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Association between Information Dissemination and Compliance with Preventive Measures during the Coronavirus Disease Pandemic in Hong Kong Working Population: Cross-Sectional Survey

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Abstract: Background: To fight the Coronavirus disease (COVID-19) pandemic, it is important for the population to keep abreast of COVID-19 updates and comply with the suggested preventive measures. Understanding the influence of popular dissemination channels under the surge of an 'infodemic' is crucial, as the population may receive conflicting information from various sources. Objective: This study aimed to examine the association between information source usage and COVID-19-preventive measures compliance. Methods: An online cross-sectional study was conducted in February 2020. Four COVID-19-preventive strategies, including 'hand hygiene', 'mask wearing', 'household hygiene', and 'social distancing', were studied with respect to their usage from three common health information sources and three dissemination channels. Logistic regressions were modelled to study the odds ratio of the preventive behavior compliance in terms of information source usage. Results: A total of 1048 respondents completed the survey and the sample demonstrated high compliance in hand hygiene (81.4%) and mask wearing (93.5%), but lower compliance in household hygiene (22.4%) and social distancing (65.7%). Females and chronic diseases patients were found more likely to adopt COVID-19-preventive measures. Participants recorded highest usage in social media (80.1%) among information sources and respondents with frequent social media use had improved compliances in the preventive behaviors studied. Conclusions: The study presented evidence to demonstrate the effectiveness of social media in disseminating information related to complying COVID-19-preventive behaviors. The impact of social media in spreading COVID-19 information should be recognized, despite the concerns regarding misinformation. With disciplined use, social media may help to halt the spread of COVID-19 and other communicable diseases by encouraging community participation.

Keywords: COVID-19; pandemic; infodemic; information dissemination; social media; health behavior

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1. Introduction

The unprecedented outbreak of the novel coronavirus disease (COVID-19) has become one of the top public health concerns of 2020. The World Health Organization (WHO) characterized COVID-19 as a pandemic on 11 March 2020 [1]. Although the transmission routes of the COVID-19 remain uncertain, it is generally believed that coronaviruses are mainly transmitted from person-to-person via direct contact or respiratory droplets produced when an infected person coughs, sneezes, or talks [2–4]. To mitigate this risk of transmission, the WHO advised the public to maintain a distance of at least 1 m between individuals, regularly use soap or alcohol-based sanitizer to wash hands, avoid public places, and use either

surgical or non-surgical masks as the situation demands [5,6]. Reporting the first COVID-19 case in January 2020 [7], the Hong Kong Government has adopted stringent social policies, including urging citizens to avoid unnecessary travel outside the administrative region, asking visitor to fill in health declaration form at borders, declaring school closure and encouraging 'Work from Home' arrangements. Hygiene measures, including the use of masks, washing of hands, and the use of diluted bleach to disinfect the home environment and drainage pipes, were promoted [8]. Although the details of the preventive measures may have been adjusted to a local context [9], the strategies were generally aligned with the guidelines issued by the WHO, and the effectiveness of preventive measures was heavily dependent on community participation.

Community participation can promote the diffusion of community-based strategies while compliances with the preventive behaviors are positively related to health information orientation and efficacy [10]. There are various information channels to engage the public and allow reliable updates to reach the target audience. To facilitate the compliance of public health practices, conventional media, such as radio and newspapers, social media or even policy briefs and seminars, can be utilized to disseminate information [11]. In particular, social media is often trusted to provide real-time information together with the attention to preparedness and agility towards any health or social crisis with its immediacy and convenience [12]. Yet, an observational study that explored the public's perception of the COVID-19 pandemic based on the content and trends on social media platforms found that the messages distributed by the online community could cause emotional turbulence among the group [13]. In an early review of the COVID-19 spread, it was highlighted that the lack of transparency and public misinformation may have led to a delayed release of incorrect information, causing unprecedented fear in the global community [14]. Facing the growing panic for COVID-19, tackling inaccuracies and conspiracies in the social media and conventional outlets with verified information is crucial to prevent an 'infodemic' [15].

Messages conveyed by different media sources may deviate from one another, as discrepancies in COVID-19-preventive recommendations suggested by the digital media and the official public health organizations could be observed at an early stage of the COVID-19 outbreak. In the Spanish and American communities, the odds of promoting wearing a mask while taking care of suspected COVID-19 patients were found to be 4.39 times (95% CI 1.45–13.32) higher for the official websites of the public organizations than for digital media [16]. Previous research also pointed out the possibility of information discrepancies in what people perceived from social media and health authorities regarding to the spread of the disease [17]. In turn, it is crucial for the public to receive accurate updates of the pandemic and comply with the suggested preventive measures in order to achieve the expected benefit of the COVID-19 guidelines.

