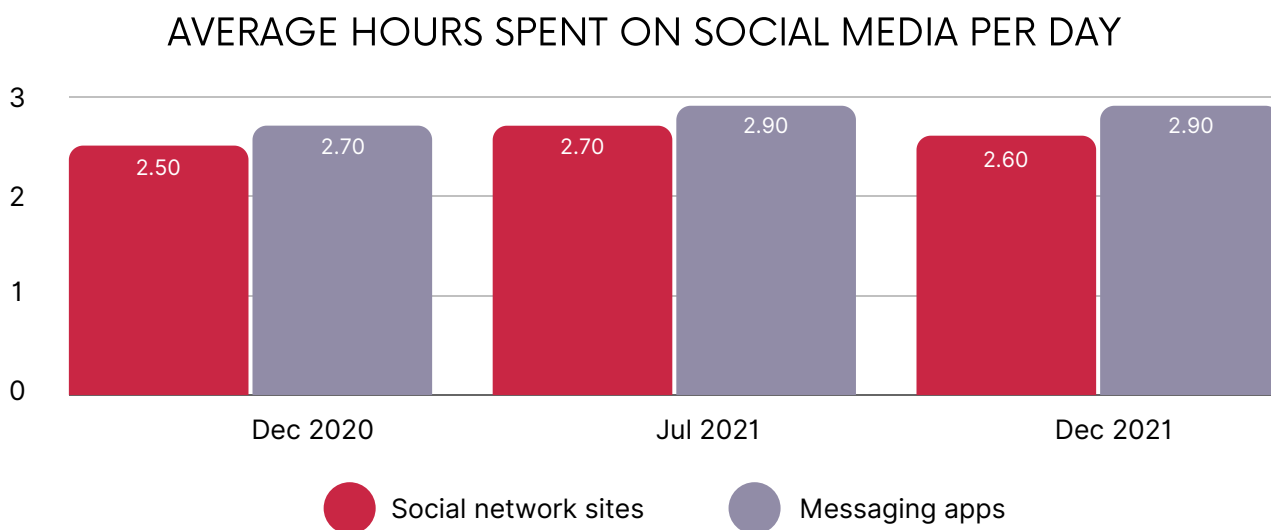
Participants were asked: "How many hours in a day do you spend on each type of social media?"
Participants responded by selecting from 0 hours to 13 hours or more.

Zhang Langcheng is a Ph.D. student at the Wee Kim Wee School of Communication and Information (WKWSCI).

CHAPTER 5. ENTERTAINMENT
## *By Goh Zhang Hao*

5.1 Introduction

Entertainment and leisure are indispensable for those working and living in Singapore, a country that has high internet penetration and digital literacy rates. It is clear that the internet has become a useful tool for entertainment and leisure. Observations from our three-wave dataset revealed that the frequency of internet use for entertainment (e.g., gaming, watching movies, or listening to music) has increased since Wave 1. Likewise, compared with Wave 1, the frequency in engaging in offline entertainment activities (e.g., watching movies in the cinema, watching local or cable TV) decreased in Wave 3.

5.2 Internet for Entertainment

All participants use the internet for entertainment purposes. Across all three waves, participants were asked, based on a score from 1 = "Never" to 5 = "Very often", the extent to which they use the internet for entertainment purposes. Scores were averaged across all three waves. The scores were recoded to form three categories: "high," "medium", and "low". A comparison of these scores suggests a gradual increase in terms of the percentage of those who indicated that they frequently use (i.e., often, and very often) the internet for entertainment.
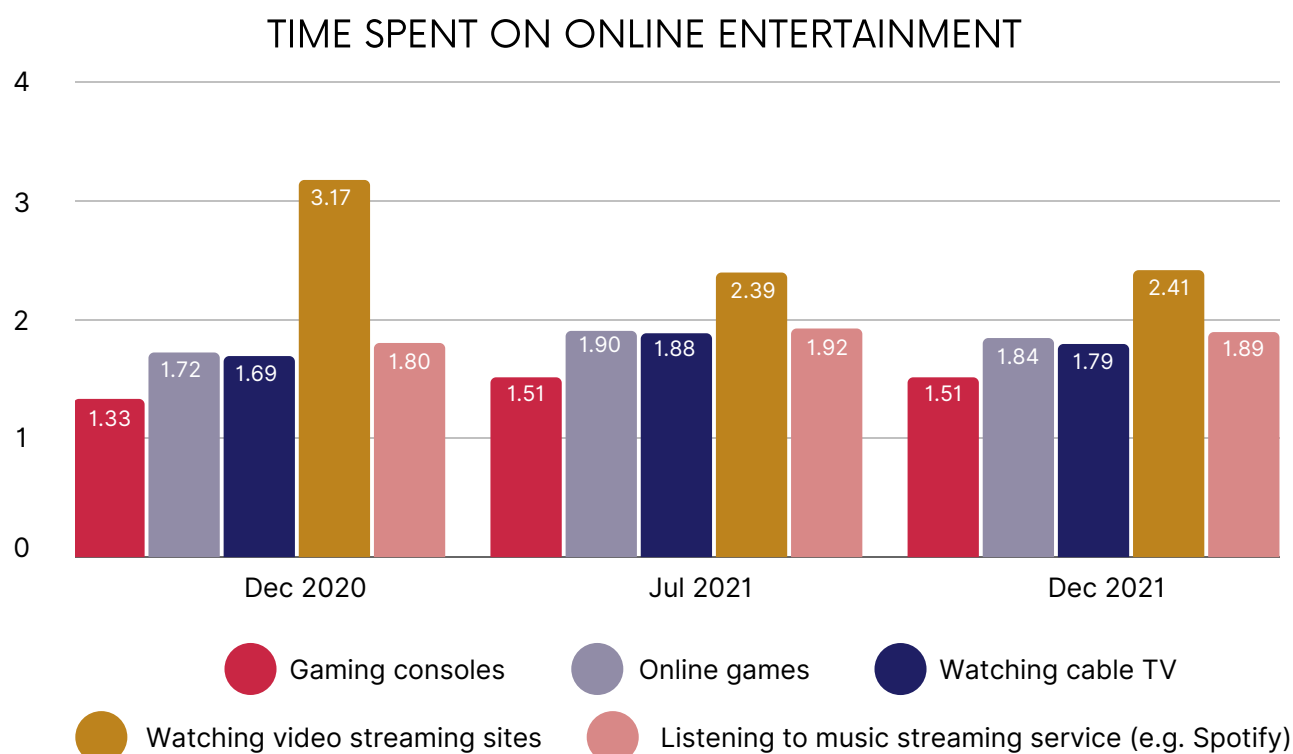
FREQUENCY OF USE OF THE INTERNET FOR ENTERTAINMENT (%)
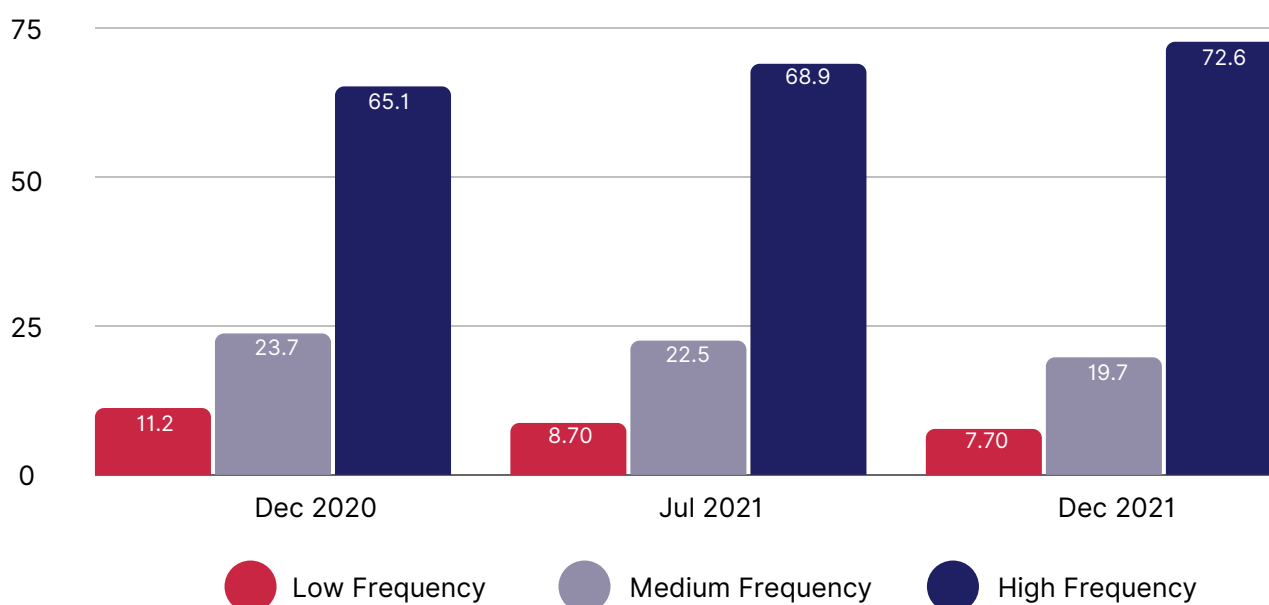
Participants were asked: "How often do you connect to the internet ...? - For entertainment (e.g. watch movies, gaming, music)"

