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Knowledge, Attitudes and Practices, and Personality Predictors of Risk Taking towards COVİD-19 among University Students in Kenya

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ABSTRACT

The purpose of this study was to examine the knowledge, attitudes, and practices (KAP) of university students towards COVID-19, and further, some personality characteristics that exacerbate the risk of infection. Out of the 300 university students based in Mombasa, Kenya, targeted in the online study, 219 submitted their filled questionnaires. Data was analyzed quantitatively using SPSS (v.25). Two-way ANOVA and regression models were used to analyze the data. Findings show high knowledge levels and low-risk behaviors towards COVID-19 but unhealthy attitudes especially among women aged 20-29 who also reported higher extroversion, and positive attitudes towards social interactions during COVID-19. Basic knowledge was predicted by age, gender, extroversion, public self-consciousness, and high-risk perception while advanced knowledge was predicted by basic knowledge. Low-risk perception was predicted by age, basic knowledge, and positive attitudes towards social interaction during COVID-19. Age, extroversion and risk perception predicted attitudes about social interactions. Preventive practices were in turn predicted by gender, risk perception, attitudes towards social interactions, extroversion and lack of premeditation. Findings of the study raise interest about university students' KAP, underlying personality dynamics that predict risk taking towards COVID-19, and appropriate COVID-19 messaging to affect attitudes.

Keywords:
Attitudes; COVID-19; knowledge; personality; practices; university students.

1. Introduction

Since 2020 when the coronavirus disease (COVID-19) was declared a pandemic by the World Health Organization, unprecedented changes in people's lives have been witnessed. Despite low initial numbers of COVID-19 infections in sub-Saharan Africa, the numbers began to rise. By then, community transmission of COVID-19 was detected by the WHO and more fatalities were duly expected. To control the pandemic, almost all countries implemented public measures which included border closures, social isolation, and school closures among others. In Kenya, the COVID-19 National Emergency Response Committee (NERC) was launched, chaired by the Ministry of Health (MoH) to implement initial prevention and mitigation measures. The measures included curfews and cessation of movements and health protocols including social distancing, closing educational institutions, hand washing, etc (MoH, 2020). As of January 2021, Kenya had recorded 97,398 confirmed infections and 1,694 deaths due to COVID-19 (WHO, 2021).

While night curfews are still in effect, Kenya has entered a phased reopening of schools and universities for face to face learning. While mass vaccination remains a distant reality, the management of the outbreak requires adherence to the recommended measures. The measures are in turn affected by the knowledge, attitudes, and practices (KAP) of the population (Aldukhayel et al., 2020). Studies (Austrian et al., 2020; Hatabu

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et al., 2020) indicate that sufficient KAP ensures that the population does not underestimate the situation or stigmatize those infected. The demographic profile of the population is an important measure for adherence to protocols. For instance, most university students are emerging adults, a stage corresponding to independence and personality development in the cognitive, physical, affective, sexual, family, and social domains; and also heightened risk-taking behavior (Alves et al., 2020). By their educational background, university students occupy an enviable position in their communities and hence own power to influence their communities' health, either through their own health choices or decision-making influences. Consequently, this special demographic segment is responsible for a wide range of preventive measures through providing knowledge and adopting protective measures.

Underlying psychological traits are expected to shape behaviour. As they develop separate identities separate from their families, university students' behaviour is more likely to be influenced by what is acceptable by society. Therefore, how they carry themselves in public, i.e. their public self-awareness is assumed to influence behaviour (including risk behaviour). The extent to which such behaviour is manifested is hypothesised to depend on underlying personality characteristics including extroversion and lack of premeditation. This is in line with studies which have found personality influences of COVID-19 risk perception including extroversion, conscientiousness and self-consciousness (Al-Omiri et al., 2021; Aschwanden et al., 2021; Hatabu et al., 2020); and optimism/pessimism and self-enhancement tendency (Sakakibara & Ozono, 2020). Further, demographic characteristics including age, gender, education level and place of residence, among others, predict KAP (Aldukhayel et al., 2020; Alves et al., 2020; Peng et al., 2020). In Kenya, studies indicate significantly higher knowledge of COVID-19 among females than males (Austrian et al., 2020; Karijo et al., 2020).