The odds of adopting COVID-19 protection behaviors may differ depending on the usage of different types of information sources and dissemination channels. As research on the relationship between information channels and compliance with COVID-19-preventive measures is scanty, this study aimed to examine the compliance of COVID-19-preventive measures based on the usage of various information sources.

2. Methods

2.1. Study Population

A cross-sectional survey was conducted between 17 and 27 February 2020 in Hong Kong. Varying methods were adopted to promote the survey and enhance recruitment, including face-to-face invitation, email invitation, and hyperlink disseminated through mass social media (Facebook, Instagram, WhatsApp). Participants who were Hong Kong-Permanent Residents and aged $\geq$18 years working adults were eligible for the study. The study focused on the working population as the working populations could be pressurized to stay socially active in times of COVID-19. Despite the heated promotion of 'Stay Home' and 'Work-from-home' policy, the extent of this policy was often not company-wide and varied in different occupations [18]. In other words, many working adults were still

required to leave home and gathered at workplace, being a less-mentioned COVID-19 high-risk group [7]. The structure of target working population was based on the reported Hong Kong working population profile from the Census and Statistics Department (2019). Occupation was separated into five categories and the corresponding proportion guided the sampling frame. Unemployed samples were excluded from the study as they were not able to access COVID-19 information from workplace. Respondents were required to have proficiency in traditional Chinese to understand and respond to the questionnaire. Potential participants of the study needed to have access to the Internet and electronic devices as the survey was distributed online.

2.2. Instruments

The survey was divided into three sections. In the first section, there was a list of four protection strategies: (1) hand hygiene, (2) wearing surgical mask, (3) household hygiene, and (4) social distancing and the definitions were referenced to the Hong Kong Centre for Health Protection guidelines [8]. 'Hand hygiene' referred to the habit of hand-washing before meals or the use of alcohol-based hand rub. The application of bleach to household toilets, its water tank, and the sewage system were considered as compliance with adequate 'household hygiene' based on local COVID-19 prevention guidelines [8]. The concept of 'social distancing' included the behaviors, such as minimizing contact with neighbors, living in quarantine facilities, and staying home to the extent possible. The participants were asked about the frequency of adopting protection strategies in the previous week on a four-point Likert scale (never to always). The preventive strategies would be considered as complied in the data analysis if the sample had reported 'always' on any one of the captioned behaviors in the particular category. The second section included questions regarding the participants' source of COVID-19 information updates from three sources: (1) local government press conferences; (2) WHO or United States Centre for Disease Control and Prevention (CDC) press conferences; (3) health experts press conferences; and three dissemination channels, including: (1) information gathered from the workplace; (2) conventional media (radio, television and newspaper); and (3) the social media (Facebook, WhatsApp, WeChat). In particular, health experts press conference was referred to the forums held by local public health stakeholders, such as scholars or epidemiologists from the local universities. The respondents were asked about the frequency of the usage for the particular information sources used and their responses were measured on a three-point Likert scale (never, sometimes, always). Those who chose the 'always' response were renamed as 'frequent' users of that specific information source, whereas other responses were taken as the base reference group. Demographic details were also collected in the third section, including details related to age, gender, education, marital status, living condition, the nature of employment, and status of any known chronic condition(s).

2.3. Data Collection

Respondents were recruited using convenience sampling methods with stratification by occupation categories to enhance the generalization of findings. Invitations to participate in the survey by the publicity through liaison with target occupation groups and word-of-mouth. With obtaining the verbal consent, the hyperlink to the online questionnaire were then distributed via mobile phone, email account or social networking platforms (WhatsApp, WeChat). The electronic written consent was verified, and the participation was voluntary and anonymous. The survey responses were collected as a Google form, and all the collected data were encrypted and protected with a password. Potential participants who clicked onto the invitation hyperlink would be directed to an information page that explained the survey background and objectives, and the data collection process would start after the respondent had agreed to provide consent. Participants could withdraw from the data collection process at any time point without any consequence, and no personal

identifiable data were collected in the process. Data collection remained anonymous and voluntary.