5.3 Time Spent on Online Entertainment

We also asked our participants about the number of hours they spend using digital forms of entertainment, such as online gaming and using video streaming sites.

TIME SPENT ON ONLINE ENTERTAINMENT

	Dec 2020	Jul 2021	Dec 2021
Gaming consoles	1.33	1.51	1.51
Online games	1.72	1.90	1.84
Watching cable TV	1.69	1.88	1.79
Watching video streaming sites	3.17	2.39	2.41
Listening to music streaming service (e.g. Spotify)	1.80	1.92	1.89

Average time spent (hours per day) on entertainment activities.
Participants were asked "How many hours in a day do you spend actively using …? - Gaming consoles (e.g., Nintendo Switch, Xbox, PlayStation); "How many hours in a day do you spend …? - Playing online games"; - Watching cable TV (e.g., MioTV, Starhub); - Watching video streaming sites (e.g., Netflix); - Listening to music streaming service (e.g., Spotify).

5.3.1 Gaming consoles. Gaming consoles like Nintendo Switch, PlayStation and Xbox provide users hours of entertainment at home. Gaming consoles can be connected to the internet, and users can instantly download new games to enhance their play. Our participants spent about 1.3 hours (SD = 2.64) per day on gaming consoles in Wave 1; this slightly increased to 1.5 hours (SD = 2.95) per day in Wave 2 and remained at 1.5 (SD = 2.93) hours per day in Wave 3.

5.3.2 Online gaming. Online gaming platforms allow users to interact with other players during gaming. Average time spent on online games increased during the first two waves, from 1.7 hours (SD = 2.53) in Wave 1, to 1.9 hours (SD = 2.96) in Wave 2 and dropped to 1.8 hours (SD = 2.79) in Wave 3.

5.3.3 Using video streaming sites. Video-streaming services (e.g., Netflix, Disney+, Viu) are alternatives to cable TV programs. Unlike cable TV programs, video streaming allows viewers to access video content over any accessible internet connections. Given the advancement of the wireless 5G network in Singapore, viewers' experience can be enhanced with shorter loading times and better video quality. The average number of hours spent in a typical day watching video streaming content in Wave 1 and 2 was 2.2

hours (SD = 2.63) and 2.4 hours (SD = 2.97), respectively. This remained at 2.4 hours (SD = 2.80) in Wave 3.

5.3.4 Listening to music streaming service. Music streaming services (e.g., Spotify) is an alternative to accessing music through traditional broadcast radio. Unlike traditional broadcast radio, music streaming sites allow users to access virtually any song in an unlimited amount of time for a monthly fee, thus giving users more freedom to choose the songs they want to hear. Many smart devices have an in-built music streaming function (e.g., Apple Music in iPhones) and offer attractive packages for users to download and listen to music immediately. The number of hours spent streaming music remained stable across three waves: Wave 1: 1.8 hours (SD = 2.72); Wave 2: 1.9 hours (SD = 2.85); and Wave 3: 1.9 hours (SD = 2.72).

5.4 Time Spent on Offline Entertainment

Besides tracking the use of Internet for entertainment, we also measured time spent on offline entertainment such as watching movies at a cinema, watching local and cable TV, and listening to radio. These activities have remained popular through the years, and even after the internet has provided alternatives for the public.

5.4.1 Watching movies at a cinema. Watching movies at a cinema is a popular entertainment activity for Singaporeans. Advancements in the cinematic audio-visual technology and better physical facilities have enhanced the experience of watching a movie in a cinema, be it alone or with friends or family. However, most of our participants avoided going to the cinemas during the pandemic, with some 70% of the participants indicating that they have "never" or "rarely" watched a movie in a cinema in the past one month. Furthermore, the percentage of participants who indicated that they frequently (i.e., often and very often) watched movies in a cinema has fallen from Wave 2 (17.1%) to Wave 3 (13.2%). While cinemas are open, moviegoers may still feel hesitant about going to the cinemas during the pandemic.

WATCHING MOVIES IN A CINEMA (%)
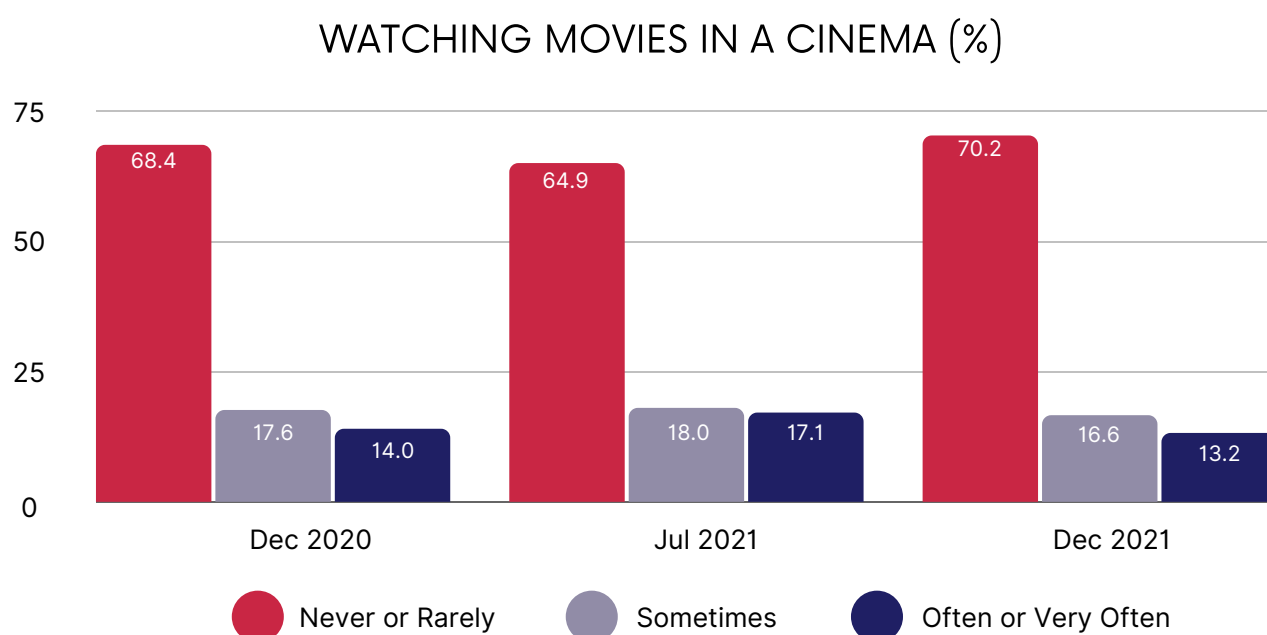
Participants were asked: "In the past month, how frequently did you ...? - watch a movie at the cinema"