Whereas no published studies in Kenya on KAP have specifically targeted university students (Austrian et al., 2020; Karijo et al., 2020; Muriuki et al., 2020; Twaweza, 2020), they expose gaps that are cause for concern. They include findings that few Kenyans observe social distancing and mask wearing, self-medicate when feeling symptoms or ignore symptoms (MoH, 2020); feel at low risk and have misconceptions about COVID-19 including its origins and possible remedies (Karijo et al., 2020; Twaweza, 2020) and use social media as sources of information (Karijo et al., 2020; Muriuki et al., 2020). Studies among university students across the globe show high knowledge levels but inconsistent attitudes and practices (Aldukhayel et al., 2020; Alves et al., 2020) and hence provides justification for a study of this nature among university students in Kenya for comparisons. Additionally, studies on KAP have not exhaustively examined the underlying psychological predictors.

Considering that university students are more independent, yet retaining close ties with their families, they are more likely to be asymptomatic with the possibility of spreading viruses to the high-risk population by virtue of their engagement in vigorous activities and more opportunities to get into contact with others. Knowing the states of KAP toward COVID-19 among university students and further analyzing psychological factors that underlie risk behavior can help in planning countermeasures and developing appropriate risk communication strategies during COVID-19 and other pandemics. The inclusion of psychological attributes to the study of KAP adds a new dimension in understanding innate reluctance and resistance to adhere to government enforced COVID-19 restrictions.

Therefore this study sought to:

1. Evaluate knowledge, attitudes, and practices (KAP) towards COVID-19.
2. Assess the extent to which personality factors of extroversion, lack of premeditation, and public self-consciousness predict knowledge, attitudes, and practices.
3. Determine demographic group differences in knowledge, attitudes, and practices.

2. Methodology

2.1 Research Model

A cross-sectional research design using an anonymous online survey was employed for the study. The study entailed collecting information on students' knowledge, attitudes and practices at a specific point in time to establish relationships between the variables of interest.

2.2 Research Sample and Procedure

The survey targeted self-sponsored university students resident in Mombasa, Kenya. No financial incentive was provided. Out of the target of 300, a total of 219 students returned their completed questionnaires. The sample included undergraduate students from Year 1-4 residing in Mombasa, Kenya during the period of the government-enforced lackdown ranging in age from 20-45 years. Informed consent was obtained from each participant on the first page of the online questionnaire and participation was voluntary. Data were collected using Google forms in February 2021 during the 11th month of government-enforced lockdowns due to COVID-19 via a link posted on students' social media groups (Whatsapp).

2.3 Data Collection Tools

KAP questionnaire: The tool was developed and used by Hatabu et al. (2020) was modified and used for this study. The questionnaire is divided into six categories: demographic information (age and gender), knowledge, attitudes, practices, extroversion and public self-consciousness. Responses to all categories save demographic data were made on a five point Likert scale (1 = strongly disagree; 5 = strongly agree). Negative items were reverse-coded. The reliability indices for the sub-scales were: KAP = 0.72; Extroversion = 0.68; Public self-consciousness = 0.66. These reliability indices were found to be closely similar to Hatabu et al. (2020) who used a similar instrument in Japan.
Lack of premeditation: Four items of the lack of premeditation sub-scale of the Short UPPS-P Impulsive Behaviour Scale (Cyders et al., 2014) were used on a four point Likert scale from 1 = strongly agree to 4 = strongly disagree (Cronbach alpha= .88). Sample items include "My thinking is usually careful and purposeful" (reverse coded); I like to stop and think things over before I do them"; I tend to value and follow a rational "sensible" approach to things"; and, "I usually think carefully before doing anything" (reverse coded).

2.4 Data Analysis

Data pre-processing included testing for normality which was examined with skewness and kurtosis. Data were analyzed using two-way ANOVA, multiple linear regression and logistic regression analyses. For the regression analyses, autocorrelations were tested using Durbin Watson statistic and values of 2 ±0.2 were regarded as appropriate. Homogeneity was tested using Levene test of the equality of variance. Acceptance of the skewness and kurtosis values for the main values of interest was in line with recommendations of -2/+2 and -7/+7 respectively by Hair et al. (2010).

2.5. Ethical considerations

This study was approved by the National Commission for Science, Technology and Innovation, Kenya (Licence No. 843229) on 20.01.2021.