2.4. Statistical Analysis

Statistical analysis was conducted using the R Software version 3.60 [19]. The demographic characteristics of the sample population, their compliance with respective COVID-19-preventive measures, and the usage of information sources were reported descriptively. As the data collected had a higher proportion of professionals compared to the Hong Kong working population, weighed adjustment was applied based on the occupation groups of respondents. The percentages of frequent users with respect to different sources and channels were calculated and Pearson Chi-square tests were performed to test for collinearity among media variables. Two new variables were computed to indicate the respondents' mixed use of information sources and dissemination channels, respectively. The usage of social media was further investigated with reference to demographic factors. The chi-square or the Fisher's exact tests were conducted to explore whether there were any significant differences among groups, whereas trend tests were carried out for 'age group'. For the preventive behavior compliances, chi-square or Fisher's exact test were performed with respect to the demographic factors to determine possible differences in the compliance of preventive measures between various levels or categories, and $p < 0.05$ were accepted as statistically significant. The factors with $p < 0.2$ were introduced to the univariate logistic regressions to adjust the relationship between the different information sources and COVID-19-preventive strategies. The odds ratio and the respective 95% CI of adjusted models were reported. The 95% CIs which did not include the value of '1' were highlighted with an asterisk to signify that they were statistically significant.

3. Results

3.1. Demographics

Of the 1048 respondents, 345 (32.9%) were aged between 40–49 years and 712 (67.9%) were female. Among all the participants, the majority of the sample population were female (712/1048, 67.9%), married (557/1048, 53.1%), living with their family or others (980 /1048, 93.5%), attained education of the university level or above (787/1048, 75.1%), and employed full-time (950/1048, 90.6%), while 440 (42.0%) had a professional occupation and 897 (85.6%) reported with no known chronic conditions. Referencing to the HK working population statistics, the sample population was composed of more middle-aged, professional, and females (Table 1). As the study focused on the working population, weightings were, therefore, applied to the compliance tables and logistic regression models according to the Hong Kong occupation mix [20].

Table 1. Characteristics of the sample population.

	Study Sample (n = 1048) n (%)	HK Population [a] (%)
Age Group		
18–29	217 (20.7)	(18.6)
30–39	294 (28.1)	(25.0)
40–49	345 (32.9)	(23.6)
≥50	192 (18.3)	(32.8)
Gender		
Female	712 (67.9)	(50.5)
Male	336 (32.1)	(49.5)

Table 1. *Cont.*

	Study Sample (n = 1048) n (%)	HK Population [a] (%)
Marital Status		
Never Married/Single	444 (42.4)	
Married/Co-Living	557 (53.1)	
Divorced/Widowed	47 (4.5)	
Living Status		
Alone	68 (6.5)	
With Family/Others	980 (93.5)	
Education Level		
Secondary Level or Below	113 (10.8)	
Post-Secondary Level	148 (14.1)	
University or Above	787 (75.1)	
Job Status		
Full time	950 (90.6)	
Part time	98 (9.4)	
Occupation		
Managerial and Administrative	183 (17.5)	(11.6)
Professional	440 (42.0)	(7.9)
Associate-professional	256 (24.4)	(20.6)
Clerks	104 (9.9)	(12.8)
Others	65 (6.2)	(47.1)
Self-reported Chronic Disease(s)		
Yes	151 (14.4)	
No	897 (85.6)	

[a] Census and Statistics Department. Hong Kong Annual Digest of Statistics. 2019 Edition. 2019.

3.2. Compliance with Individual Preventive Measures

Among the four personal protection behaviors studied, compliance level for wearing surgical masks was the highest (980/1048, 93.5%). Of the 1048 samples, 853 (81.4%), 688 (65.7%), and 235 (22.4%) complied with hand hygiene, social distancing, and household hygiene strategies, respectively. Based on the 95% confidence interval, it was found that females showed a higher compliance with respect to all the preventive strategies. Significant differences in preventive behavior compliances were observed based on 'age group'; while the younger group seem to practice mask wearing ($p < 0.001$) and social distancing ($p < 0.001$) more often than the elders, the compliance of household hygiene was higher among people >40 in the study ($p < 0.001$). Samples with self-reported chronic conditions tended to have higher compliances in all four captioned strategies, while statistical significances were reached in all except household hygiene.

The compliance may differ according to marital status, as the divorced or widowed group had the highest household hygiene compliance ($p < 0.001$), while mask wearing ($p = 0.003$) and social distancing ($p = 0.001$) were more common in the single or never married group. In addition, full-time employees had significantly higher hand hygiene compliance ($p = 0.04$) but lower compliance rate in household hygiene ($p < 0.001$) and social distancing ($p = 0.001$) (Table 2).