5.4.2 Watching local TV. Owning a TV is common in almost every household in Singapore. Hence, watching local TV at home could be one of the most accessible forms of entertainment at home during the pandemic. Watching local TV has been relatively stable in Wave 1 (2.1 hours, SD = 2.47), Wave 2 (2.2 hours, SD = 2.72), and Wave 3 (2.2 hours, SD = 2.70). However, these are slightly lower than the average time spent on video streaming sites.

5.4.3 Watching cable TV. Cable TV programs (e.g., MioTV, StarHub) offer an alternative to local TV viewers. Cable TV channels offer more choices for subscribers and enhance their viewing pleasure. The average time spent on watching cable TV was also stable across waves: 1.7 hours (SD = 2.53) in Wave 1; 1.9 hours (SD = 2.88) in Wave 2; and 1.8 hours (SD = 2.72) in Wave 3. Interestingly, these are lower than either watching local TV or using video streaming sites, echoing anecdotes of households shifting from paying for cable TV to subscribing to video streaming sites.

5.4.4 Listening to local radio. Like local TV, local radio in Singapore offers free access to news and entertainment media through national broadcasts. Access to radio content is easy, and it can be done through car radio, mobile phones, or laptops. Our panel data shows the average time spent listening to local radio remained stable at around two hours per day: Wave 1: 2.0 hours (SD = 2.82), Wave 2: 2.3 hours (SD = 3.13), Wave 3: 2.0 hours (SD = 2.93).

OFFLINE ENTERTAIMENT ACTIVITIES
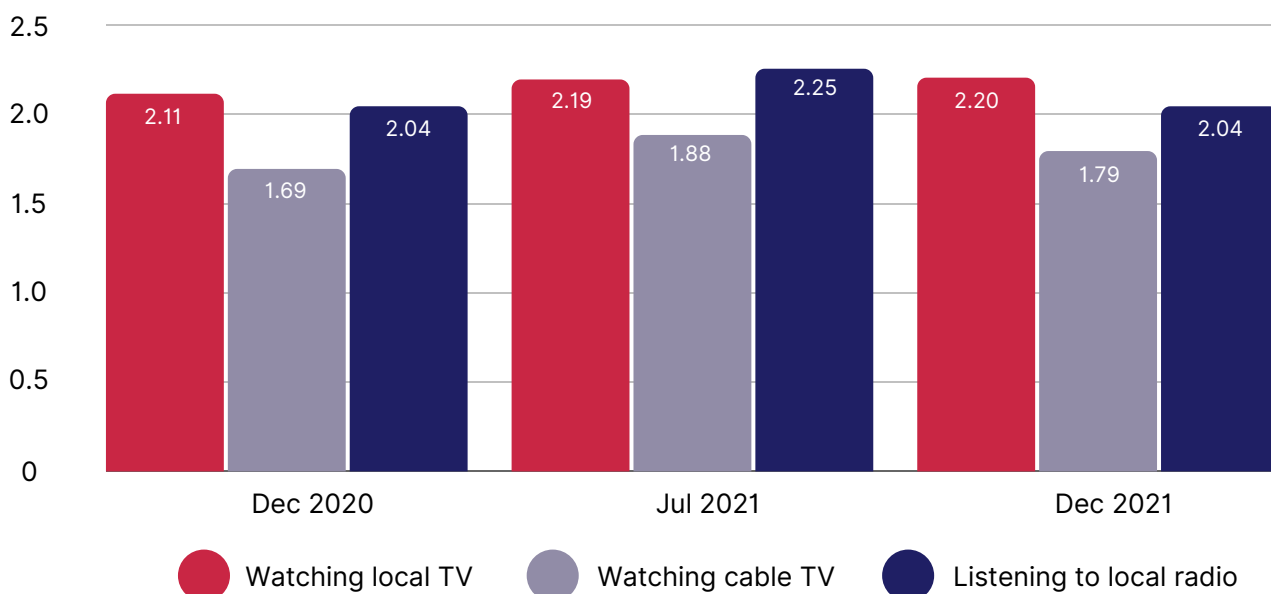
Participants were asked: "How many hours in a day do you spend ...? - Watching cable TV (e.g., MioTV, Starhub); - Watching local TV (e.g., Channel 5); - Listening to local radio (e.g., Class 95)"

Goh Zhang Hao is a postdoctoral fellow at IN-cube.

CHAPTER 6. ONLINE SHOPPING
## *By Sofia Contreras-Yap*

6.1 Introduction

Lockdowns and social-distancing to control the COVID-19 pandemic had negative effects on brick-and-mortar shops and restaurants' profitability as most consumers stayed home and avoided public areas. In Singapore, where stringent social distancing measures were mandated by the government as COVID-19 cases increased, online and offline shopping activity generally ebb and flow with the guidelines.

Overall, more of our participants still buy their groceries from supermarkets versus buying them online. Most participants also order food online at least sometimes. Most participants also pay for purchases via credit card, though there is a steady rise in the use of mobile wallets for payments.

6.2 Shopping

Participants who buy their groceries online often or very often increased from 24.8% in December 2020 to 27.8% in July 2021, most likely due to the increasing number of COVID-19 cases during this period which prompted the government to discourage people from going out. This figure decreased again to 23.6% in December 2021 possibly due to the relaxing of safety measures in November 2021.

BUYING GROCERIES ONLINE (%)
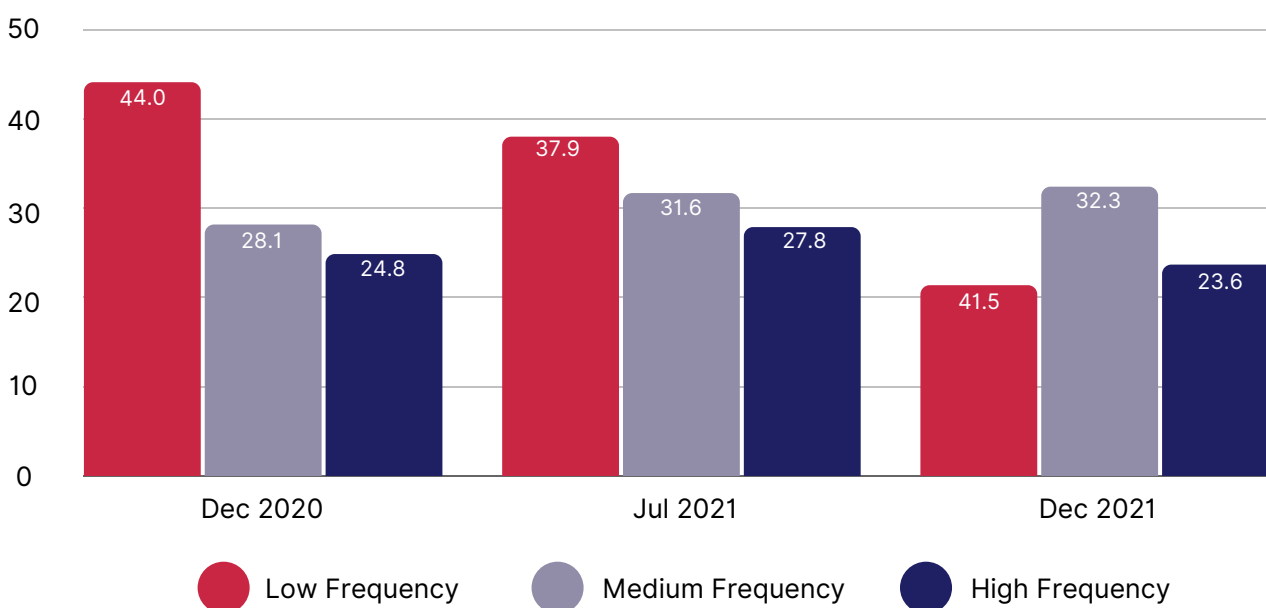
Participants were asked: "In the past month, how frequently did you buy groceries online (e.g., Redmart)?" Participants responded using a 5-point scale, from 1 (never) to 5 (very often). Recoded into low (i.e., never or rarely), medium (i.e., sometimes), and high (i.e., often or very often) frequency.