3. Findings

University students' knowledge, attitudes and practices

A total of 216 participants were included in the analyses after removing three participants due to incomplete questionnaires. The participants' age ranged from 19-45 years (M = 23.5, SD = 3.08) and 58.3% were women.

Descriptive statistics of KAP showed that university students tended towards having COVID-19 information and staying safe. Responses on consolidated KAP ranged from 65.7%-96.3% for attitudes about COVID-19 risk and COVID-19 basic knowledge respectively (Table 1). Item level analyses also indicated high scores when split into low/high based on a theoretical median of 2.5. The highest scores were reported on COVID-19 basic knowledge items especially "I know it is important to avoid enclosed spaces, crowded areas and close situations (98.1%); "I know that COVID-19 is spread by respiratory droplets of infected persons (98.1%); and "I know COVID-19 is airborne" (99.1%). The majority of respondents reported high advanced knowledge concerning signs of COVID-19: fever and cough (86.1%), taste disorders (96.8%), smell disorders (93.1%), and the likelihood of developing severe symptoms and death (92.1%). High scores were also reported on COVID-19 preventive practices especially washing hands (95.4%) and wearing masks (94.4%). However, concerning

attitudes, 44.4% would still travel if they got a cheap ticket; participate in gatherings and parties (43.5%); have meals with non-family people on the same table (49.1%); think that COVID-19 restrictions are excessive (44.9%) and want bars opened (45.8%). Cumulatively, 34.3% had low risk perception of COVID-19, 22.7% had positive attitudes towards social interactions during the period and up to a third (32.9%) reported unsafe preventive practices. Findings, therefore, show that despite having high basic information, attitudes towards COVID-19 restrictions and prevention remain unhealthy.

Table 1. *Descriptive Information of Measured Variables (Consolidated)*

Variables	Min	Max	Mean	SD	Skewness	Kurtosis
Age	20	45	23.5	3.08	1.22	-.51
Gender	0.00	1.00	.42	.49	.34	-1.90
COVID-19 basic knowledge	8.00	20.00	17.61	2.14	-1.65	5.50
COVID-19 advanced knowledge	7.00	20.00	15.78	2.61	-.71	1.66
COVID-19 risk perception	4.00	14.00	8.00	2.68	.12	-.87
Attitudes about social interactions during COVID-19	5.00	25.00	12.42	4.39	.25	-.08
COVID-19 preventive practices	17.00	27.00	21.65	2.39	.23	-.38
Extraversion	10.00	24.00	16.90	2.81	-.23	-.26
Lack of premeditation	4.00	16.00	7.50	2.51	1.15	2.60
Public self-consciousness	7.00	25.00	15.97	4.02	.06	-.52

*N = 216. Age: 0 = 20-29 (75.9%), 1 = 30+ (24.1%). Gender: 0 = Female (58.3%), 1 = Male (41.7%). COVID-19 basic knowledge: 0 = Low (3.7%), 1 = High (96.3%). COVID-19 advanced knowledge: 0 = Low (13.9%), 1 = High (86.1%). COVID-19 risk perception: 0 = Low = (34.3%), 1 = High (65.7%). Attitudes about social interactions during COVID-19: 0 = Safe/Negative (77.3%), 1 = Risky/Positive (22.7%). COVID-19 preventive measures: 0 = Safe (67.1%), 1 = Risky = (32.9%). Extroversion: 0 = Low (51.4%), 1 = High (48.6%). Lack of premeditation: 0 = Low (91.2%), 1 = High (8.8%). Public self-consciousness: 0 = Low (55.1%), 1 = High (44.9%).