Table 2. Compliance of COVID-19-preventive behaviors (weighted with occupation).

	COVID-19-Preventive Behaviors							
	Hand Hygiene		Mask Wearing		Household Hygiene		Social Distancing	
	n (%)	*p* Value	n (%)	*p* Value	n (%)	*p* Value	n (%)	*p* Value
Age Group		0.42		<0.001 *		<0.001 *		<0.001 *
18–29	157 (78.7)		195 (97.6)		25 (12.7)		146 (73.2)	
30–39	205 (83.0)		232 (94.2)		51 (20.6)		153 (62.1)	
40–49	284 (83.4)		327 (96.3)		98 (28.9)		246 (72.3)	
≥50	208 (79.5)		226 (86.4)		61 (23.2)		143 (54.8)	
Gender		<0.001 *		0.004 *		<0.001 *		<0.001 *
Female	611 (84.2)		689 (95.0)		189 (26.1)		521 (71.9)	
Male	243 (75.1)		292 (90.3)		45 (14.1)		167 (51.7)	
Marital Status		0.52		0.003 *		<0.001 *		0.01 *
Never Married/Single	291 (81.6)		346 (97.0)		54 (15.1)		247 (69.4)	
Married/Co-Living	500 (82.0)		561 (92.0)		154 (25.2)		398 (65.4)	
Divorced/Widowed	63 (76.8)		74 (89.7)		27 (33.1)		43 (52.0)	
Living Status		0.66		0.33		0.63		0.34
Alone	42 (83.8)		45 (90.2)		10 (19.6)		36 (71.9)	
With Family/Others	812 (81.3)		935 (93.7)		225 (22.5)		653 (65.4)	
Education Level		<0.001 *		0.45		0.12		0.29
Secondary Level or Below	189 (68.1)		259 (93.3)		70 (25.4)		173 (62.2)	
Post-Secondary Level	192 (92.2)		199 (95.5)		37 (17.5)		143 (68.7)	
University or Above	472 (84.1)		522 (93.0)		128 (22.8)		373 (66.3)	
Job Status		0.05		0.46		<0.001 *		0.01 *
Full time	716 (82.5)		809 (93.3)		171 (19.7)		556 (64.1)	
Part time	138 (76.3)		171 (94.8)		64 (35.4)		133 (73.6)	
Occupation		0.01 *		0.01 *				
Managerial and Administrative	102 (84.2)		115 (94.5)		35 (28.4)	0.03 *	83 (68.3)	0.51
Professional	70 (84.3)		79 (95.7)		19 (23.6)		55 (66.4)	
Associate-professional	186 (85.9)		207 (95.7)		60 (27.7)		150 (69.5)	
Clerks	116 (86.5)		132 (98.1)		30 (22.1)		89 (66.3)	
Others	379 (76.9)		448 (90.8)		91 (18.5)		311 (63.1)	
Self-reported Chronic Disease(s)		0.04		<0.001		0.07		0.002 *
Yes	709 (82.6)		817 (95.2)		202 (23.5)		582 (67.9)	
No	145 (76.2)		163 (86.1)		33 (17.4)		106 (55.8)	
Overall	853 (81.4)		980 (93.5)		235 (22.4)		688 (65.7)	

Note: * $p < 0.05$.

3.3. Utilization of the Information Source

Among the three information sources, the sample population made the most frequent use of press conferences held by local health experts (386/1048, 37.8%), while the use of WHO/CDC press conferences and local government press conferences were lower. For dissemination channels, social media (837/1048, 80.1%) was used most extensively, closely followed by conventional media (821/1048, 78.8%). The percentage of social media frequent users was similar to the local social media participation rate (83%) [21]. The results of the chi-square test reflected potential collinearity among information sources and dissemination channels under study. New variables were computed to show to proportion of information sources usage mix and dissemination channels usage mix in the sample population. Approximately half of the respondents did not frequently use one of the information sources studied and around half of the sample population used a mix of conventional media and social media as dissemination channels (Table 3).

Table 3. Utilization of media sources (weighted with occupation).

