

**ANXIETY, DEPRESSION AND INSOMNIA DURING COVID - 19 PANDEMIC
AMONG THE PUBLIC IN MALAYSIA: THE ASSOCIATION WITH
KNOWLEDGE, ATTITUDE AND PRACTICE (KAP), AND SOCIAL MEDIA
ADDICTION.**

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**DISSERTATION SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER IN
PSYCHOLOGICAL MEDICINE**

FACULTY OF MEDICINE

UNIVERSITY OF MALAYA

KUALA LUMPUR

2021

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ABSTRACT

ANXIETY, DEPRESSION AND INSOMNIA DURING COVID - 19 PANDEMIC AMONG THE PUBLIC IN MALAYSIA: THE ASSOCIATION WITH KNOWLEDGE, ATTITUDE AND PRACTICE (KAP), AND SOCIAL MEDIA ADDICTION.

Background: The COVID-19 pandemic caused severe distress to the government and the public. The community had to adapt to the movement control order, impacting social interaction, employment, and schooling. The public's knowledge, attitude, and practice (KAP) of the pandemic and possibly frequent social media usage during sudden and prolonged social isolation might affect one's mental health.

Objectives: The study measured anxiety, depression and insomnia in the participants and its association with knowledge, attitude, practice (KAP) and social media usage during the pandemic.

Methods: This cross-sectional online survey study was conducted between April 2020 and June 2020. The participants were from the public who could understand and read adequate Malay or English, and ≥ 18 years old.

A total of 353 participants responded and were recruited in the online survey. The participants were assessed using the Knowledge, Attitudes, and Practices towards COVID-19 Pandemic (KAP), the Social Media Addiction during COVID-19 pandemic (SMACOP), Insomnia Severity Index, Generalized Anxiety Disorder Scale – 7 (GAD-7), and Patient Health Questionnaire – 9 (PHQ-9). In the KAP, scores of 13 and below were considered low,

while scores more than 13 were adequate. The cut-off point for depression is ≥ 5 , and for anxiety is ≥ 6 . The multivariate logistic regression analysis was used for the purpose to explore the influential factors.

Results: The average age of the participants was 42 years old, and more than half were female (63.5%). Two-thirds of the participants were Chinese, followed by Indian (22.1%), and only about 12% were Malay; 77% of the individuals were still working. Most of the participants were married, and more than 70% had tertiary educational levels and above.

More than half the participants (77.3%) were equipped with adequate KAP towards this pandemic and about half of them (45.6%) were classified as social media addicts. There were a considerably high proportion of them had insomnia (34.0) while in 32.0% of the participants experienced symptomatic depression. Anxiety-wise, a total of 89 individuals (25.2%) had symptomatic anxiety.

The total KAP was significantly correlated with total insomnia ($\rho = -0.211$; $p < 0.01$), anxiety ($\rho = -0.187$; $p < 0.01$), and depression ($\rho = -0.169$; $p < 0.01$) symptoms. The total social media addiction was fair to moderately correlated with having insomnia ($\rho = 0.315$; $p < 0.01$), anxiety ($\rho = 0.318$; $p < 0.01$), and depression ($\rho = 0.244$; $p < 0.01$). Multivariate analysis revealed that insomnia was significantly related to KAP and SMACOP (95% CI: -0.0098, -0.007; $p = 0.025$) and (95% CI: 0.044, 0.087) respectively. For anxiety symptoms, there was significant association with KAP (95% CI: -0.119 to -0.019), SMACOP (95% CI: 0.057, 0.104), age (95% CI: -0.021, -0.008), and being female (95% CI: 0.063, 0.408). For depression symptoms, there was significant association with SMACOP (adjusted B = 0.048, 95% CI: 0.025, 0.070), and age (adjusted B = -0.018, 95% CI: -0.025, -0.011).

Conclusions: There is significant prevalence of anxiety, depression and insomnia among the public during the COVID-19 pandemic. Knowledge, attitudes, and practices (KAP) regarding the COVID-19 pandemic are crucial in determining the risk of developing mental health issues. The higher the levels of knowledge, attitudes, and practices towards COVID-19, the lower the levels of anxiety and insomnia among the public during the COVID-19 pandemic. Misinformation and disinformation adversely affect psychological wellbeing. The higher the levels of social media addiction, the higher the levels of anxiety, depression and insomnia among the public during the COVID-19 pandemic. Thus, all relevant authorities play a pivotal role in disseminating and monitoring facts and misinformation to the general public.

ABSTRAK

KEGELISAHAN, KEMURUNGAN, DAN INSOMNIA SEPANJANG PANDEMIK COVID-19 DI KALANGAN MASYARAKAT DI MALAYSIA: HUBUNGAN DENGAN PENGETAHUAN, SIKAP, DAN AMALAN (KAP), SERTA KETAGIHAN MEDIA SOSIAL

Latar Belakang: Pandemik COVID-19 menyebabkan kesusahan yang teruk kepada kerajaan dan orang ramai. Masyarakat terpaksa menyesuaikan diri dengan perintah kawalan pergerakan, interaksi sosial, pekerjaan, dan persekolahan. Pengetahuan, sikap dan amalan (KAP) orang ramai tentang pandemik dan kemungkinan penggunaan media sosial yang kerap semasa pengasingan sosial secara tiba-tiba dan berpanjangan mungkin menjejaskan kesihatan mental seseorang individu.

Objektif: Kajian ini mengukur kegelisahan, kemurungan dan insomnia pada peserta dan hubungannya dengan pengetahuan, sikap, amalan (KAP) dan penggunaan media sosial semasa pandemik.

Kaedah Kajian keratan rentas tinjauan online ini telah dijalankan antara April 2020 dan Jun 2020. Para peserta adalah daripada orang awam yang boleh memahami dan membaca bahasa Melayu atau Inggeris, dan berumur ≥ 18 tahun.

Seramai 353 peserta menjawab dan telah direkrut dalam tinjauan online ini. Para peserta dinilai menggunakan Pengetahuan, Sikap dan Amalan terhadap Pandemik COVID-19 (KAP), Ketagihan Media Sosial semasa pandemik COVID-19 (SMACOP), Indeks Keterukan Insomnia, Skala Gangguan Kebimbangan Umum – 7 (GAD-7), dan Soal Selidik Kesihatan Pesakit – 9 (PHQ-9). Dalam KAP, markah 13 dan ke bawah dianggap rendah,

manakala markah lebih daripada 13 adalah mencukupi. Tahap kemurungan ialah ≥ 5 , dan untuk kebimbangan ialah ≥ 6 . Analisis regresi logistik multivariate digunakan untuk tujuan mengenalpasti faktor yang mempengaruhi semua ini.

Keputusan: Umur purata peserta adalah 42 tahun, dan lebih daripada separuh adalah perempuan (63.5%). Dua pertiga daripada peserta adalah Cina, diikuti oleh India (22.1%), dan hanya kira-kira 12% adalah Melayu; 77% daripada individu masih bekerja. Kebanyakan peserta telah berkahwin, dan lebih daripada 70% mempunyai tahap pengajian tinggi dan ke atas.

Lebih separuh daripada peserta (77.3%) telah dilengkapi dengan KAP yang mencukupi untuk menghadapi pandemik ini dan kira-kira separuh daripada mereka (45.6%) diklasifikasikan sebagai penagih media sosial. Terdapat sebahagian besar daripada mereka mengalami insomnia (34.0) manakala dalam 32.0% daripada peserta mengalami gejala kemurungan. Dari segi kegelisahan, sejumlah 89 individu (25.2%) mengalami gejala kegelisahan.

Jumlah KAP berkait dengan ketara dengan jumlah insomnia ($\rho = -0.211$; $p < 0.01$), kegelisahan ($\rho = -0.187$; $p < 0.01$), dan gejala kemurungan ($\rho = -0.169$; $p < 0.01$). Jumlah ketagihan media sosial berkait dengan sederhana dengan insomnia ($\rho = 0.315$; $p < 0.01$), kegelisahan ($\rho = 0.318$; $p < 0.01$), dan kemurungan ($\rho = 0.244$; $p < 0.01$). Analisis multivariate menunjukkan bahawa insomnia berkait secara ketara dengan KAP dan SMACOP (95% CI: -0.0098, -0.007; $p = 0.025$) dan (95% CI: 0.044, 0.087) masing-masing. Untuk gejala kegelisahan, terdapat kaitan yang ketara dengan KAP (95% CI: -0.119 hingga -0.019), SMACOP (95% CI: 0.057, 0.104), umur (95% CI: -0.021, -0.008), dan jantina perempuan (95% CI: 0.063, 0.408). Untuk gejala kemurungan, terdapat kaitan yang ketara

dengan SMACOP (B diselaraskan = 0.048, 95% CI: 0.025, 0.070), dan umur (dilaraskan B = -0.018, 95% CI: -0.025, -0.011).