Group differences in university students' KAP and psychological characteristics

Two-way ANOVA (age and gender) was conducted to explore group differences in KAP and psychological variables. An interaction was found on COVID-19 basic knowledge, F(1) = 4.61, p = .033. Group means indicate that 20-29 women had higher basic knowledge (M = 17.87, SD = 1.42) than those 30 years and above (M = 17.81, SD = 1.80) while men 30 years and above had higher basic knowledge (M = 18.35, SD = 1.73) compared to the 20-29 years group (16.94, SD = 2.92). Significant age differences were found in attitudes about social interactions during COVID-19, F(1) = 11.22, p = .001 with students between 20-29 years reporting more positive attitudes (M = 12.99, SD = 4.45) compared to students 30 years and above (M = 10.62, SD = 3.68). Significant age differences were found in extroversion, F(1) = 8.49, p = .004 with students between 20-29 years reporting higher extroversion (M = 17.22, SD = 2.61) compared to those 30 years and above (M = 15.88, SD = 3.20). An interaction was found in public self-consciousness, F(1) = 7.21, p = .008. Women between 20-29 years reported higher public self-consciousness (M = 15.96, SD = 3.13) compared to those 30 years and above (M = 13.53, SD = 3.29); while men 30 years and above had higher public self-consciousness (M = 17.20, SD = 4.11) compared to their younger counterparts (M = 16.20, SD = 4.94). Only gender significantly predicted lack of premeditation, F(1) = 5.44, p = .021 with higher reports among men (M = 8.07, SD = 2.87) compared to women (M = 7.10, SD = 2.13).

Factors predicting university students' COVID-19 knowledge levels

Linear regressions were conducted to explore predictors of university students' basic and advanced knowledge (Table 2). For basic knowledge, age, gender, extroversion, public self-consciousness and COVID-19 risk perception were significant predictors. The model was significant, F(7,208) = 11.74, p = .000, with a predictive ability of .28. Findings show that highly extroverted female students aged 30 years and above with low lack of premeditation and high COVID-19 risk perception were likely to have more basic knowledge than others.

For advanced knowledge, the only significant explanatory variable was having COVID-19 basic information. The overall model was also significant, F(8, 207) = 9.31, p = .000, with a predictive ability of .27.

Table 2. *Linear Regression Models for Knowledge Level*

a) Linear regression model for COVID-19 basic knowledge	Unstandardized Coefficients			
	B	SE	*t*	*p*
Constant	14.39	1.16	12.46	.000
Age	.79	.31	2.52	.012
Gender	-.56	.26	-2.16	.032
Extraversion	.22	.05	4.61	.000
Public self-consciousness	.12	.03	3.76	.000
Lack of premeditation	-.06	.05	-1.21	.228
COVID-19 risk perception	.23	.06	4.02	.000
Attitudes about social interactions during COVID-19	.06	.04	1.68	.095
b) Linear regression model for COVID-19 advanced knowledge				
Constant	7.83	1.89	4.13	.000
Age	-.46	.39	-1.18	.239
Gender	-.22	.33	-.67	.505
Extroversion	-.12	.06	-1.92	.056
Public self-consciousness	-.01	.04	-.24	.812
Lack of premeditation	.11	.07	1.63	.104
COVID-19 basic knowledge	.61	.09	7.04	.000
COVID-19 risk perception	.03	.07	.35	.729
Attitudes about social interactions during COVID-19	.07	.05	-1.60	.111

Factors predicting university students' COVID-19 related attitudes

University students' attitudes were measured as COVID-19 risk perception and attitudes towards social interactions during COVID-19 (Table 3). For COVID-19 risk perception, age, COVID-19 basic knowledge and attitudes about interactions during COVID-19 were significant predictors. The model was significant, $F(8,207) = 15.52$, $p = .000$, with a predictive ability of .38. Older students with high basic knowledge were more likely to perceive COVID-19 as more risky while more positive attitudes towards social interactions during COVID-19 were associated with low COVID-19 risk perception. For positive (unhealthy) attitudes towards social interactions during COVID-19, age, extroversion and COVID-19 risk perception were significant predictors. The model was significant, $F(8,207) = 17.22$, $p = .000$, and had a predictive ability of .40. Younger students high in extroversion and low COVID-19 risk perception had more permissive attitudes towards social interaction during COVID-19.

Table 3. *Linear Regression Models for Attitudes*

a) COVID-19 risk perception	Unstandardized Coefficients			
	B	SE	*t*	*p*
Constant	5.98	1.82	3.29	.001
Age	1.08	.36	2.98	.003
Gender	-.17	.31	-.55	.586
Extroversion	.05	.06	.83	.410
Public self-consciousness	.07	.04	1.84	.068
Lack of premeditation	.05	.06	.85	.397
COVID-19 basic knowledge	.33	.09	3.74	.000
COVID-19 advanced knowledge	.02	.07	.35	.729
Attitudes about social interactions during COVID-19	-.31	.04	-8.23	.000
b) Attitudes towards social interaction during COVID-19				
Constant	9.12	2.93	3.12	.002
Age	-2.00	.58	-3.44	.001
Gender	.02	.50	.05	.964
Extroversion	.26	.09	2.90	.004
Public self-consciousness	-.07	.06	-1.10	.273
Lack of premeditation	.09	.10	.891	.374
COVID-19 basic knowledge	-.11	.15	-.79	.433
COVID-19 advanced knowledge	-.17	.11	-1.60	.111
COVID-19 risk perception	-.80	.10	-8.23	.000