	Frequent Users
	n (%)
Information Source	
(1) Local Government Press Conference	201 (19.9)
(2) WHO/CDC Press Conference	105 (9.9)
(3) Press Conference by Local Health Experts	386 (37.8)
Pearson's Chi-square Test	*p* value
(1) and (2)	<0.001 *
(1) and (3)	0.06
(2) and (3)	0.01 *
Dissemination Channel	
Information from Workplace	177 (23.6)
Conventional Media	821 (78.8)
Social Media	837 (80.1)
Pearson's Chi-square Test	
(1) and (2)	0.14
(1) and (3)	<0.01 *
(2) and (3)	<0.01 *
Information Source Mix	
(1) Local Government Press Conference Only	92 (8.8)
(2) WHO/CDC Press Conference Only	13 (1.2)
(3) Press Conference by Local Health Experts Only	281 (26.9)
(1) and (2)	23 (2.2)
(1) and (3)	35 (3.3)
(2) and (3)	19 (1.8)
(1), (2) and (3)	51 (4.9)
Non-frequent User of the above Sources	533 (50.9)
Dissemination Channel Mix	
(1) Information from Workplace Only	12 (1.1)
(2) Conventional Media Only	123 (11.8)
(3) Social Media Only	87 (8.3)
(1) and (2)	15 (1.5)
(1) and (3)	19 (1.8)
(2) and (3)	552 (52.6)
(1), (2), and (3)	131 (12.5)
Non-frequent User of the above Channels	109 (10.4)

Note: * $p < 0.05$.

Focusing on the usage pattern of social media with respect to demographic factors, significant p values were observed in age groups, marital status, education level, and occupation. A decreasing trend could be found in social media usage per age group, as the 18–29 years of age group topped with 88.6% (177/199), and the percentage of social media users among those aged at least 50, dropped to 64.8% (170/262, $p < 0.01$). In addition, an inverse relationship between age groups and the use of social media was found ($p < 0.01$) (Table 4).

Table 4. Summary of frequent users of social media (weighted with occupation).

Demographics	Frequent User	*p* Value	*p* Value	Total
	n (%)	(Chisq.)	(Trend)	n (%)
Age Group		<0.001 *	<0.001 *	
18–29	177 (88.6)			199 (19.0)
30–39	180 (73.2)			247 (23.5)
40–49	262 (77.1)			340 (32.5)
≥50	170 (64.8)			262 (25.0)
Gender		0.40	-	
Female	551 (76.0)			725 (69.2)
Male	238 (73.6)			323 (30.8)
Marital Status		0.02 *	-	
Never Married/Single	287 (80.4)			357 (34.0)
Married/Co-Living	441 (72.4)			609 (58.2)
Divorced/Widowed	61 (74.7)			82 (7.8)
Living Status		0.74	-	
Alone	38 (77.3)			50 (4.8)
With Family/Others	750 (75.2)			998 (95.2)
Education Level		<0.001 *	-	
Secondary Level or Below	201 (72.5)			278 (26.5)
Post-Secondary Level	136 (65.2)			208 (19.9)
University or Above	452 (80.4)			562 (53.6)
Job Status		0.40	-	
Full time	657 (75.8)			867 (82.8)
Part time	132 (72.8)			181 (17.2)
Occupation				
Managerial and Administrative	96 (79.2)	0.03 *	-	122 (11.6)
Professional	68 (82.3)			82 (7.9)
Associate-professional	172 (79.7)			216 (20.6)
Clerks	103 (76.9)			134 (12.8)
Others	349 (70.8)			493 (47.1)
Self-reported Chronic Disease(s)		0.14		
Yes	654 (76.2)			858 (81.9)
No	135 (71.1)			190 (18.1)
Overall	837 (80.1)			1048 (100)

Note: * $p < 0.05$.

3.4. The Association of Media Usage and Preventive Measures Compliance

With the frequent usage of any sources under study, the compliances of the COVID-19-preventive behavior were generally be higher. In terms of information source, the compliances of the COVID-19-preventive behavior were generally higher with the use of information from local health experts. Sample with frequent use of information from health experts demonstrated significant increased compliance in hand hygiene (OR 1.81, 95%CI 1.17–2.79), mask wearing (OR 6.35, 95%CI 2.06–19.57), and household hygiene (OR 5.45, 95%CI 1.80–16.49). Groups using both information from health experts and local government had higher compliance in hand hygiene (OR 5.34, 95%CI 1.07–26.77), household hygiene (OR 1.79, 95%CI 1.26–2.53), and social distancing (OR 1.58, 95%CI 1.14–2.20). The simultaneous use of information from WHO/CDC and local health experts had surged compliance in hand hygiene (OR 12.51, 95%CI 1.40–111.52) and the use of all three sources had improved compliance in hand hygiene (OR 7.26, 95%CI 1.71–30.80). However, sample who only obtained information from the local government press conference had lower compliance in household hygiene (OR 0.21, 95%CI 0.09–0.50) (Table 5).