We also asked participants how often they use online shopping platforms, in general. Like that of buying groceries online, the percentage of people who often and very often engage in online shopping in general (e.g., using Lazada, Zalora, etc.) increased between December 2020 and July 2021 (from 31.4% to 35.4%) and decreased between July 2021 and December 2021 (from 35.4% to 31.4%).

ONLINE SHOPPING (%)
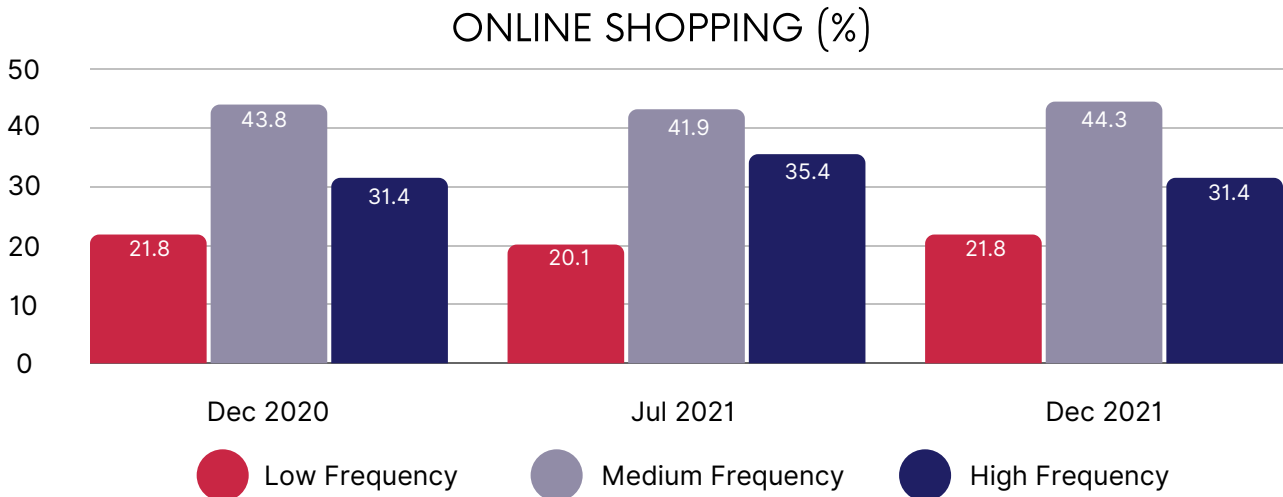
Participants were asked: "In the past month, how frequently did you shop online (e.g., Zalora, Lazada, Shopback)?" Participants responded using a 5-point scale, from 1 (never) to 5 (very often). Recoded into low (i.e., never or rarely), medium (i.e., sometimes), and high (i.e., often or very often) frequency.

6.3 Food

As eating is a mask-off activity, there is a risk of transmission and it has been the subject of multiple safety mandates from the government throughout the pandemic. We saw an 11.2% increase from December 2020 to July 2021 of those who rarely and never eat out during the past month. Similarly, there was also a 5.2% decrease in those who often and very often eat out during the same period. Unexpectedly, for December 2021, the percentage of those who eat out often and very often still decreased by 9.6% despite the relaxing of safety measures on eating out in public.

FREQUENCY OF EATING OUT (%)
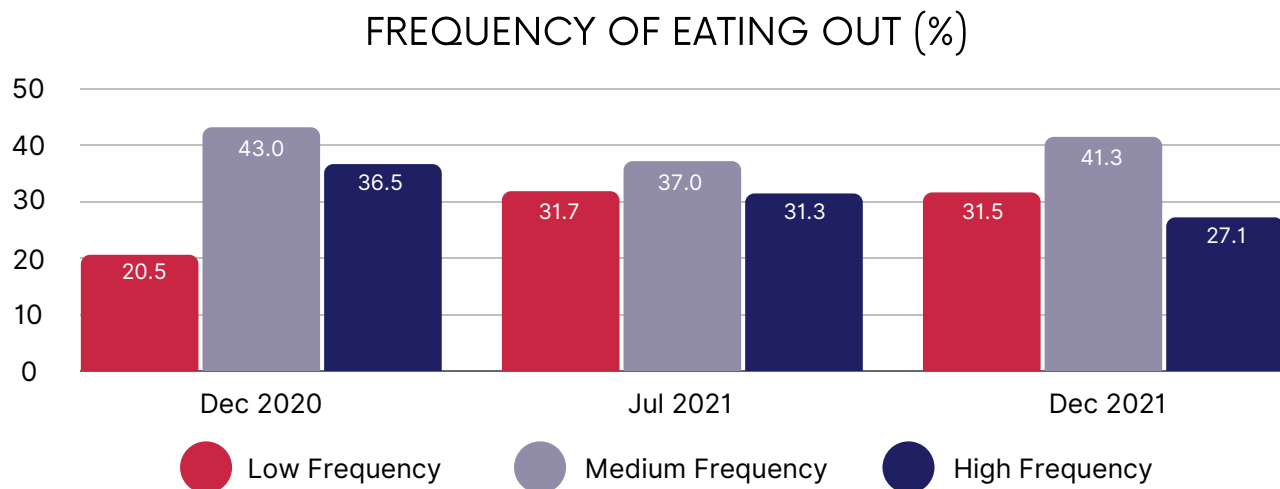
Participants were asked: "In the past month, how frequently did you eat-out at the restaurant, hawker centre, coffeeshop?" Participants responded using a 5-point scale, from 1 (never) to 5 (very often). Recoded into low (i.e., never or rarely), medium (i.e., sometimes), and high (i.e., often or very often) frequency.