Kesimpulan: Kejadian kebimbangan, kemurungan dan insomnia adalah ketara dalam kalangan orang ramai semasa pandemik COVID-19. Pengetahuan, sikap dan amalan (KAP) berkaitan pandemik COVID-19 adalah penting dalam menentukan risiko mengidapi isu kesihatan mental. Semakin tinggi tahap pengetahuan, sikap dan amalan terhadap COVID-19, semakin rendah tahap kebimbangan dan insomnia dalam kalangan orang ramai semasa pandemik COVID-19. Maklumat salah memberi kesan buruk kepada status kesihatan mental. Semakin tinggi tahap ketagihan media sosial, semakin tinggi tahap kebimbangan, kemurungan dan insomnia di kalangan orang ramai semasa pandemik COVID-19. Justeru, semua pihak berkuasa yang berkaitan memainkan peranan penting dalam memantau fakta dan mengawal penyebaran maklumat salah kepada masyarakat umum.

ACKNOWLEDGEMENTS

Here, I would like to take the opportunity to express my utmost gratitude to both my supervisors Associate Professor Dr. Ng Chong Guan, and Associate Professor Aili Hanim binti Hashim. Thank you for their continuous and never-ending support and patience throughout their guidance for the completion of this research study.

My appreciation goes out towards all the academic staffs in the program of Masters of Psychological Medicine, University Malaya. Thank you for always giving me a chance to learn from my mistakes.

A very big thank you to my batch mates in Masters of Psychological Medicine, University Malaya; and my colleagues in Psychological Medicine Department, University Malaya Medical Centre. Thank you for making work and study life enjoyable.

Thank you to Mr. Ng Yit Han for his patience, teaching, and guidance in the area of knowledge – research statistics.

Most importantly, I would like to thank God for his never-ending provision in my life. Thank you for His blessings upon me by giving me my family members (late-father, Lim Chuan Hoi; mother, Tan Wee Sim; elder brother, Lim Kuok Hau; and youngest sister, Lim Ai Jia). They have never ceased to believe in me throughout the thick and thin of my life's journey. Appreciation of thanks goes out to my best-friend, Liew Wei Bing, for always being available when I needed support.

TABLE OF CONTENTS

TITLE.....	i
CERTIFICATION.....	ii
UNIVERSITY OF MALAYA ORIGINAL LITERARY WORK DECLARATION.....	iii
ABSTRACT.....	iv-vi
ABSTRAK.....	vii-ix
ACKNOWLEDGEMENT.....	x
TABLET OF CONTENTS.....	xi-xiv
LIST OF APPENDICES.....	xv
LIST OF TABLES.....	xvi
LIST OF ABBREVIATIONS.....	xvii
CHAPTER 1: INTRODUCTION.....	1-3
CHAPTER 2: LITERATURE REVIEW.....	4
2.1 Prevalence of psychiatry illnesses and COVID-19.....	4-9
2.2 Sociodemographic and clinical characteristics associated with psychiatric illness and COVID-19.....	9-11
2.3 Home confinement, social media use, and COVID-19.....	12-18
2.4 Social media coverage and COVID-19.....	18-22
2.5 Knowledge, attitude and practices toward COVID-19.....	22-23
CHAPTER 3: STUDY OBJECTIVE.....	24
3.1 Hypothesis.....	24
3.2 Specific objectives.....	24

CHAPTER 4: METHODOLOGY.....	25
4.1 STUDY DESIGN AND SAMPLING METHOD.....	25
4.1.1 Study Design.....	25
4.1.2 Period of Study.....	25
4.1.3 Study Population.....	25
4.1.4 Study Setting.....	25
4.1.5 Inclusion Criteria.....	26
4.1.6 Exclusion Criteria.....	26
4.2 DATA COLLECTION.....	26-27
4.3 SAMPLE SIZE.....	28-29
4.4 INSTRUMENTS.....	29
4.4.1 Identification Profile and Socio-demographic data.....	29
4.4.2 Measurement of anxiety among public during COVID-19 pandemic using Generalized Anxiety Disorder-7 (GAD-7).....	29-30
4.4.3 Measurement of insomnia among public during COVID-19 pandemic using Insomnia Severity Index.....	30-31
4.4.4 Measurement of depression among public during COVID-19 pandemic using Patient Health Questionnaire-9 (PHQ-9).....	31-32
4.4.5 Measurement of Knowledge, Attitudes, and Practices among public towards COVID-19 pandemic using Knowledge, Attitudes, and Practices Scale during COVID-19 (KAP).....	32-33
4.4.6 Measurement of Social Media Addiction among public during COVID-19 pandemic using Social Media Addiction during the COVID-19 Pandemic (SMACOP).....	33-34

4.5 STATISTICAL ANALYSIS.....	35
4.6 ETHICAL CONSIDERATIONS.....	35-36
CHAPTER 5: RESULTS.....	37-38
5.1 Descriptive Statistics.....	39-40
5.2 Correlation Statistics.....	41
5.3 Logistic regression statistics.....	42-49
CHAPTER 6: DISCUSSION.....	50
6.1 Prevalence of anxiety among public during the COVID-19 pandemic.....	50-52
6.2 Prevalence of insomnia among public during the COVID-19 pandemic.....	52-53
6.3 Prevalence of depression among public during the COVID-19 pandemic.....	53-54
6.4 Socio-demographic association with anxiety, depression and insomnia, among public during the COVID-19 pandemic.....	54-55
6.5 Association between knowledge, attitudes, and practices (KAP) of COVID-19 pandemic among public and anxiety, depression and insomnia.....	55-57
6.6 Association between social media addiction to COVID-19 pandemic (SMACOP) related news among public, and anxiety, depression and insomnia.....	57-59
6.7 Clinical Implications.....	59-60
6.8 Limitations.....	60-61
6.9 Strengths.....	61
CHAPTER 7: CONCLUSION.....	62
REFERENCES.....	63-78
APPENDICES.....	79-91

LIST OF APPENDICES

APPENDIX A: Ethic Committee Approval

APPENDIX B: Patient Information Sheet

APPENDIX C: Consent

APPENDIX D: Questionnaires Social Demographic and Clinical Data

APPENDIX E: Knowledge, Attitudes and Practices Scale during COVID19 (KAP)

APPENDIX F: Social Media Addiction during COVID19 Pandemic (SMACOP)

APPENDIX G: Generalized Anxiety Disorder-7 (GAD-7)

APPENDIX H: Insomnia Severity Index (ISI)

APPENDIX I: Patient Health Questionnaire-9 (PHQ-9)

:

LIST OF TABLES

Table 5.1: Sociodemographic characteristics of participants.....	39-40
Table 5.2: Knowledge, attitude, and practices (KAP), social media addiction status, insomnia status, anxiety, and depression symptoms among public during the COVID-19 pandemic in Malaysia.....	41
Table 5.3: Spearman correlations between knowledge, attitude & practice (KAP), age, social media addiction (SMACOP), insomnia (ISI), anxiety (GAD), depression (PHQ) symptoms during the COVID-19 pandemic in Malaysia.....	42
Table 5.4: Sociodemographic variables in association with Insomnia, anxiety, and depression among public during the COVID-19 pandemic in Malaysia.....	44-45
Table 5.5: Generalized linear model on the factors associated with insomnia using a gamma log linked transformed score (insomnia plus one).....	46
Table 5.6: Generalized linear model on the factors associated with anxiety using a gamma log-linked transformed score (anxiety plus one).....	47-48
Table 5.7: Generalized linear model on the factors associated with depression using a gamma log-linked transformed score (depression plus one).....	48-49

LIST OF ABBREVIATIONS

APA	:	American Psychiatric Association
CDC	:	Centers for Disease Control and Prevention
COVID-19	:	Coronavirus Disease 2019
DSM-5	:	Diagnostic and Statistical Manual of Mental Disorders (5 th Edition)
GAD-7	:	Generalised Anxiety Disorder - 7
ISI	:	Insomnia Severity Index
KAP	:	Knowledge, Attitudes, and Practices towards COVID-19 in Malaysia
MCO	:	Movement control order
MREC	:	UMMC Medical Research Ethics Committee
PHQ-9	:	Patient Health Questionnaire - 9
SARS-CoV-2	:	Severe Acute Respiratory Syndrome Coronavirus 2
SMACOP	:	Social Media Addiction during COVID-19 Pandemic
UMMC	:	University Malaya Medical Centre
WHO	:	World Health Organization

CHAPTER 1: INTRODUCTION

The beginning of a pandemic was in its infancy from the beginning of December 2019. Little did everyone know that a mere virus would cause catastrophic implications to the livelihood of human beings. This is in regard to the novel corona virus. It was initially identified as a cause of upper and lower respiratory tract infections in Wuhan city, China. It rapidly spread and resulted in an epidemic throughout China which eventually became a global pandemic. The outbreak was declared a Public Health Emergency of International Concern on 30 January 2020. In February 2020, WHO (2020) designated the disease COVID-19 which stands for corona virus disease 2019. A month later in March 2020, World Health Organization (2020a) declared COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a pandemic which points to over 118,000 cases of the coronavirus illness over 110 countries. (Center for Disease Control, 2020; World Health Organization, 2020a).