Predicting university students' COVID-19 related preventive risk practices

A logistic regression model for COVID-19 risk practices was constructed using demographic characteristics of age and gender; psychological variables; knowledge and attitudes. The model explained 28% variance in practices (Nagelkerke R square = .28).

The determinant factors for risky practices were gender, low COVID-19 risk perception, having positive attitudes towards social interactions during COVID-19, extroversion and lack of premeditation. The odds of male students engaging in risky practices was 3.80 times greater than female students (Table 4). Findings show that male students with low COVID-19 risk perception and positive attitudes towards social interactions during COVID-19, and who were high in extroversion were more likely to engage in high risk COVID-19-related preventive practices. Interestingly, the odds ratio (OR) of lack of premeditation was <1 suggesting that the more individuals were able to think about their actions, the more likely they were to engage in safe COVID-19-related behaviours.

Table 4. *Logistic Regression Model for COVID-19 Risk Practices*

							95% CI for EXP(B)	
	B	SE	Wald	df	Sig.	Exp(B)	Lower	Upper
Age	-.08	.42	.04	1	.849	.92	.40	2.11
Gender	1.34	.37	13.15	1	.000	3.80	1.85	7.83
COVID-19 basic knowledge	-.22	.87	.06	1	.803	1.24	.23	6.81
COVID-19 advanced knowledge	-.42	.48	.77	1	.380	.66	.26	1.68
COVID-19 risk perception	-.92	.36	6.64	1	.010	2.51	1.25	5.07
Attitudes towards social interaction in COVID-19	.82	.40	4.30	1	.038	2.67	1.05	4.92
Extroversion	1.08	.36	9.20	1	.002	2.95	1.47	5.93
Public self-consciousness	.58	.34	2.96	1	.085	1.79	.92	3.49
Lack of premeditation	-2.17	.87	6.30	1	.012	.11	.02	.62
Constant	-2.44	.95	6.58	1	.010	.09		

4. Conclusion and Discussion

This study was done to examine university students' KAP and selected personality factors that predict risk taking towards COVID-19. Findings reveal the highest scores on COVID-19 basic and advanced knowledge in general. Specifically, knowledge on avoiding enclosed spaces, crowded areas, and close situations, and how COVID-19 is spread (airborne, respiratory droplets), and symptoms of COVID-19 (smell and taste disorders) is reported. High scores were also reported on prevention practices especially washing hands, and wearing masks. The high scores may be attributed to the 'COVID-19 information explosion' since the first cases were reported in Kenya. For the past year, print and electronic media that are easily accessible to university students have repeated the message of COVID-19 infection and prevention and it is likely that university students understand the importance of adhering to the government's directives on the prevention of COVID-19. This finding corroborates similar studies among university students in Japan (Hatabu et al., 2020) which indicate an understanding of the importance of the 3Cs (avoiding enclosed spaces, crowded areas, and close situations); Portugal (Alves et al., 2020), and China (Peng et al., 2020). Further, the findings corroborate studies among the general population in Kenya (Austrian et al., 2020; Muriuki et al., 2020; Twaweza, 2020) which show high knowledge of transmission and symptoms.

However, concerning attitudes, up to half the sample reported low COVID-19 risk perception as well as positive attitudes towards social interactions during the COVID-19 period. Between 40-45% of respondents would travel if a cheap ticket was available, participate in gatherings and have meals with non-family people on same table. They also saw the COVID-19 restrictions as excessive and saw no reason to keep bars and other entertainment places closed. In line with studies among the general population in Kenya, this finding shows that more knowledge has not been transformed into appropriate attitudes towards COVID-19. For instance, Austrian et al. (2020) found that only 35% of the sample in Nairobi's urban informal settlements perceived that they were at risk of infection while both Karijo et al. (2020) and Twaweza (2020) found low risk perception despite high knowledge. This can be explained in light of the finding by Twaweza, 2020) on misconceptions about origins, transmission and remedies of COVID-19. Poor attitudes about COVID-19 have not been helped

by reports of corruption in the management of funds (Igunza, 2020) and police brutality in the enforcement of measures (Bearak & Ombuor, 2020) while political leaders continue flouting measures by addressing large public rallies countrywide.