Table 5. Summaries of univariate logistic regressions (weighted with occupation).

	COVID-19-Preventive Behaviors Odds Ratio (95% C.I.)			
	Hand Hygiene [a]	**Mask Wearing [b]**	**Household Hygiene [c]**	**Social Distancing [d]**
Information Source Mix				
Non-frequent Users	Ref	Ref	Ref	Ref
Frequent Users				
(1) Local Government	1.74 [0.88–3.46]	0.73 [0.29–1.86]	0.21 * [0.09–0.50]	1.12 [0.48–2.62]
(2) WHO/CDC	2.84 [0.55–14.59]	0.22 [0.02–1.97]	1.62 [0.96–2.73]	1.17 [0.72–1.91]
(3) Local Health Experts	1.81 * [1.17–2.79]	6.35 * [2.06–19.57]	5.45 * [1.80–16.49]	1.02 [0.33–3.15]
(1) and (2)	8.32 [0.78–88.98]	5,318,941.81 [0.00-Inf]	0.95 [0.19–4.83]	1.41 [0.35–5.70]
(1) and (3)	5.34 * [1.07–26.77]	11.38 [0.05–2705.24]	1.79 * [1.26–2.53]	1.58 * [1.14–2.2]
(2) and (3)	12.51 * [1.40–111.52]	2.78 [0.17–45.66]	0.99 [0.47–2.10]	2.03 [0.97–4.22]
(1), (2), and (3)	7.26 * [1.71–30.80]	10.98 [0.66–181.67]	1.60 [0.59–4.34]	0.91 [0.37–2.22]
Dissemination Channel Mix				
Non-frequent Users	Ref	Ref	Ref	Ref
Frequent Users				
(1) Information from Workplace	0.87 [0.31–2.43]	21.3 [0.07–6734.46]	0.18 [0.06–0.49]	0.90 [0.35–2.29]
(2) Conventional Media	1.82 [0.26–12.94]	17.51 * [4.56–67.23]	0.38 [0.04–3.28]	0.71 [0.21–2.45]
(3) Social Media	4.77 [0.77–29.77]	64.98 * [4.04–1045.52]	2.46 [0.77–7.80]	1.28 [0.44–3.72]
(1) and (2)	12.48 * [5.37–29.04]	9.18 [0.14–582.53]	0.90 [0.42–1.94]	0.85 [0.46–1.55]
(1) and (3)	10.67 * [4.42–25.79]	5.79 [0.24–141.87]	1.12 [0.53–2.37]	1.56 [0.84–2.88]
(2) and (3)	3.34 [0.79–14.14]	8.29 * [3.57–19.23]	1.88 [0.65–5.44]	1.3 [0.51–3.35]
(1), (2), and (3)	3.10 * [1.87–5.14]	10.14 * [2.44–42.15]	1.45 [0.80–2.62]	1.66 * [1.03–2.69]

[a]. The model was adjusted with gender, education level, job status, occupation, and self-reported chronic diseases. [b]. The model was adjusted with age group, gender, marital status, occupation, and self-reported chronic diseases. [c]. The model was adjusted with age group, gender, marital status, job status, occupation, and self-reported chronic diseases. [d]. The model was adjusted with age group, gender, marital status, job status, and self-reported chronic diseases. Note: * $p < 0.05$

For dissemination channel, improved compliances were observed in groups which had received information from conventional media or social media. Groups with sole use of conventional media and social media reported 17.51 (95%CI 4.56–67.23) and 64.98 (95% CI 4.04–1045.52) odds in complying mask wearing behavior, respectively, while the mix used of the two channels reported 8.29 odds in compliance (95%CI 3.57–19.23). Respondents who frequently used updates from the workplace had significantly boosted compliance in hand hygiene if they had simultaneous use of conventional media (OR 12.48, 95%CI 5.37–29.04) or social media (OR 10.67, 95%CI 4.42–25.79). Group with the mixed use of all three dissemination channels under study had increased compliance in hand hygiene (OR 3.10, 95%CI 1.87–5.14), mask wearing (OR 10.14, 95%CI 2.44–42.15), and social distancing (OR 1.66, 95%CI 1.03–2.69) (Table 5).

4. Discussion

Principal Results

The study was the first of its kind to study the association between COVID-19-preventive behavior compliance, the information sources and dissemination channels during COVID-19. The study highlighted that the self-reported usage of different information sources in these COVID-19 times may result in differences in the compliance of suggested preventive measures. Taken as a whole, the sample population generally demonstrated high compliance in wearing surgical masks and adopted extra hand hygiene measures, whereas social distancing and household hygiene measures were less commonly used as preventive strategies.