Being declared a pandemic, COVID-19 did not spare Malaysia from its calamity. Malaysian authorities detected the first SARS-CoV-2 infection in 25 January 2020. In a span of 2 months, on 17 March 2020, first death due to this infection was reported. Gradually, the number of cases of infections rose to an exponential state including deaths in Malaysia. Due to limited information and medical pharmaceutical availability in battling COVID-19 (absence of vaccine), societal and community containment are vital in restricting the spread of COVID-19. The government of Malaysia and health ministry was mobilized into implementing multiple lockdowns in the name of movement control orders (MCOs). This MCO was conducted nationwide on 18th March 2020 (Hashim JH et al., 2021). It required the majority of Malaysian population to restrict movements into being in contact with others physically. The term 'home confinement' was widely used. The first MCO prohibited mass

movement and gatherings such as sports, social, religious and cultural activities. It also impeded the activities of schools, higher education institutions, and non-essential businesses (businesses that provide services beyond basic necessities) (New Straits Times, 2020). From then on, multiple MCO phases took place with various levels of limitations such as conditional movement control order (CMCO) and recovery movement control order (RMCO) which took place from 13 May to 9 June 2020, and 10 June 2020 until 31 March 2021 respectively. To date, MCO has been implemented yet again due to the rising cases of COVID-19 infections in the nation.

The impact of COVID-19 has been evident in the world today. Internationally, the battle against COVID-19 has had remarkable social and economic effect to the countries and even individuals (Ibn-Mohammed et al., 2021). The result of self-isolation, social distancing, and travel restrictions have burdened the workforce of nations across all economic sectors. Without the exception of Malaysia, like other countries globally, this COVID-19 pandemic has implicated disastrous outcomes on the socioeconomic aspect (Wong & Alias, 2021). The social restrictions, measures taken for distancing, financial and employment uncertainties, and the idea of COVID-19 can affect the mental wellbeing of individuals in the world and Malaysia (Xiong et al., 2020). In addition, with the increased amount of time spent at home by majority of population, social media has been the sought-after choice to obtain information especially regarding COVID-19. It is identified that social media has strong impact in influencing people's behavior when there is an outbreak of epidemic or pandemic scale (Sharma et al., 2020). There would be legitimate and false information regarding COVID-19 pandemic obtainable from social media. This in turn can also impact individuals by worsening their mental health of further improving it.

Consequently, the main aim of this study is to determine the impact of COVID-19 pandemic on the psychosocial aspect among public in Malaysia. Furthermore, it is to determine the relationship between psychological impact with knowledge, attitudes, and practices, and social media addiction during COVID-19 pandemic.

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Chapter 2: Literature Review

2.1 Prevalence of psychiatry illnesses and COVID-19

A few pandemic incidences occurred over the course of the past century. Jernigan (2020) and the Center for Disease Control (2018) named several pandemics:

1. The pandemic in 1918 due to the H1N1 virus,
2. The pandemic in 1957-1958 due to the H2N2 virus,
3. The pandemic in 1968 due to the H3N2 virus
4. Most recently, the pandemic in 2009 was due to the H1n1 pdm09 virus.

Then came the novel Coronavirus (Marty & Jones, 2020; Wang, Horby, et al., 2020). The Coronavirus Disease 2019 (COVID-19) epidemic emerged in Wuhan, China, between December 2019 and early 2020 (Deng et al., 2021; Wu et al., 2020). It then spread nationwide and then rapidly to other countries; in fact, the COVID-19 has affected nearly the entire world, causing considerable loss of life and high rates of physical morbidity (Richter et al., 2021).

In contrast to the previous epidemics and pandemics, the COVID-19 is more contagious and spreads faster (Meo et al., 2020), infecting many people within a short time (World Health Organization, 2020b; Wu et al., 2020). While most infected people show mild symptoms (80%), others develop pneumonia and/ or acute respiratory distress syndrome (J. Sun et al., 2020; Wu et al., 2020). Then, there were many severe cases needing intensive care (Xu et al., 2020).

Nothing could prepare us for the onslaught brought by the COVID-19 pandemic. Despite a year on, countless uncertainties remain. Pfefferbaum and North (2021) cited factors such as:

1. The duration of the pandemic, and
2. The treatment of the COVID-19 infection.
3. The debilitating consequences of unfamiliar public health measures imposed that have infringed on freedoms of individuals,
4. Financial losses
5. Conflicting disseminated messages from authorities regarding the pandemic.

Several studies reported various psychological outcomes observed during the virus outbreak, at individual, community, national, and international levels. The novel coronavirus (COVID-19) caused severe and potentially life-threatening pneumonia (Wang, Horby, et al., 2020). The virus relentlessly spread while its severe morbidity forced unprecedented strict quarantine measures in many countries, affecting many people's lives. People have begun having fears of getting sick, possibilities of dying, and feeling helpless (Brooks et al., 2020; Salari et al., 2020). The impact of rumors and false news circulating did not at all help matters. People were unsure how and how many people caught the disease, the fatality rate, the incubation period, how far or fast it spread (Rubin & Wessely, 2020). Consequently, these uncertainties generate fears and anxiety. In fact the outbreak of 2019-nCoV in China has caused wide spread public panic and mental health stress (Bao et al., 2020).

Due to the rapid spread and severe threat to people's health and lives, governments in many countries had to implement strict measures never experienced by the

public. Countries after countries were placed under mass quarantine (Brooks et al., 2020), while many thousands of thousands of nationals returning home to their home countries were isolated in unfamiliar facilities for two weeks. There are unprecedented measures, which Malaysians experienced too. Businesses, workplaces, all education centers and institutions were all forced to close down. People were told repeatedly to work together to fight the virus.

Even with the first wave of the Coronavirus pandemic and the first phase of lockdowns, there were widespread fears concerning mental health problems beyond population groups directly affected by the illness (Deng et al., 2021; Richter et al., 2021).

Governments of numerous countries weighted the potential benefits of mandatory mass quarantine carefully against the possible psychological costs (Rubin & Wessely, 2020). The public health measures implemented may affect the safety, well-being, and health of all individuals and communities (Le et al., 2020; Qiu et al., 2020; Richter et al., 2021). In addition to the physical and emotional isolation from home confinement (Brooks et al., 2020; Fouques et al., 2021), there is confusion regarding the knowledge and information with the COVID-19 pandemic. Then, fear and anxiety seem an almost certain consequence of the prolonged mass quarantine (Rubin & Wessely, 2020).

The impact of the pandemic is worrying as studies have emerged globally, albeit quickly showing the psychological impact of the pandemic. Being in a prolonged quarantine state meant for many a loss of control and a sense of being trapped (Rubin & Wessely, 2020). There were shouts of frustration with families forced to separate.

These factors may contribute to the increased risk for emotional distress and psychiatric illness associated with the COVID-19 (Margetić et al., 2021; Pfefferbaum & North, 2021; Schnell & Krampe, 2020).

The COVID-19 pandemic, such as what is occurring, is unprecedented, especially for younger generations who have never experienced such disasters (Fouques et al., 2021). The impact on communities ranges from economic losses from jobs and businesses, closures of schools and workplaces, inadequate resources and necessities (Fouques et al., 2021; Schnell & Krampe, 2020). These factors, in combination, can lead to a vast sense of insecurity for many individuals (Sánchez-Sánchez et al., 2021). The sudden changes implicate a range of emotional reactions such as psychiatric conditions (anxiety and depression), unhealthy behaviours (excessive substance usage), and nonconformity with public health advice (Pfefferbaum & North, 2021).

Evidence from previous epidemics showed negative consequences on the mental health of various population groups such as health care workers and survivors of infectious disease (Richter et al., 2021; Zürcher et al., 2000). Natural disasters, intentional acts of mass destruction, and technological accidents pose a concern to the occurrence of post-traumatic stress disorder (PTSD) due to exposure to trauma. After such disasters, some resilient people do not succumb to psychopathology as they find new strengths. However, medical conditions such as COVID-19, a life-threatening viral infection, and arises from natural causes, do not meet the criteria for a diagnosis of PTSD (DSM-5, 2013). Instead, anxiety and depressive disorders may follow.

In a systematic review and meta-analysis, Salari et al. (2020) investigated the prevalence of stress and anxiety during the COVID-19 pandemic in 17 studies with a sample

size of 63439 people (31.9%). The review revealed the prevalence of depression during the COVID-19 pandemic in 14 studies as 33.7% (95% confidence interval: 27.5–40.6) in a sample size of 44,531 people.