In addition, the changes in takeaways and online ordering do not follow the pattern opposite that of eating out. The percentage of those who often and very often order food online continuously decreased in all three waves (from 31.4% in December 2020 to 28.7% in July 2021 to 23.8% in December 2021). The percentage of those who often and very often takeaway food was stable between December 2020 (40.6%) and July 2021 (40.4%) and decreased slightly in December 2021 (38.2%).
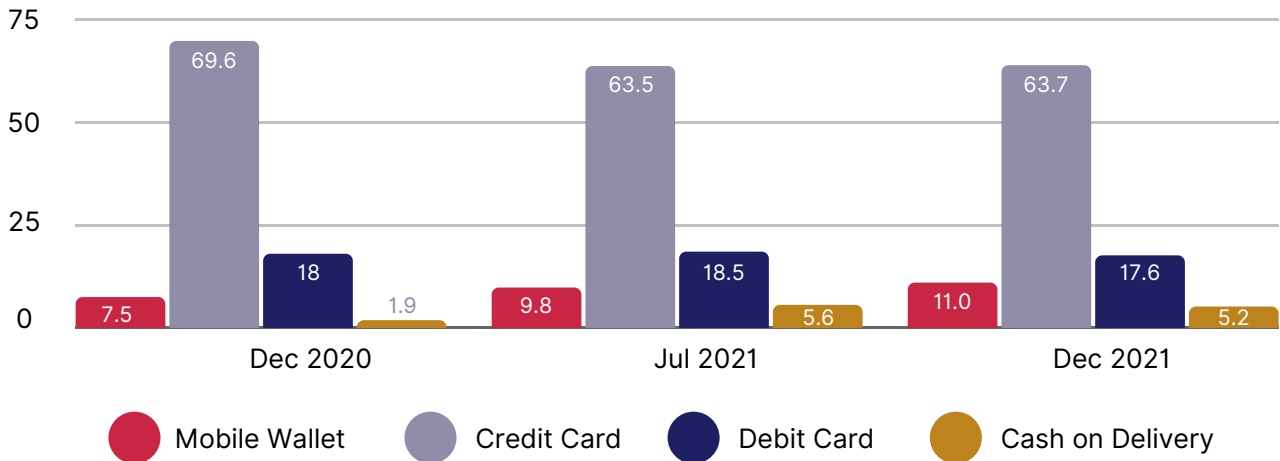
DINE OUT, ORDER ONLINE, AND TAKEAWAY (%)
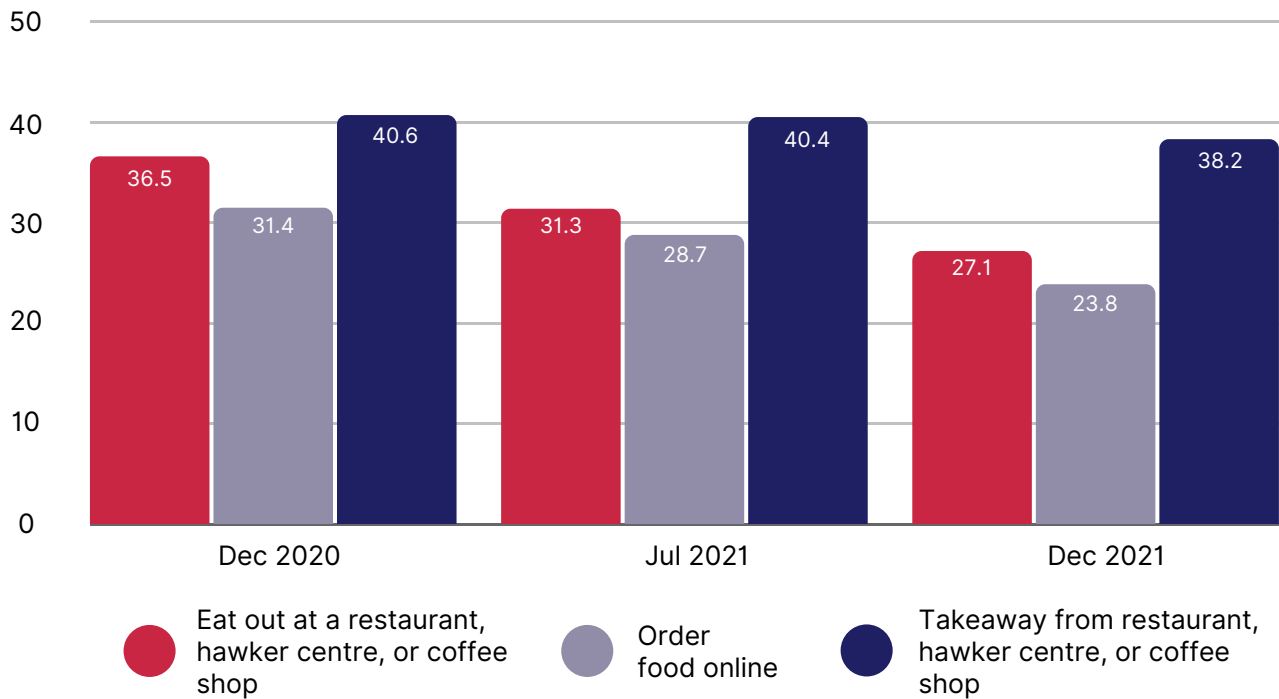
Percentage who said often or very often.
Participants were asked: "In the past month, how frequently did you...?"
Participants responded by selecting from 1 (never) to 5 (very often).

6.4 Payments and Devices

Paying via credit card is the most common method our participants use to pay for their purchases across all three waves, though there was a decrease in the percentage of those who usually pay via credit cards between December 2020 and July 2021, from 69.6% to 63.5%, which then remained stable in December 2021 (63.7%). Mobile wallet usage saw a continuous increase in percentage of users in each subsequent wave: a 2.3% increase from December 2020 to July 2021 and a 1.2% increase from July 2021 to December 2021. There was also a big jump in the percentage of cash-on-delivery-payment users, 1.9% to 5.6%, from December 2020 to July 2021, which then remained stable in December 2021 at 5.2%.
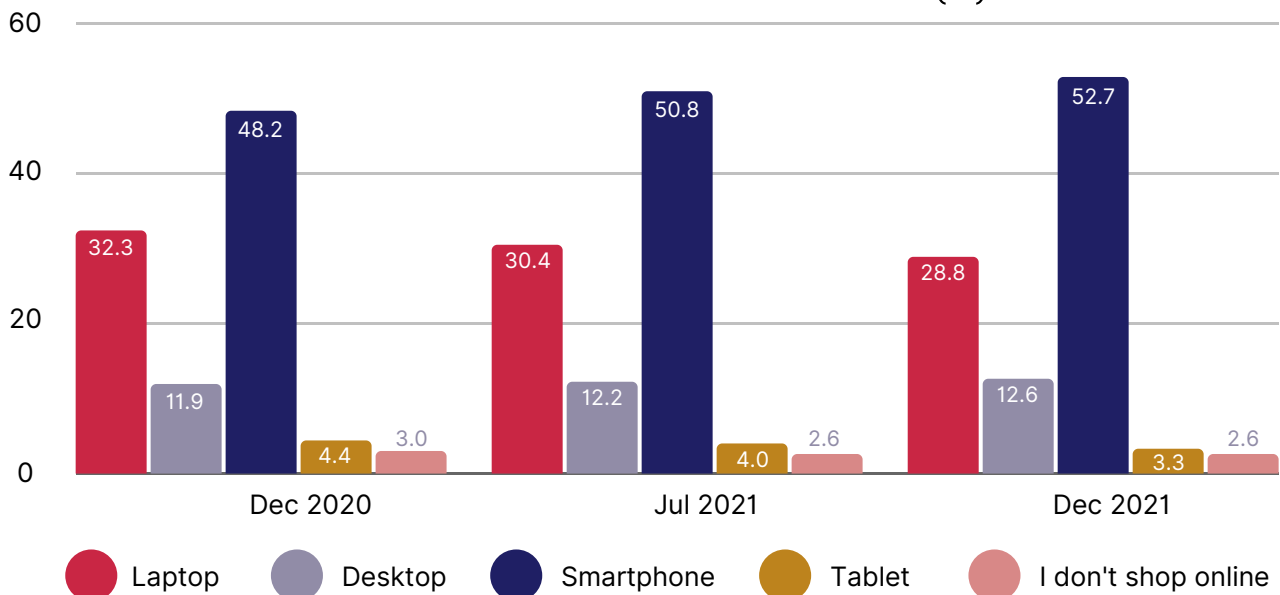
MODE OF PAYMENT (%)

	Dec 2020	Jul 2021	Dec 2021
Mobile Wallet	7.5	9.8	11.0
Credit Card	69.6	63.5	63.7
Debit Card	18	18.5	17.6
Cash on Delivery	1.9	5.6	5.2

Percentage who said often or very often.
Participants were asked: "How do you usually pay for your purchases?"
Participants responded by selecting the above options.