The compliance finding has matched the results found in the early phase of outbreak in Hong Kong, which reported that the early compliance rate of enhanced personal hygiene measures reached over 95% (mask wearing: 99.0%; hand washing with hand sanitizer/alcohol gel: 95.8%), but the adoption rate of avoiding social activities was only 64.3% [22]. Comparing the Hong Kong statistics to that of other regions, the compliance of wearing a surgical mask in the Hong Kong sample population was remarkably high. The market research company Ipsos had previously published its study on the increasing mask-wearing trend around the world. Vietnam ranked first with 91% in the compliance of wearing a mask, followed by China and Italy with 83% and 81%, respectively [23]. Our data also showed that the sample population complied with hand hygiene precautions as compared to data collected in mainland China (79.44%) [24]. In other words, mask wearing and hand hygiene compliance in the Hong Kong sample population was higher than other countries, suggesting a high level of COVID-19 awareness [11]. The high level of awareness could be the result of lessons learned from the 2003 Severe Acute Respiratory Syndrome (SARS) outbreak in Hong Kong. During the SARS outbreak, the tendency to wear face masks increased significantly since the start of the outbreak and peaked at 93.9%. Even after the outbreak, over 70% of people stated that they would wear face masks and adopt distancing if new waves of the SARS emerged [25,26]. These could explain the readiness of the Hong Kong public to comply with the suggested preventive measures, especially when COVID-19 was frequently compared to SARS epidemic [27].

Our data showed that females and younger individuals were more likely to comply with the suggested preventive behaviors for the COVID-19. The findings were consistent with an Australia study that indicated that women were more likely to feel responsibility for disease prevention, while an Egyptian study stated that younger age was associated with higher compliance in COVID-19-preventive behaviors [28,29]. However, such differences were not reflected in the demographics of confirmed cases in Hong Kong as the median age of infected persons was 44 and the gender ratio was approximately balanced throughout the epidemic [2] One study pointed out that the risk perceived by blue-collar workers and associate professionals was generally higher [7], but the compliance of preventive measures across different occupations did not seem to follow any particular pattern. Further studies should be conducted to investigate the association between behavioral compliance and the occupation of individuals. The data showed that samples working part-time had higher household hygiene compliance than full-time employees. This may be due to shorter working hours of part-time employment, leading to a longer time of staying at home, and hence, more time for household chores and cleaning. Yet, with the increasing popularity of 'Work from Home' policy, the actual differences between job status should be further investigated as the difference between the groups may diminish.

Among the three information sources studied, press conferences held by health experts was most used by the samples, followed by local government press conference, suggesting that public tend to rely on the frontline and local health authorities and further illustrates the importance of building public trust and collaboration of multi sectors in the community in the course of the epidemic [30,31]. Information provided by the local government and local health experts may effectively work hand-in-hand in tackling such a pandemic. For dissemination channels, the sample population had the highest usage of social media

to access COVID-19-related information, closely followed by conventional media. This contrasted the relative low usage of information from their workplace, despite employees spending significant time on-site, often bearing the risk of COVID-19 infection. A local study reported that sample workers had poor experiences in workplace COVID-19 guidelines, especially regarding the timeliness and transparency of information given [7]. Developing comprehensive workplace policies could help mitigating the risk of COVID-19 spread at workplaces.

The study provided statistically significant data to support the view that frequent users of social media could promote higher odds of complying suggested COVID-19-preventive measures. In promoting health-related preventive strategies, disseminating health and disease-related information online is not a novel idea, but it is obvious that the role of social media has changed over time. During the past SARS outbreak in 2003 and the 2012 Salmonella outbreak, the internet was not as well developed as in 2020, and as the circulation of information on the web was still 'patchy and incomplete' [31], social media played only 'a marginal role' [32]. In recent years, social media has provided concrete benefits to target populations, such as providing public updates for the Zika-virus outbreak [33] whereas social media often triggered self-relevant emotions, such as anger in the Middle East respiratory syndrome outbreak in South Korea, resulting in higher public risk perceptions and encouraging individual preventive measure adoptions [34]. The difference in compliance with respect to social media usage reflected by our data may have demonstrated that the social media platform is now more mature and ready for delivering healthcare information in a timely manner.