Deng et al. (2021), in a meta-analysis study on the prevalence of depression, anxiety, and sleep disturbances during the COVID-19 among 31 studies ($n = 5153$) found the prevalence of depression was 45% (95% CI: 37–54%, $I^2 = 96\%$), while the prevalence of anxiety was 47% (95% CI: 37–57%, $I^2 = 97\%$). The study revealed that the prevalence of sleep disturbances was 34% (95% CI: 19–50%, $I^2 = 98\%$).

Countries in Asia were severely affected by the pandemic. J. Zhang et al. (2020) used an anonymous questionnaire to survey the level of psychological distress among residences in a prefecture-level cities in a province in China. The survey found that both patients who experienced COVID-19 infection (19.3%) and the public (14.3%) had a greater proportion of severe depressive symptom ($p = 0.002$). Then patients who experienced COVID-19 infection were more likely to demonstrate depressed mood ($p = 0.038$) and somatic symptoms (all $p < 0.01$), while participants from the public were more likely to have anxiety-like behaviours.

In the Philippines, Tee et al. (2020) similarly surveyed participants online, assessing the psychological impact of the pandemic. Tee et al. (2020) demonstrated that 16.9% of the respondents reported moderate-to-severe depressive symptoms even in the early phase of the pandemic. In 28.8% had moderate-to-severe anxiety levels and 13.4% had moderate-to-severe stress levels.

Similarly, in Malaysia, in an anonymous online questionnaire distributed through social media, email and the Department of Social Welfare. Zainudeen et al. (2021) revealed that the prevalence of anxiety among the respondents was 23%. Zainudeen et al. (2021)'s study included parents and their children. The result revealed among the children population 28.5% reported anxiety, 31.4% reported depression and 13.3% reported feeling stressed.

A study in Malaysia by Abdullah et al. (2021) investigating the prevalence of depression and anxiety in the urban population compared with the rural population. The research was interrupted the emergence of the COVID-19 pandemic. The study recruited 326 participants. As the pandemic hit the country the results found that 23.9% had symptoms of depression, anxiety symptoms, 41.7%, and depression with comorbid anxiety symptoms, 19.9%.

Abdullah et al. (2021) noted the association of COVID- 19 with the development of depression symptoms in the study was consistent with the findings of several studies of the effect of COVID-19 on the general populations in other countries. These studies indicated that the odds of depression increased after the emergence of the COVID-19 pandemic (Gao et al., 2020; Mazza et al., 2020; Wang et al., 2021).

2.2 Sociodemographic and clinical characteristics associated with psychiatric illness and COVID-19

The Centres for Disease Control and Prevention (2020) defined a *pandemic* as an epidemic that spreads over several countries or continents and affecting countless people. As seen in the COVID-19 infection, various communities have seen a wide range of psychological outcomes during the pandemic.

Fear of contracting the disease, falling ill, and prolonged quarantine are factors associated with the COVID-19 infection. The coronavirus disease outbreak has seen many governments in countless countries instructing their citizens who have potentially at risk of contact with the infection to isolate themselves at home or in a dedicated quarantine facility (Brooks et al., 2020). It is like what has happened and continues to be in Malaysia.

Whether mass quarantine succeeds in controlling the outbreak, the widespread lockdown inevitably took a toll on the nations' psychological well-being (Rubin & Wessely, 2020). For sure fear and anxiety seems an almost certain consequence of mass quarantine (Ammar, Chtourou, et al., 2020; Rubin & Wessely, 2020).

Sociodemographic and clinical characteristics can pose a certain amount of risk to developing psychiatric illness during the COVID-19 pandemic (Salari et al., 2020). There are groups which would be more vulnerable than others to the psychosocial effects of COVID-19 pandemic. For instance, individuals who contract the disease itself, the population who are at higher risks of contracting it (compromised immune system, elderly population, and those living in collective settings, population with pre-existing medical illnesses, psychiatric illnesses). Apart from this, health care providers are also at aforesaid higher risks in the current pandemic, given their exposure to the virus, longer working hours, worries about infecting loved ones, dealings with resource or relocation decisions (Pfefferbaum & North, 2021).

Wathelet et al. (2020) examined university students in France, surveying various factors associated with mental health disorders during the period of confinement in the COVID-19 pandemic phase. The study found that female genders were associated with increased risk for all mental health outcomes. Additionally, students living in worst-hit areas

by COVID-19 had slightly increased risk. Also, students who experienced the loss of income were at higher risk of reporting a mental health outcome. While students living alone apart from their families and students with a history of psychiatric follow-up had a higher likelihood of having mental health disorders. Lastly, students who spent more time consulting news and information about COVID-19 were more likely to report at least 1 mental health outcome.

In China, Shi et al. (2020) found having the age younger than 40 years old, having a history of psychiatric disorders, and having lower income levels were found to be associated with symptoms of anxiety, depression, acute stress, and insomnia. Apart from that, the male gender and relationship status of being unmarried also recorded a higher risk for depression, acute stress, and insomnia.

The local study done by Abdullah et al. (2021) identified factors related the higher odds of having depression symptoms were comorbid stress and the individual having to undergo an assessment for COVID. Not surprisingly, being stressed increases the risk of depression more than twice.

The study by Tee et al. (2020) identified that higher levels of stress, anxiety and depression ($p < 0.05$) were associated with being female, of youth age, single status, students, and having specific symptoms. The other significant factors were the recently imposed quarantine, prolonged homestay and having poor health status, unnecessary worry, concerns for family members, and facing discrimination ($p < 0.05$).

2.3 Home confinement, social media use, and COVID-19

Social connection is essential to one's quality of life (Bethell et al., 2021; Bradshaw et al., 2021). The engagement and participation of an individual in their social life requires

the maintenance of a variety of relationships and connections, which includes involvement in community and social activities (Del Bono et al., 2007). These social activities and involvement comprise contact with family and friends and engaging with them via occupational or social roles (Zimmerman et al., 2003). Other situations include engagement in cultural and sports activities (Cicognani et al., 2008). Participation in social activities and integration into community life increases psychological and social well-being, thus, reinforcing the importance of social life for each individual's psychological health (Prilleltensky et al., 2001).

So, when mass quarantine is mandatory for all during the pandemic, there is strict movement and social separation restriction. Quarantine is the separation and restriction of peoples' movements who have potentially been exposed to a contagious disease and reducing the risk of them infecting others (Brooks et al., 2020; Centers for Disease Control and Prevention, 2017). Isolation and quarantine help protect the public by preventing exposure to the masses who have or may have a contagious disease (Brooks et al., 2020; Centers for Disease Control and Prevention, 2017).

Quarantine is never an unpleasant experience for anyone (Brooks et al., 2020), and not one which has prolonged to more than twelve months. Separation from loved ones, losing one's freedom, and being bogged down with the uncertainty over disease status (Brooks et al., 2020) and again in a prolonged state creates a restless situation. Other than boredom, the restlessness and anxiety for sure would creep in, resulting in many being in a state of heightened insecurity. Whether mass quarantine succeeds in controlling the outbreak, the widespread lockdown inevitably took a toll on the nations' psychological well-being (Ammar, Chtourou, et al., 2020; Rubin & Wessely, 2020).

Social health remains one of the critical targets for health professionals to maintain holistic care (Huber et al., 2011). It plays a vital positive role in personal and social well-being (Berkman et al., 2000). World Health Organization (WHO) recommends that social participation be given particular attention, especially to the elderly, as they are less exposed to the employment environments (Bethell et al., 2021; World Health Organization, 2002).

Many have raised that during the COVID-19 pandemic, the measures taken by health authorities in initiating mass home-confinement (Rubin & Wessely, 2020), are not conforming to the norms of daily human social life. Multiple emotional outcomes can stem from the stay home orders, isolation, and quarantine, such as depression, insomnia, anxiety, stress, frustration, and boredom. The uncertainty of home confinement for indefinite periods in addition to conflicting messages from governments and public health authorities, can intensify distress (Pfefferbaum & North, 2021). Authors such as Pfefferbaum and North (2021), Brooks et al. (2020) and Munk et al. (2020) discovered adverse psychological outcomes resulting from the current pandemic and lockdown situation included anger, anxiety, boredom, confusion, fear, depression, emotional exhaustion, frustration, irritability, and stress.

Although home confinement is seemingly an effective solution to impede the spread of infectious diseases (Brooks et al., 2020), authors such as Ammar, Mueller, et al. (2020), Ammar, Chtourou, et al. (2020) and Park et al. (2020) emphasize that we should not ignore the adverse effects brought about on mental health, and lifestyle behaviors. A recent multi-center study by Ammar, Mueller, et al. (2020) showed that COVID-19 home confinement increased the number of individuals experiencing psychosocial disorders (10%), emotional disorders (16.5%), and about 13% had poor sleep quality.

Consequently, with the mandatory confinement albeit at home, it is not surprising many resorts to the availability of information via social media and online activities. The restricted physical and social contact thus created a transition for individuals to transition from offline to online activities.