Around three quarters of our participants spend less than S$150 per typical online shopping session. The largest percentage of participants, 37%, usually spend around S$50-100 when they shop online. The percentage of participants for each amount-spent range remained relatively stable across three waves.

Smartphones were the most commonly used device for online shopping in all three waves (52.7% in December 2021), with approximately a 2% increase in percentage between each wave. Laptops came in second (28.8% in December 2021).

DEVICE FOR ONLINE SHOPPING (%)

	Dec 2020	Jul 2021	Dec 2021
Laptop	32.3	30.4	28.8
Desktop	11.9	12.2	12.6
Smartphone	48.2	50.8	52.7
Tablet	4.4	4.0	3.3
I don't shop online	3.0	2.6	2.6

Percentage who said often or very often.
Participants were asked: "How do you usually pay for your purchases?"
Participants responded by selecting the above options.

Sofia Contreras-Yap is a PhD candidate at the Wee Kim Wee School of Communication and Information (WKWSCI) and a student member of IN-cube.

CHAPTER 7. VIDEOCONFERENCING
## By Shruti Malviya

7.1 Introduction

One of the major changes since the pandemic has been the transition to a remote studying and working environment, especially after Singapore made work-from-home (WFH) as the default option with the Circuit Breaker in April 2020. This resulted in a shift from in-person interaction to the use of videoconferencing apps such as Zoom, Skype, Microsoft Teams, etc. Our surveys saw a consistent pattern of videoconferencing use in terms hours spent, as well as in the apps used the most, which included WhatsApp and Zoom.

The use of videoconferencing remained consistent in Singapore across the pandemic, even when Singapore relaxed its restrictions and shifted to treating COVID-19 as endemic. While there has been a slight increase in the hours spent videoconferencing from December 2020 to July 2021, the pattern stabilised from July to December 2021. Among the participants in their 20s, there was an increase in the use of videoconferencing from December 2020 to July 2021, which decreased in December 2021

7.2 Hours Spent Videoconferencing

Participants were asked to select from 0 hours or no videoconferencing to 13 or more hours spent videoconferencing. In December 2020, average hours spent on videoconferencing was 1.98 hours (SD = 2.73) per day. This increased to an average of 2.14 (SD = 2.97) hours per day in July 2020. Our December 2021 survey saw a slight decline to 2.07 hours (SD = 2.87) per day.
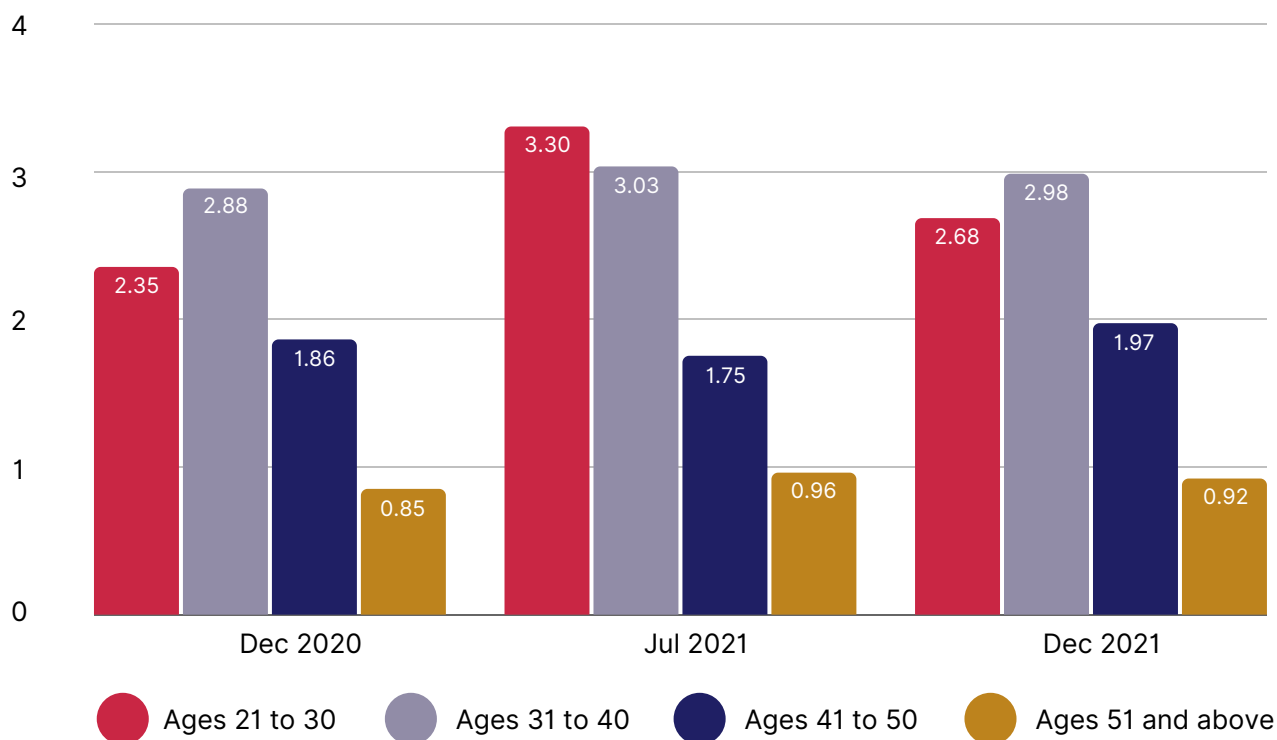
HOURS SPENT VIDEOCONFERENCING
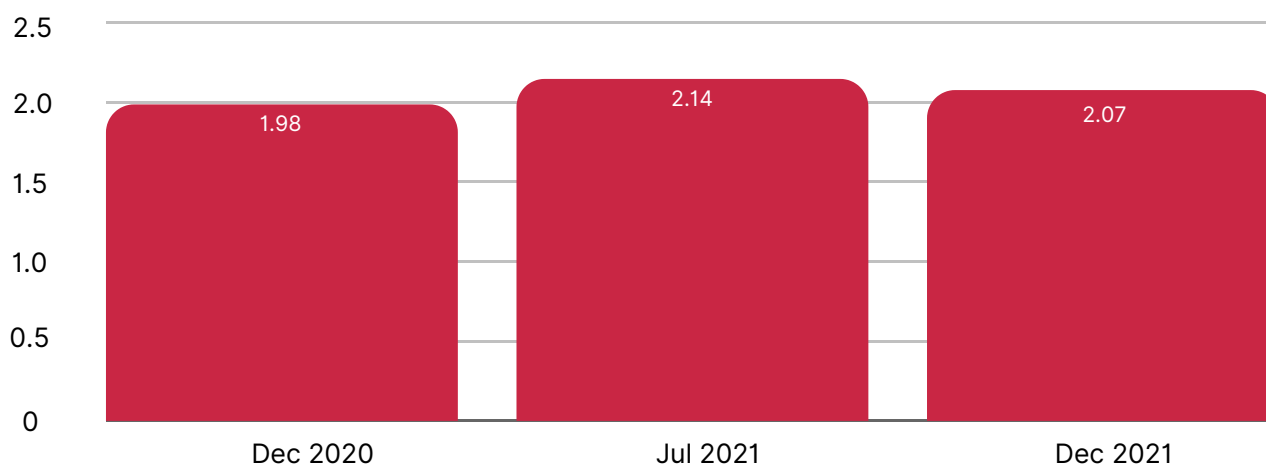
Participants were asked: "How many hours in a day do you spend …? - Using video-conference tools (e.g., Zoom)"

Additionally, there was a difference in the average hours spent videoconferencing among the different age groups in the three surveys. The average hours spent videoconferencing was the highest among those aged 31-40 in the surveys held in December 2020 (M = 2.88, SD = 3.40) and December 2021 (M = 2.98, SD = 3.37), while the survey in July 2021 saw a rise in the average hours spent videoconferencing among participants aged 21-30 (M = 3.30, SD = 3.77).