Our study has illustrated that social media could be one of the influential public health information dissemination channels and the potential of social media can be further expanded. A previous study, which attempted to analyze the content of the top 100 most widely viewed YouTube videos, reported that less than one-third of the videos mentioned the key preventive measures suggested by the CDC in relation to the COVID-19 pandemic [35]. Although it is undeniable that videos with sole COVID-19 content may not gain sufficient popularity, it would be feasible to seek co-operation with the content creators on these platforms to utilize their popularity as a way to extend the reach of information regarding the preventive measures. The impact of social media and electronic devices may not be bound to preventive strategies, as research has tested the implementation of educational programs, self-assessment tests, and symptom monitoring through mobile applications. Research from the Netherlands welcomed the availability of such information platforms as COVID-19 information updates, and the symptom diary function was highly appreciated, while near 100 participants reached proper healthcare consultations for further care [36]. Not only did such electronic health applications support the community, data obtained from the application via questionnaires also allowed the healthcare workers to build an interactive map by linking the demographic data with the clinical data, thereby generating better insights and close monitoring of the COVID-19 spread.

As concern on the 'infodemic' has been raised during the course of the COVID-19 epidemic, early detection and high responsiveness to public rumors will be of importance to enhance the benefits brought by disseminating information through social media. While building interactive platforms with the aid of social media may allow the government or authorities to safeguard and take up a proactive role to clarify misinformation [37], a list of criteria is proposed to promote responsible public health information updates via social media, including: (1) the preferential use of established professional forums; (2) the use of clear information sources; (3) a declaration of conflict of interest; (4) the use of systematic information verification processes whenever necessary; (5) the use of peer review and feedback forums; (6) the enhancement of the content according to contextual needs with the support of a professional; and (7) the use of a traditional peer review to the extent feasible [38]. Acknowledging the impact of social media on the compliance of protective measures, the potential health benefits of information dissemination via social media may be enhanced with the aid of rapid updates and verified information.

5. Limitations

Firstly, the survey utilized a non-probabilistic sampling approach and the demographic structure of the sample population was different from that of the Hong Kong population [39], which may lead to response bias and undermine the generalizability of findings. As we focus on the working adults, to minimize the bias, all responses were weighted by the stratified proportions of five occupation groups of the general population. Secondly, the cross-sectional survey was conducted online; the proportion of the sample recruited through social networks may be more likely to report themselves as frequent users of social media. Additionally, respondents may be biased towards the dissemination channel of the research, leading to potential design bias and response bias. To enhance the coverage of those participants from both frequent or infrequent user of social media, the promotion of project was conducted through various ways, i.e., via face-to-face invitation, specific email invitation, and dissemination of a survey link through mass social media (Facebook, Instagram, WhatsApp). Yet, the proportion of social media user with 80.1% in this study was similar to the local government statistics on the social media participation in Hong Kong (83%). Another local study which recruited their study samples via referral of local district councilors had demonstrated similar usage pattern on obtaining COVID-19 updates through social media (93.8%) [21,22]. Future research may repeat the study with alternative methodologies, such as a telephone survey, to provide more evidence on current findings.

Thirdly, the study attempted to conduct multivariate logistic regression with all the information sources under study together, but collinearity between media usages was observed. One of the possible explanations is that within the same dissemination channel, the user may obtain information from diverse sources simultaneously, while it would be difficult to credit each information source distinctively. This study had, therefore, computed new categorical variables to illustrate the mix use of information source and dissemination channel respectively. Groups created within the variable were independent to each other and the group with non-frequent use of media studied was regarded as the baseline. The interaction between different information sources and channels may be explored later in future studies. Regardless of its limitations, this study is the first of its kind to compare information sources and COVID-19-preventive behaviors with a large sample (n = 1048) to provide statistical power.

This study is an early and timely response to the rapidly emerging epidemic and recorded the public reactions before the official pandemic declaration by the WHO. Despite the captioned limitations and possible sampling flaw, the study captured how the Hong Kong working population reacts in the bud of a public health crisis and highlighted the importance of facilitating trusted and effective information dissemination to encourage community participation to halt an epidemic.

6. Conclusions

The majority of the community relies on social media as the source of COVID-19 information. Disseminating disease information and promoting protective measures through social media are crucial to educate and remind the public of its compliance with COVID-19-preventive strategies. Social media is an effective information dissemination channel to spread public health updates in a timely manner, especially of information relating to COVID-19.

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Abbreviations

CDC	United States Centre for Disease Control and Prevention
COVID-19	Coronavirus disease
HK	Hong Kong
SARS	Severe Acute Respiratory Syndrome
WHO	World Health Organization

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