Many workforces resorted to working remotely, as seen in Malaysia. In addition to that, even the academic sectors were forced and have succumbed to remote learning. As a result, people spent more time on social media, such as Facebook, Instagram, Twitter, and WhatsApp. Humans submit to using social media to satisfy the needs for entertainment, interpersonal communication, and, most notably during the COVID-19 pandemic, to obtain disaster-related information (Merchant & Lurie, 2020; Ni et al., 2020). It made sense as the widespread lockdowns and stringent measures that required people to stay at home could result in more time spent on social media and online resources.

In the past two decades, people have resorted to online news sites, news-aggregation services, social networks, web sites to disseminate information (Budd et al., 2020), including both government and non-government entities. Consequently, people use these digital technologies and worldwide web to harness support for public-health responses to COVID-19 (Budd et al., 2020).

The research literature revealed that social media could influence people's behavior particularly, in an epidemic or pandemic (Sahni & Sharma, 2020; Sharma et al., 2020). Indeed, the research literature shows that social media plays an essential role in a pandemic like COVID-19 (Depoux et al., 2020; Sharma et al., 2020). No doubt, social media platforms are essential for disseminating information during the outbreak of coronavirus 2019 (COVID-19). The public needs access to timely and reliable information about the disease

and everything related to the outbreak. However, social media platforms, too, are a conduit for spreading rumours and deliberate misinformation (Merchant & Lurie, 2020). News spread faster and wildly via social media (Depoux et al., 2020). Additionally, escalating social media usage can bring about addictive social media use (Andreassen, 2015; Andreassen et al., 2016; Depoux et al., 2020).

It is essential to recognize that significant usage in online surfing may not be beneficial and can pose risks for vulnerable individuals such as minors and those at risk of addiction disorder (Andreassen, 2015; Andreassen et al., 2016; King et al., 2019).

Addictive social media use is defined as compulsive and excessive use of social platforms (King et al., 2019). Griffiths (2005) stated a specific form of Internet addiction, or social media addiction involves six core components of a behavioral addiction model. The component includes

- being unduly concerned with/or spending too much time on social media (salience),
- using social media to regulate negative emotions (mood modification),
- feeling an urge to invest more time on social media to attain same level of pleasure (tolerance),
- feeling restless, irritable, and uncomfortable when prohibited from social media (withdrawal),
- social media usage causing harm to lie, work and interpersonal relationship (conflict),
- Unable to give up social media usage despite trying (relapse).

Although social media addiction is not recognized as a psychiatric disorder, the definition is in congruence with diagnostic addiction criteria (DSM-5, 2013).

Often, people resort to media use in response to daily stress and hassles in life (Lazarus & Folkman, 1984; Nabi et al., 2017). It can be viewed as a form of coping with stress. In the stress and coping theory described by Lazarus and Folkman (1984), there are 2 types of coping strategies that people adopt to manage stress. One is emotion-focused coping while the other is problem-focused coping. Emotion-focused coping is a form of coping mechanism that regulates emotional responses to the problem without the actual stress being affected. In problem-focused coping, it is described as coping with the behaviors that could help solve issues (Lazarus & Folkman, 1984).

Recent studies show the increased tendency of internet addiction because of the COVID-19 pandemic (King et al., 2020) .

In the event of COVID-19, a form of a challenge faced by the general public, people tend to resort to social media for both emotion and problem-focused coping (van Ingen et al., 2016). People using emotion focused coped by venting emotions in chat groups, joining online communities for social support. At the same time, those with problem-focused coping browsed health-related information, such as looking through COVID-19 news outlets (van Ingen et al., 2016).

The dependence on social media for coping does not necessarily bring benefits. Nimrod (2020) showed among 407 Internet users aged 60 years with stress levels from moderate-to-high, there was a significant positive association between stress and increased internet use for interpersonal communication and online errands. The study also identified

that internet usage increased when coping with stress due to the COVID-19 pandemic; however, internet use did not enhance their well-being.

Indeed, online activities and social media usage can temporarily alleviate anxiety, stress and low mood; however, it has the potential to lead to excessive social media usage which can potentiate an addiction (Brailovskaia et al., 2019); as shown in the study by Nimrod (2020).

In China, in an online survey involving 6416 Chinese concerning the relation between the COVID-19 pandemic and addictive behaviour Y. Sun et al. (2020) close to 7% of the participants reported increased dependence on internet use. Then, close 17% reported longer hours of internet use. The survey also found that about in 5% of those surveyed internet usage up to 23% than before the COVID-19 pandemic. Their dependence degree rose 20 times more often than declining. Additionally, the survey found relapses of alcohol and smoking abstinence were relatively common at 19% and 25%, respectively.

The COVID-19 affected Bangladesh as well. Similarly, the Bangladesh government imposed strict social isolation and home quarantine measures. In an online survey comprising 13,525 Bangladeshi individuals, Islam et al. (2020) found problematic internet use was significantly and positively associated with:

- younger age group,
- having a higher level of education,
- living with a nuclear family,
- engaging in less physical exercise, avoiding household chores,
- playing online videogames, social media use, and
- engaging in online recreational activities.

Islam et al. (2020) concluded that excessive internet use appears commonplace during the COVID-19 pandemic and among young adults.

2.4 Social media coverage and COVID-19

Over the past decade, more people progressively turn to social media. They see social media as a fast and effective source and platform for searching, sharing (Sahni & Sharma, 2020; Sharma et al., 2020; Wiederhold, 2020), and distributing information about health (Li & Liu, 2020). China is one country that has made remarkable achievements in mobile digital communication (Li & Liu, 2020). The Chinese authorities used social media to inform the public about the latest news, disseminate public health knowledge, refute rumours, and facilitate effective coordination of medical, public, and pharmaceutical resources (Li & Liu, 2020).

There is a global push to utilise mobile technologies to the fight against the COVID-19 pandemic (Ishmaev et al., 2021). Many governments and related agencies believe and hope social media platforms influence public health protection against the COVID-19 pandemic via creating awareness and subsequent behavioural changes. Likewise, there is a general belief that social media platforms can enhance public health awareness and prevention during epidemic disease transmission in other countries. However, various types of social media can have different effects. With the increased likelihood of people resorting to social media for information gathering regarding the COVID-19 pandemic, there is an equal risk of exposure to illegitimate information, which can perpetuate mental health crises during the pandemic (Depoux et al., 2020).

Indeed crisis communication is pivotal in times of global crisis such as COVID-19 (Depoux et al., 2020; Sahni & Sharma, 2020). If executed well, it can be cost-effective in

addressing multifaceted issues about the pandemic. Crisis communication, in this instance, means the collection, processing and subsequent dissemination of information to address crises (Coombs, 210).

Three forms of media coverage can broadly classify the impact of media coverage of COVID-19 on the population's mental health issues. Su et al. (2021) provided examples as in:

1. It is balanced, fact-based, and truth-oriented media coverage.
2. It is biased and misleading COVID-19 media coverage.
3. It is false and dishonest COVID-19 media coverage.

To begin with, media coverage regarding COVID-19 is fundamentally harmful as the disease represents a deadly pandemic that is still ongoing (Pearman et al., 2021). Although the coverage is balanced, fact-based and truth-oriented, it poses a form of negativity which is transferred to media coverage of the virus which can lead to mental health issues.

The widespread use of social media platforms allows countless groups and individuals to exchange information (Garrett, 2020; Lee et al., 2020). These are internet websites, social networking services (SNSs), and instant messaging services. People worldwide are more connected than ever, allowing information to be shared quickly and hastily (Garrett, 2020; Lee et al., 2020). These social media platforms allow their members to exchange information regarding anything and everything (Kaplan & Haenlein, 2010). These social media platforms often provide information away from official and government departments (Kaplan & Haenlein, 2010). Thus, while official social media platforms are regulated and monitored, there are individually owned or net-working sites that are not (Al-

Dmour et al., 2020). The worrying thing is that the information provided from these unofficial sites may be false or inaccurate and not supported by scientific evidence. It is challenging as people are confronted with so much information and finding difficulties choosing and believing credible and trustworthy information.

The misinformation connected to the COVID-19 can include inaccurate information regarding the virus and its transmission, conspiracy theories, and fabricated reports regarding methods of prevention and treatment (Lee et al., 2020; Pennycook et al., 2020). Of late and occurring in the country is regarding the vaccinations.

Research has revealed that mild to severe mental health issues can be caused by negative news. It is not surprising as misinformation will amplify humanity's challenges. Given the severity and scale of COVID -19, social media has been focused on pandemic-related news, which can further affect individuals' mental health (Olagoke et al., 2020).