AVERAGE TIME SPENT (IN HOURS) VIDEOCONFERENCING BY AGE GROUP

Different age groups and their use of videoconferencing.
Participants were asked: "How many hours in a day do you spend …? - Using video-conference tools (e.g., Zoom)"

7.3 Videoconferencing Apps Used

Participants were also asked about which videoconferencing apps they used the most in a typical week the most. Most used a mix of different videoconferencing apps, such as Zoom, WhatsApp, Teams, Skype, Facebook Messenger, and Google Hangouts.

In December 2020, 79.4% of the participants used videoconferencing apps, while in July 2021, 81% of the participants used videoconferencing apps. In December 2020, 51.5% used WhatsApp often or very often, making it the most used app. This was followed by Zoom, which was used often or very often by 28.8% of the participants.

WhatsApp remained stable in July 2021, used often or very often by 50.4%. But Zoom showed the highest jump, as the percentage of those who use it often or very often increased to 38.6% in July 2021. Microsoft Teams also saw a slight increase in its usage from December 2020 (22.3%) to July 2021 (26%).

VIDEOCONFERENCING APPS USED

	Zoom		Facebook Messenger		WhatsApp		Microsoft Teams		Skype		Google Hangouts	
	Dec 2020	July 2021	Dec 2020	July 2021	Dec 2020	July 2021	Dec 2020	July 2021	Dec 2020	July 2021	Dec 2020	July 2021
Sometimes	31.4%	24.4%	22.7%	19.0%	15.2%	17.8%	18.5%	19.9%	17.1%	19.2%	11.9%	15.2%
Often	20.4%	26.0%	9.4%	11.2%	26.0%	24.6%	15.0%	16.9%	11.2%	9.1%	6.6%	7.7%
Very Often	8.4%	12.6%	5.9%	4.4%	25.5%	25.8%	7.3%	9.1%	5.4%	5.6%	2.6%	2.8%

Videoconferencing apps used.
Participants were asked: "How often do you use each of the following video- conferencing apps in a typical week? (Zoom, Facebook Messenger, etc.)"
Participants responded by selecting from 1 (never) to 5 (very often).

Shruti Malviya is a Master of Communication Studies Research Student at the Wee Kim Wee School of Communication and Information (WKWSCI).

CHAPTER 8. EMERGING TECHNOLOGIES
By Edmund W. J. Lee

8.1 Introduction

This section showcases the usage of and trust in emerging technologies, such as wearable devices (e.g., smartwatches), voice-assisted personal devices, and virtual and augmented reality headsets among Singapore residents. Tracking the consumption of emerging digital technologies is vital to providing a snapshot of our nation's progress in the journey towards a Smart Nation. Under the Digital Readiness Blueprint developed by the Ministry of Communications and Information, there are four strategic thrusts:

- Expand and enhance digital access for inclusivity
- Infuse digital literacy into national consciousness
- Empower community and businesses to drive widespread adoption of technology
- Promote digital inclusion by design

By measuring digital consumption and trust, the preliminary results could provide insights into facets of digital readiness of Singapore during the pandemic.

Overall, our participants reported an increase in the use of emerging technologies related to exercise such as smartwatches and fitness trackers, as well as the use of voice-assisted personal devices and virtual and augmented reality headsets. Notably, participants reported an increase in the use of fitness trackers and voice-assisted personal devices from Wave 1 to Wave 2, but usage of these gadgets dipped in Wave 3.

Trust in the use of artificial intelligence technologies remained stable throughout all three waves of the survey, signaling that our participants are generally open to the use of emerging technologies in their lives.

8.2 General Emerging Tech Use

8.2.1 Smartwatches. When asked "How many hours in a day do you spend actively using Smart watch (e.g., Apple Watch)?", our participants reported spending an average of 1.42 hours in Wave 1. This increased slightly to 1.67 hours in Wave 2 and 2.03 hours in Wave 3.

8.2.2 Fitness trackers. In terms of using fitness trackers (e.g., FitBit), participants reported spending an average of 2.08 hours in Wave 1. This decreased slightly to 1.89 hours in Wave 2, and increased to 2.41 hours in Wave 3.

8.2.3 Voice-assisted personal devices. In terms of voice-assisted personal assistant devices (Google Mini, Alexa, Amazon Echo etc), participants reported spending an average

of 1.25 hours in Wave 1. This increased slightly to 1.44 hours in Wave 2, and dropped to 1.29 hours in Wave 3.

8.2.4 Virtual reality headsets. When it comes to VR (virtual reality) headsets, our participants reported spending an average of 1.15 hours using it in Wave 1. This increased slightly to 1.20 hours in Wave 2 and remained the same at 1.21 hours in Wave 3.

8.2.5 Augmented reality headsets. When asked "How many hours in a day do you spend actively using AR (augmented reality) devices?", our participants reported spending an average of 1.06 hours in Wave 1. This increased slightly to 1.25 hours and 1.26 hours respectively in Waves 2 and 3.

8.3 Trust in emerging technologies

When asked how much they would rate their level of trust in technology that uses artificial intelligence (AI) (e.g., self-driving cars) on a five-point scale (where 1 = Very low trust; 5 = Very high trust), respondents reported a slight increase in their trust of AI technologies over the three waves. At Wave 1, 78.4% of the respondents reported that they trust AI technologies. This number increased to 81% in Wave 2, and 82.2% in Wave 3.

LEVEL OF TRUST IN TECHNOLOGY THAT USES AI

	Dec 2020	Jul 2021	Dec 2021
	2.96	3.04	3.10
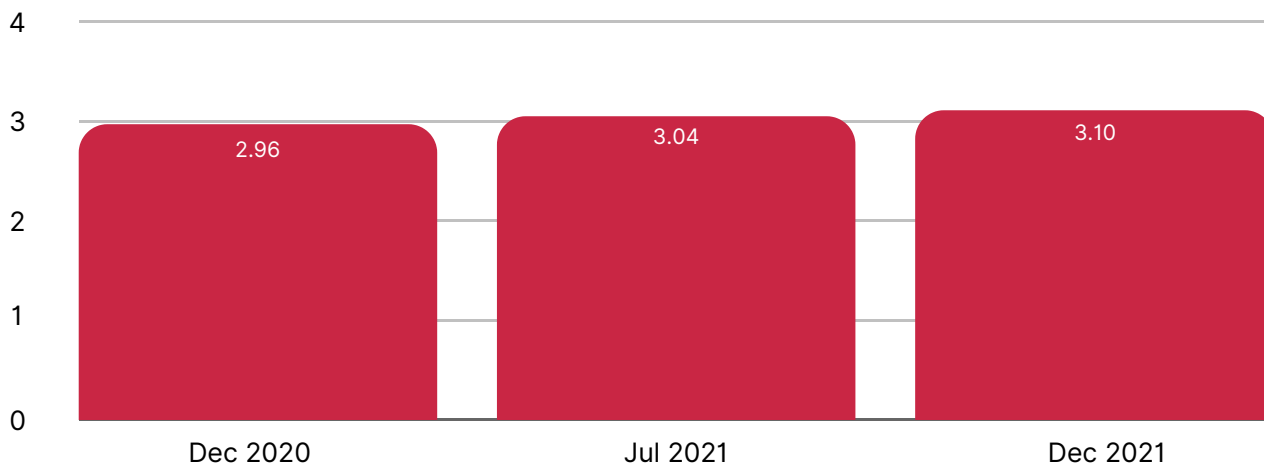
Level of trust in technology that uses AI.
Participants were asked: "How much would you rate your level of trust in each of the following? - Technology that uses Artificial Intelligence (AI) (e.g., self driving cars)"
Participants responded using a 5-point scale, from 1 (very low trust) to 5 (very high trust).