Among this sample, basic knowledge was predicted by age, gender, extroversion, public self-consciousness and high COVID-19 risk perception. More specifically, being female over 30 years, extroverted, with high public self-consciousness and high risk perception of COVID-19 predicted having high basic knowledge; while being male was associated with lower basic knowledge. The finding on the significant prediction of gender supports previous studies that indicate significantly higher knowledge among female students (Aldukhayel et al., 2020; Alves et al., 2020; Hatabu et al., 2020; Karijo et al., 2020; Peng et al., 2020). The significance of the psychological aspect of extroversion seems to suggest that being extroverted allows one to gain information from others. This aspect aligns with harmony seeking (Sakakibara & Ozono, 2020) which is positively related to preventive behaviors. Further, the finding on the significant prediction of public self-consciousness indicates that basic knowledge among this sample can be explained by social pressure as opposed to the individual.

COVID-19 risk perception was predicted by age, basic knowledge, and positive attitudes towards social interactions during COVID-19. Being 30+ years and having positive attitudes towards social interaction during COVID-19 reduced risk perception while high basic knowledge increased risk perception. Attitudes about social interactions during COVID-19 were predicted by age, extroversion, and COVID-19 risk perception. Highly extroverted younger students with low COVID-19 risk perception were more likely to have positive attitudes towards socializing during COVID-19. This study, like Aldukhayel et al. (2020) shows higher risk perception among the oldest group and further highlights the role of macro factors e.g. media in developing attitudes among the population (Igunza, 2020). Additionally, this finding points to a contradiction between attitudes and practices – that individuals can accept to act proactively despite inconsistent attitudes, maybe through violent enforcement of COVID-19 measures (Bearak & Ombuor, 2020). This cognitive dissonance is at the root of difficulties in prevention measures faced by the Kenyan government.

Findings show that university students who were male with low COVID-19 risk perception, positive attitudes towards social interaction, high in extroversion and low in premeditation were more likely to engage in risky COVID-19- related preventive practices. The gender difference in preventive measures supports Sakakibara & Ozono (2020) whose findings in a Japanese sample show that being female was associated with mask wearing; and Peng et al., (2020) in China who found higher scores on practice related to COVID-19 among female students. Further, Hatabu et al., (2020) found gender, extroversion, basic knowledge to significantly predict self-restraint practices. The significant prediction of extroversion and lack of premeditation indicates the important gap to be filled by personality characteristics and supports findings of earlier studies (Al-Omiri et al., 2020; Aschwanden et al., 2021) that found higher extroversion to predict more acceptance and application of precautions to avoid infections. However, extroversion seems to play a dual role –it is associated with both basic knowledge and risky practices risky practices. The significant role of attitudes in prevention is in line with the finding by Peng et al., (2020) and Aldukhayel et al. (2020) of a positive relation between attitudes and practice.

5. Limitations and Recommendations

The usefulness of this study is in its application to COVID-19 prevention policy as educational institutions reopen and compensates for the absence of studies among Kenyan university students. However, the study has some limitations. First, though practical in the COVID-19 context, the lack of random sampling may present challenges in generalizing the findings to other populations. Secondly, age and gender were the only demographic factors assessed for comparisons. Since human behavior is multi-influenced, future studies may incorporate other demographic and environmental factors. Thirdly, the cross-sectional nature of the study does not examine causality and trends of KAP which a longitudinal study could. Fourth, responses to items were self-reported with the likelihood of social desirability bias.

Beyond demographic factors, results of this study show that KAP are associated with psychological factors of extraversion, lack of premeditation and public self-consciousness. Therefore, this study supports previous research on the relation between personality and KAP and adds to the body of knowledge on pandemic-

related health behaviours. COVID-19 and other pandemic management needs to take into consideration personality factors in the design and application of public health messages and personality should be included in models that predict COVID-19 and other future pandemics.

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Research Approval

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