Studies have shown that the spread of misinformation on COVID-19 is partly due to right-leaning media outlets, which often have biased and misleading reports (Motta et al., 2020) . In the context of biased and misleading COVID-19 media coverage, its adverse effects can be more pronounced on the population's health and well-being (Olagoke et al., 2020; Su et al., 2021). COVID-19 related misinformation can, in turn, lead to panic and fear, which can have a lasting effect on people's mental health (Ahmad & Murad, 2020; Motta et al., 2020). A report from the BBC (2020) showed the misinformation lead to panic-buying and hoarding of goods, taking ineffective and potentially harmful remedies, while ignoring advice from health authorities. The report as well showed the public engaging in behaviours that increases the risk of virus transmission.

False and dishonest COVID-19 media coverage is the most problematic type of media coverage (Su et al., 2021). The prevalence of “Wuhan virus”, “China virus”, and “Chinese virus” in media suggests that a number of outlets are capable of generating baseless news (Lee et al., 2020; Zheng et al., 2020). This is because the media directly associated the virus to an entire race, nation and people, which can lead to mental health concerns to those targeted.

Proliferation of misinformation worldwide has remained rampant (Lee et al., 2020; Su et al., 2021). Frequently, the misinformation does not require professional verification or review. The process thus hastens the spread of fake news. ‘Fake news’ is another irreversible negative effect of media which can lead to deterioration of the public trust around COVID-19 (Bunker, 2020). This can be challenging as it can affect the practices of public to ignore other proper COVID-19 information disseminated by media outlets by government officials and public health experts regarding the latest developments related to COVID-19 (Bunker, 2020; Okan et al., 2020). The results can be catastrophic.

Lee et al. (2020) assess the prevalence of misinformation regarding the COVID-19 in 1049 South Korean adults in April 2020. The study found COVID-19 misinformation exposure was associated with disbelieving information regarding the virus. The misinformation belief was associated with less preventive behaviour. Misinformation exposure was associated with being younger in age, higher education levels, and lower income. Sources of information associated with misinformation exposure were social networking services (aOR 1.67, 95% CI 1.20-2.32) and instant messaging (aOR 1.79, 1.27-2.51). Misinformation exposure was also associated with psychological distress including

anxiety, depressive, and posttraumatic stress disorder symptoms. Misinformation belief was associated with poorer COVID-19 knowledge and less preventive behaviour.

Lastly, is the exponential growth of infodemics. Infodemics is the purposeful spread of disinformation and misinformation via media especially on social media platforms such as Facebook, Twitter, Instagram, and Whatsapp. It can create public fear, mistrust, and uncertainty, and eventually destroy health experts and government officials' efforts. Infodemics such as promoting use of disinfectants to "cure" COVID-19 has brought about personal and economic consequences (Kouzy et al., 2020).

Considering the prevalence of misinformation and disinformation on social media platforms regarding COVID-19, the knowledge, attitude and practices of people towards COVID-19 can be immensely affected negatively. This phenomenon can incur further mental health burden to the nation due to possible distrust towards certain public health measures.

2.5 Knowledge, attitude and practices toward COVID-19

Knowledge, attitudes, and practices (KAP) toward COVID-19 plays a vital role in defining a population's readiness to assimilate behavioural change measures into daily living from health and government authorities.

As further studies and researches are done regarding COVID-19, various facts and information changes. In the meantime, multiple myths are also prevalent in the general population in regards to the management and prevention of the virus spread. This widespread of misinformation and disinformation is further intensified by the easy accessibility to social media. As a result, it became increasingly challenging as such misinformation and disinformation shared on social media clouded people's understanding of COVID-19

(Mohamad & Azlan, 2020). For example, in Malaysia, when the initial MCO was announced, Malaysians were seen panic buying, crowding in public transportation to travel back to hometowns. Unknown to them, these actions increase the risk of infections to other parts of the country. Identifying such phenomenon, World Health Organization (2020c) has provided authentic information and myth busters that are readily available online.

KAP related to COVID-19 among public is ubiquitous as it reflects the insight of the population. With that information, preventive strategies can be further developed to counter COVID-19 and health promotion programs can be enforced. From the previous SARS outbreak, we learned that knowledge and attitudes are indeed associated with levels of emotion and panic that can further complicate measures to contain the spread of the virus (Person et al., 2004).

Therefore, different levels of KAP among the public which can be influenced by social media can determine the onset and occurrence of mental health issues such as anxiety and depression, during the COVID-19 pandemic

CHAPTER 3: STUDY OBJECTIVE

3.1 Hypothesis

- 1) The higher the level of knowledge, attitudes, and practices towards COVID-19 pandemic among public; the lower the levels of anxiety, depression and insomnia
- 2) The higher the level of social media addiction to COVID-19 related news, the higher the levels of anxiety, depression and insomnia

3.2 Specific objectives

- 1) To determine the association of COVID-19 pandemic on psychological aspects such as anxiety, depression and insomnia, of the public in Malaysia during the pandemic.
- 2) To examine the socio-demographic association with psychological impact among the public in Malaysia during the pandemic.
- 3) To determine the relationship between knowledge, attitudes, and practices (KAP) towards COVID-19, and psychological impact of COVID-19, during the pandemic.
- 4) To determine the relationship between social media addiction to COVID-19 related news and psychological impact of COVID-19 during the pandemic.

CHAPTER 4: METHODOLOGY

4.1 Study Design and Sampling Method

4.1.1 Study Design

This study is a cross-sectional online survey study to identify the psychological impact of COVID-19 pandemic. In the study we examine the prevalence of depression, anxiety, and insomnia among the public, and its relationship with knowledge, attitudes, and practices (KAP), and social media addiction during the COVID-19 pandemic.

4.1.2 Period of Study

This is a cross-sectional online study conducted from April 2020 to June 2020, during the pandemic of COVID-19.

4.1.3 Study Population

Subjects who participated in the study were from the general public who meets the inclusion and exclusion criteria.

4.1.4 Study Setting

This study was conducted via online survey using social media platforms such as Facebook and Whatsapp messenger. As it was not practical to conduct a systematic sampling procedure during this period, online survey using Google Forms was carried out. The participants were selected based on the contacts of the author via both platforms of Facebook and Whatsapp messenger such as family, relatives, friends and colleagues, which were then disseminated further to other contacts.

4.1.5 Inclusion criteria

Subjects who fulfilled the inclusion criteria participated in the study

1. Subjects who are capable of understanding and reading Malay or English.
2. Subjects who are above the age of 18.
3. Subjects who gave consent with regards to participation of this study.

4.1.6 Exclusion criteria

Subjects who were excluded from the study

1. Subjects who did not give consent for the study.
2. Subjects who are less than 18 years old.
3. Subjects who are not capable of reading and understanding Malay or English.
4. Subjects who do not have access to the internet via social media.

The subjects were asked to read carefully the information sheet, consented and subsequently filled in the questionnaires.

4.2 Data Collection

The study was conducted from April 2020 to June 2020. As it was unpractical to conduct a systematic sampling procedure during this period of pandemic which involved a national lockdown requiring home confinement, an online survey using Google Forms was considered most appropriate to gather data for this study purpose. The information of the online survey was provided via social media platforms including Facebook and WhatsApp messenger in which a general description of the survey regarding its objectives and procedure was explained.

Prior to the study being carried out, the Medical Research Ethical Committee of the University Malaya Medical Centre has approved the study. As per the agreement, subjects who voluntarily agreed to participate in the survey would click the checkbox with “I

agree”. The subjects will then proceed to complete the self-administered questionnaire. The subjects were informed and assured that their personal information, such as identification card numbers and name would be kept private and confidential. Also, it was informed to the subjects that no personal data would be disclosed in the final report.

After obtaining the consent, the researcher ensured that the criteria for inclusion and exclusion were met for the subject. Then, the subjects proceeded with socio-demographic questionnaire. After completing the socio-demographic questionnaire, the subjects were given Knowledge, Attitudes, and Practices towards COVID-19 Scale (KAP), and Social Media Addiction during the COVID-19 Pandemic (SMACOP) to answer. Subsequently, the subjects proceeded with answering the Generalized Anxiety Disorder Scale (GAD-7), Insomnia Severity Index, and Patient Health Questionnaire-9 (PHQ-9) to assess anxiety, insomnia, and depressive symptoms respectively.

As the questionnaires were bilingual (English and Malay), the subjects were required to answer the instruments in either of these languages. Subjects were also encouraged to clarify uncertainties with the researcher regarding any the statements in the questionnaire. After the subject has completed the questionnaires, it was submitted to the researcher. Subjects were allowed further questioning in regards to the study via a contact number provided in the online form.

4.3 Sample Size

Adequate sample size in this cross-sectional study was calculated using a formula as below

$$\begin{aligned}
N &= \frac{z^2 p(1-p)}{d^2} \\
&= 1.96^2 \times 0.74 (1- 0.74) / 0.05^2 \\
&= 3.841 \times 0.74 (0.26) / 0.0025 \\
&= 0.7390084 / 0.0025 \\
&= 295.60
\end{aligned}$$

Hence, the minimal sample size required is 296.