Edmund Lee Wei Jian is an Assistant Professor at the Wee Kim Wee School of Communication and Information (WKWSCI) and the Assistant Director of IN-cube.

SUPPLEMENTARY CHAPTER. ONLINE VIGILANTISM
By Loy Guan Peng

S.1 Introduction

IN-cube had also conducted another national online survey in July 2020 prior to its official launch. The survey focused on social media use during the pandemic. A commercial polling company based in Singapore recruited 1,000 adult residents to participate in a national online survey, when the total number of COVID-19 cases breached 45,000, following outbreaks in crowded migrant worker dormitories and a slew of government regulations to curb the spread of the virus in Singapore. We sought to match the adult population distribution in Singapore. The average age was 38.75 (SD = 12.04) and some 48% were female. In terms of ethnicity, 75% identified as Chinese, 15% were Malay, 8% were Indian, and 2% selected "others." Some 59% had at least a university degree or higher. In terms of monthly household income, some 25% reported having below $4,500 while 33% reported having more than $9,000.

In this supplemental report, we focus on online vigilantism. Starting in April 2020, COVID-19 safety measures such as mask-wearing, and social distancing have been a mainstay in Singapore. As the government implemented these regulations to curb the spread of COVID-19, social media users have taken to the internet to not only call on others to adhere to the guidelines, but also to call out those that were seen violating them. These acts of online vigilantism are often carried out through the uploading of images and videos onto popular social media sites such as Facebook and Instagram. Overall, responses from our participants suggest that a significant proportion of the population has either actively taken part in, or are supportive of, acts of online vigilantism. A higher number of participants had put up social media posts documenting acts that violate COVID-19 safety measures in comparison to reporting them to the Government.

S.2 Perceptions of online vigilantism

Survey responses suggest that a majority of participants have come across social media posts showing an individual violating existing COVID-19 control measures: 68.4% of the respondents indicated that they had come across social media posts related to individuals not wearing a mask, while 66% of the respondents had come across social media posts related to the lack of safe social distancing among individuals. Support for social media posts of these nature were fairly significant, with 39.7% and 41.8% of the respondents, respectively, indicating that they have "liked" these social media posts.

S.3 Participating in online vigilantism

Some 33.1% indicated they have uploaded to social media images of people not wearing a mask in public, while 37.2% shared they have posted social media posts of people

violating safe distancing measures. Similarly, 39.9% and 42.7% of the participants also indicated that they have shared someone else's social media posts related to the violation of the mask mandate and safe distancing measures respectively.

We also asked the participants whether they reported these violations to the government. At least 33.1% and 35.2% of the participants indicated that they had reported offences pertaining to mask wearing and safety distancing respectively.

REPORTING VIOLATIONS (%)

Come across a social media post showing a photo or video of someone not wearing a face mask	68.4%
Like someone else's post about people not wearing face mask	39.7%
Share someone else's post about people not wearing face mask	39.9%
Post on social media a photo or video of someone not wearing a face mask	33.1%
Report someone who was not wearing a face mask to Government authorities	33.1%
Come across a social media post showing a photo or video of some people violating safe distancing	66.0%
Like someone else's post about people violating safe distancing	41.8%
Share someone else's post about people violating safe distancing	42.7%
Post on social media a photo or video of people violating safe distancing	37.2%
Report people who were violating safe distancing to Government authorities	35.2%

Percentage who said they have engaged in this at least once.
Participants were asked how often they engaged in these behaviors, from never (0 times) to very often (6 or more times).

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CONCLUSION

The pandemic seems to have increased our reliance on different media technologies to navigate daily life. For instance, the restrictions on returning to workplaces meant an increase in the uptake of videoconferencing for carrying out day-to-day operations for businesses. Schools are relying more on online learning. Indeed, our data showed that about 80% of our participants used some form of video conferencing apps, on an average of two hours per day. The push from offline to online spaces during the pandemic meant also that people spend more time using video streaming sites for entertainment. However, the increase in time spent online would also mean that Singaporeans are more likely to be susceptible to digital harms, such as being exposed to falsehoods circulating online.

So, what does all this mean for Singapore moving forward? First, it is important to continue to track online behaviours and their impact on Singapore residents as the world moves into a new normal, where restrictions may be eased or tightened, as we adjust and live with COVID-19. This is important for providing insights to policymakers and the industry. For instance, our data showed that during the pandemic many relied largely on the local news media to get their information on COVID-19. This contrasts with findings prior to the pandemic, where Facebook and WhatsApp were the most frequently used sources for news in Singapore. But while mainstream news sources in Singapore gained more attention during the pandemic, local and cable TV are losing to video streaming sites as entertainment sources. Such trends can help to inform the media industry in Singapore.

Second, we need to examine how best to cultivate national consciousness of digital media use, in line with Singapore's Smart Nation Initiatives to build an inclusive digital society in Singapore. Our data showed that most of our participants are highly satisfied with the use of Internet, have a high degree of trust in the use of emerging technologies and AI, and are avid users of different forms of digital media for daily living (e.g., work, entertainment, communication). Despite this, we found that in certain aspects, more could be done to raise digital literacy. For instance, our data showed that many participants still rely on traditional payment methods (e.g., credit cards), even though the proportion of those adopting digital wallet payments is increasing. This may indicate that some groups may not be fully aware of how to use digital wallet payments, or the benefits compared with traditional payments. While Singaporeans are no strangers to the use of smartwatches and fitness trackers, the use of voice-assisted personal devices, virtual and augmented reality headsets, and even fact-checking sites remain low. As Singapore increasingly explores ways to adopt these technologies, it is critical to engage the public on the advantages and disadvantages of these technologies.

Finally, in harnessing digital media technologies, policy makers should stay ahead and

be aware of potential negative consequences of online behaviours and have strategies in place to mitigate some of these harms. For instance, research has shown that there may be a link between social media use and well-being, even though this link is disputed by some. By tracking the digital life of Singapore residents and exploring how that affects their well-being over time, IN-cube seeks to contribute to providing policy makers, academics, and the industry with evidence-based research that they could rely on in drafting media and health-related policies and in mitigating the harms while preserving the good in technology development.

Digital life is very much now part of our daily lives, especially so in Singapore, considered to be one of the most digitally connected nations in the world. As we rely even more on the internet for many facets of our daily lives, especially as we enter a post-pandemic world, it is important for us to remain mindful of and reflexive about our online behaviours and their consequences not only to us but also to society in general.

IN-cube is committed to contribute to this effort.

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