N = sample size

z = confidence level, standard value of 1.96

p = estimated prevalence

d = margin of error at 5% (standard value of 0.05)

N is the sample size, Z is corresponding to the level of confidence, P is expected prevalence (that can be obtained from pilot study or same study conducted by researchers), and d is precision (corresponding to effect size). The level of confidence aimed for is 95% which is reflected in the confidence interval of 95%

For this study, the prevalence of the psychological effects of the outbreak was adapted from a study on Stress, Anxiety Triggers and Mental Health Care Needs among General Public under Lockdown during COVID-19 Pandemic: a Cross-Sectional Study in India (Pal & Danda, 2021). The study revealed that 74% of respondents reported having stress about business or employment during the COVID-19 pandemic.

4.4 Instruments

In order to attain information from the subjects, a set of questionnaires was developed for the online survey participation. The instrument consisted 2 parts being the socio-demographic profile, and self-rated scales.

The first part consists of a profile and socio-demographic data. The second part consists of self-rated scales regarding Knowledge, Attributes, and Practices towards COVID-19 (KAP), Social Media Addiction during COVID-19 Pandemic (SMACOP), Generalized Anxiety Disorder Scale (GAD-7), Insomnia Severity Index, and Patient Health Questionnaire-9 (PHQ-9).

4.4.1 Identification Profile and Socio-demographic data

The sociodemographic data obtained were details on age, gender, ethnicity, marital status, education level, and employment status. Education level was categorized to 7 groups: never went to school, primary school, secondary school, diploma level, under graduate degree, post graduate degree, and doctor of philosophy. For employment, it was categorized to 4 groups: employed, unemployed, retired, and others.

4.4.2 Measurement of anxiety among public during COVID-19 pandemic using Generalized Anxiety Disorder-7 (GAD-7)

Generalized Anxiety Disorder-7 (GAD-7) scale originates from Spitzer et al. in 2006 (Spitzer et al., 2006). It is used as a screening and severity measuring tool for generalized anxiety disorder (Toussaint et al., 2020). The scale is composed of 7 items, with the usage of Likert scale which ranges from 0-3, “0” (not at all), “1” (several days), “2” (more than half the days), and “3” (nearly every day). GAD-7 scale enquires about the frequency of anxiety symptoms which has been suffered within the recent two weeks. The

scale looks into questions of feeling nervous, anxious or on edge? Not being able to stop or control worrying? Worrying too much about different things? Trouble relaxing? Being so restless that it is hard to sit still? Becoming easily annoyed or irritable? Feeling afraid as if something awful might happen? This scale is self-reported and the overall score ranges between 0 to 21.

In this study, the GAD-7 scale with a cumulative score of 15 or higher is described as presence of anxiety symptoms. The cut-off point was compatible with estimation of prevalence of generalized anxiety disorder in primary care settings (Löwe et al., 2008). The score of 0-5 is considered absence of anxiety symptoms, 6-10 (mild severity), 11-15 (moderate severity), and 16-21 (severe).

In Malaysia, the validation of the Malay language version of GAD-7 was done and revealed it to be reliable and valid. The Malay language version of GAD -7 had a sensitivity of 76% (95% CI 61%–87%) and a specificity of 94% (88% –97%). It can be used for diagnosis, screening, and severity assessment of anxiety disorders, as well as for post-traumatic stress disorders, panic disorders, and social phobia (Sidik et al., 2012).

4.4.3 Measurement of insomnia among public during COVID-19 pandemic using Insomnia Severity Index

The Insomnia Severity Index has been validated by Bastien et al, to be valid and reliable as an instrument to quantify perceived insomnia severity. It consists of a checklist with 7 items which are self-report into insomnia, reviewing the nature, impact, and seriousness. It has 86.1% sensitivity and 87.7% specificity. (Sadeh, 2015). The period of interval for recall is within the past 2 weeks. The measured parameters are sleep regulation, sleep onset difficulty, early morning awakening problems, dissatisfaction about

sleep problems, interference with daily activities, people's perception on subject's sleep problems, and worries about sleep problem. This instrument was translated into the Malay language by the researcher for the purpose of this study.

Each parameter is quantified with a 5 point Likert scale, "0" (no problem), "1" (a little), "2" (Somewhat), "3" (Much), "4" (Very much). A cumulative score given ranges from 0 to 28. The score is being graded as absence of insomnia (0-7), sub-threshold insomnia (8-14), mild insomnia (15-21), and extreme insomnia (22-28) (Bastien et al., 2001).

4.4.4 Measurement of depression among public during COVID-19 pandemic using Patient Health Questionnaire-9 (PHQ-9)

The Patient Health Questionnaire (PHQ) is a questionnaire that consists of 3 pages that can be self-administered by patients (Spitzer et al., 2006). Whereas, the Patient Health Questionnaire-9 (PHQ-9) is a depression module that consist 9-items from the full PHQ. It is a quantitative scale to measure depression and its severity. The instrument assesses depressive symptoms over a period of recent 2 weeks. The scale consists of the actual 9 criteria in which the diagnoses of DSM-IV depressive disorders are based. The 9 criteria in the scale are namely lack of interest or pleasure in doing things (anhedonia) ; feeling depressed, down, or hopeless; problems with sleeping; easily lethargic and low energy levels; appetite changes (poor or overeating); feeling bad about self; trouble in concentration; psychomotor agitation or retardation, and thoughts of suicide or of hurting self (Kroenke et al., 2001).

Each criteria is quantified with a 4 point Likert scale, "0" (not at all), "1"(several days), "2"(More than half the days), and "3"(nearly every day). As a measure

of severity, the cumulative PHQ-9 score can range from 0 to 27. The score is graded as absence of depression (0-4), mild severity (5-9), moderate severity (10-14), moderately severe (15-19), and severe (20-27). If 5 or more of the 9 depressive symptoms criteria have at least “more than half the days” in past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia, major depression is diagnosed. PHQ-9 is valid and reliable in measuring depression severity (Kroenke et al., 2001). The Malay version of the PHQ-9 was also found to be reliable and valid instrument for depression. It has a sensitivity of 87% and a specificity of 82%. (Sherina et al., 2012).

4.4.5 Measurement of Knowledge, Attitudes, and Practices among public towards COVID-19 pandemic using Knowledge, Attitudes, and Practices Scale during COVID-19 (KAP)

A study of knowledge, attitudes, and practices towards COVID-19 among Chinese residents was done in China (Zhong et al., 2020). With the adaptation from this study in China, a survey was developed to assess the knowledge, attitudes and practices towards COVID-19 pandemic among Malaysians public (Puwaneswarry et al., 2020). The survey consisted of 18 questions which were subdivided into Knowledge section (11 items, K1-K11), Attitudes section (3 items, A1-A3), and Practice section (4 items, P1-P4).

False statements were included in all three sections of knowledge, attitudes, and practices. This was done as it was noted that the misconceptions and misinformation that public has obtained can give rise to significant COVID-19 related psychological impact. The study shows that the lower the KAP scores, specifically in the knowledge section, the more severe the depressive and anxiety symptoms. This KAP survey has acceptable reliability with person reliability (0.44), KR-20 (0.50), and Rasch item

reliability (0.95). The construct validity of the KAP is uni-dimensional in its dimensionality analysis with Eigenvalue <2.0 on each contrast (Puwaneswarry et al., 2020).

4.4.6 Measurement of Social Media Addiction among public during COVID-19 pandemic using Social Media Addiction during the COVID-19 Pandemic (SMACOP)

The scale named Social Media Addiction during the COVID-19 pandemic (SMACOP) is a scale developed by a group of Malaysian researchers including the author of this study. The development of the scale has been accepted and pending publication in *Medicine & Health journal* (ISSN 2289-5728) with the title of “Development of Social Media Addiction Scale for COVID-19 Pandemic (SMACOP). It is developed to measure social media addiction among the public in Malaysia in relation to current COVID-19 pandemic.

The SMACOP scale was developed via the implementation of a 3-phase study. In phase 1, Bergen Social Media Addiction Scale (BSMAS) was adapted for the context of COVID-19 pandemic. Permission was obtained from the authors for both BSMAS and Bergen Facebook Addiction Scale (BFAS). The BSMAS content in question 3 was removed as it was unrelated in the context of COVID-19. Modifications on various items in regards to COVID-19 were carried out.

In phase 2, a pilot test was conducted with refining of certain items in the scale. The pilot study involved the general public with a sum of 20 subjects with various sociodemographic details such as hospital staffs, patients' family members, and visitors to University Malaya Medical Centre (UMMC). Completion of the pilot study resulted in minor revisions being conducted on the scale which was eventually reviewed by four medical officers, and a psychiatrist. The final version of the scale was considered complete.

In phase 3, it involved the validation of the scale. The final version of SMACOP was administered to subjects who visited UMMC. A total of 80 subjects were recruited for the study. By using Spearman's correlation test, the construct validity was established with the dissemination of various scales to measure anxiety, insomnia, and depression. These symptoms were common occurrences along with social media addiction and were not exclusively related to pandemic-related characteristics. Final SMACOP results were correlated positively with the scores on these measures ($p < 0.01$). With Spearman's rank correlation coefficient, the validity of SMACOP was examined, with Insomnia Severity Index (0.463), GAD-7 (0.468), and PHQ-9 (0.383).

SMACOP is a self-report scale with 5 items. The scale quantifies social media addiction in relation to COVID-19 pandemic within a 1-month recall period. 6 basic symptoms were examined in this scale: conflict, salience, mood modification, withdrawal, tolerance, and relapse. A 5-point Likert scale was used, ranging from "1" (very rarely), "2" (rarely), "3" (sometimes), "4" (often), and "5" (very often). A high accumulative score would indicate higher social media addiction in relation to COVID-19. Optimal cut-off score was determined at 13 to classify an individual to be at-risk of social media addiction during COVID-19. The optimal sensitivity is 0.64 and specificity is 0.63.

4.5 Statistical Analysis

Data cleaning was conducted before the data analysis to eliminate missing value issues. Next, normality tests were performed for all continuous data by examining their

skewness and kurtosis. Subsequently, the normally distributed data were presented in mean and standard deviation (SD), while non-normal data were expressed in median and inter-quartile range (IQR). Meanwhile, the frequency with percentage was used to summarize all categorical data in sociodemographic characteristics. A correlation test (Pearson = parametric; Spearman = non-parametric) was used to investigate the linear relationship between continuous explanatory and response variables in an inferential analysis.

On the other hand, a T-test or Mann-Whitney U test was applied, depending on the normality of the data, to determine the association of categorical explanatory variables with the continuous response variables. All variables with a p-value < 0.25 were included in the subsequent analysis. A multicollinearity test was used to prevent highly correlated factors included in the multi-variable analysis. Variance inflation factor < 5 indicates no multicollinearity issue. A generalized linear model with gamma-log linked was used to determine the factors associated with the outcome variables. All p-values at 0.05 level consider significant. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 28.0.

4.6 Ethical considerations

Ethical approval was applied via The Medical Research Ethical Committee of the University Malaya Medical Centre. The study was approved by the committee (MREC ID: 2020628-8832). All subjects were given assurance regarding the study's confidentiality by complying to the ethical standards of international and national research committee such as Malaysian Good Clinical Practice guidelines. The process of recruitment and data collection in this study were completely done by the principal investigator. The purpose of study was explained prior to participation into the study. Participation for the study in the

survey was entirely voluntary, as per the agreement, the clicking on the “I agree” checkbox is the written consent.

Universiti Malaya

CHAPTER 5: RESULTS

Results

The normality test with an additional box plot investigation revealed that continuous age and social media addiction total scores were distributed normally, whereas other scaled variables were distributed non-normally. A total of 353 public individuals in Klang Valley participated in this survey. The average age of the participants was 42 years old where a high proportion of them was female (63.5%). Besides, approximately two-thirds of the participants were Chinese, followed by Indian (22.1%) and surprisingly, only about 12% of total individuals were Malay. The majority of the participants were married, and more than 70% had tertiary educational level and above. Similarly, approximately 77% of the individuals were still working. The details of participants' demographic information were summarized in Table 5.1.

Table 5.2 described the Knowledge, attitude, & practice (KAP), social media addiction status, insomnia status, anxiety, and depression symptoms among the public during the Covid-19 pandemic in Klang Valley. Many of the participants (77.3%) were equipped with adequate KAP towards this pandemic and about half of them (45.6%) were classified as social media addicts. There were a considerably high proportion of them suffered from insomnia issues (34.0%). A similar condition can be observed in mental health. About 32.0% of the public participants were experiencing symptomatic depression during the survey in which a score of 5 and above in the PHQ-9 was considered symptomatic depression. Anxiety-wise, a total of 89 individuals (25.2%) had symptomatic anxiety, in which a score of 6 and above in the GAD-7 was considered symptomatic anxiety.

Table 5.3 illustrated the analysis of relationship between the main exposures (KAP of COVID-19 infection & social media addiction) with outcome of interests (insomnia, anxiety, and depression). The total KAP was significantly correlated with total insomnia ($\rho = -0.211$; $p < 0.01$), anxiety ($\rho = -0.187$; $p < 0.01$), and depression ($\rho = -0.169$; $p < 0.01$)

symptoms. On the other hand, the total social media addiction was fair to moderately correlated with the insomnia ($\rho = 0.315$; $p < 0.01$), anxiety ($\rho = 0.318$; $p < 0.01$), and depression ($\rho = 0.244$; $p < 0.01$).

Universiti Malaya

Table 5.1: Sociodemographic characteristics of participants (n=353)

Variables	Mean (SD)	n (%)
Age	41.7 (13.5)	
Gender		
Male		128 (36.3)
Female		224 (63.5)
Transgender		1 (0.3)
Ethnicity		
Malay		41 (11.6)
Chinese		226 (64.0)
Indian		78 (22.1)
Others		8 (2.3)
Marital status		
Single		129 (36.5)
Divorced		6 (1.7)
Married		208 (58.9)
Stable partner		9 (2.5)
Others		1 (0.3)
Education		
Secondary		27 (7.6)
STPM/A level		57 (16.1)
Degree		133 (37.7)
Master		127 (36.0)
Doctorate		9 (2.5)
Employment		
Employed		271 (76.8)

Retired	37 (10.5)
Unemployed	34 (9.6)
Others	11 (3.1)

SD = Standard deviation.

Table 5.1 continued.

Universiti Malaya

Table 5.2: Knowledge, attitude, and practices (KAP), social media addiction status, insomnia status, anxiety, and depression symptoms among public during the COVID-19 pandemic in Malaysia (n=353)

Variables	Mean (SD) / Median (IQR)	n (%)
KAP	15.0 (2.0) ¹	
KAP categorical		
Low (≤ 13)		80 (22.7)
Adequate (>13)		273 (77.3)
Social media addiction	13.4 (3.5) ²	
Social media addiction categorical		
Not addicted		192 (54.4)
Addicted		161 (45.6)
Insomnia	4.0 (8.0) ¹	
Insomnia categorical		
No		233 (66.0)
Yes		120 (34.0)
Anxiety	2.0 (6.0) ¹	
Anxiety categorical		
No symptom		264 (74.8)
Symptomatic		89 (25.2)
Depression	2.0 (5.0) ¹	
Depression categorical		
No symptom		240 (68.0)
Symptomatic		113 (32.0)

SD = Standard deviation; IQR = Interquartile range.

¹ = Median (IQR); ² = Mean (SD).

Table 5.3: Spearman correlations between knowledge, attitude and practices (KAP), age, social media addiction (SMACOP), insomnia (ISI), anxiety (GAD), depression (PHQ) symptoms during the COVID-19 pandemic in Malaysia (n=353)

Spearman ranked coefficient	Total KAP	Total SMACOP	Age	Total ISI	GAD (total score)	PHQ (total score)
Total KAP	-	-0.132*	0.080	-0.211**	-0.187**	-0.169**
Total SMACOP	-0.132*	-	0.076	0.315**	0.318**	0.244**

* = $p < 0.05$; ** = $p < 0.01$.

Besides investigating the primary exposures in relation to the outcomes, the researchers also determined the association of sociodemographic variables with insomnia, anxiety, and depression. Under the univariate analysis in Table 5.4, Malay ($p = 0.039$) and Indian ($p = 0.026$) were significantly associated with insomnia. Anxiety outcome-wise, four variables, age, Chinese, Indian, and employment, were associated with the outcome at 0.05 level of significance. As for depression symptoms, only three sociodemographics were related to the outcome, namely age, Chinese, and Indian. Before the multivariate analysis using a generalized linear model, the investigators included all variables with $p < 0.25$ into a multicollinearity test. Hence, there were a total of seven factors included in the multicollinearity test (KAP, SMACOP, age, Malay, Chinese, Indian, and education level) for insomnia; eight variables comprising of KAP, SMACOP, age, gender, Malay, Chinese, Indian, and employment for anxiety symptom; six variables (KAP, SMACOP, age, Chinese, Indian, and employment) for depression symptom.

The multicollinearity test showed that Chinese variables exhibited a high variance of inflation with other race variables ($VIF > 5$), and this finding was consistent across three outcomes. Therefore, the researchers decided to drop Chinese variables in all subsequent

analyses. In short, there were only six variables involved in the multivariate analysis on factors associated with insomnia; seven variables included in the regression model on factors related to anxiety symptom; five variables for depression symptoms.

Universiti Malaya

Table 5.4: Sociodemographic variables in association with Insomnia, anxiety, and depression among public during the Covid pandemic in Malaysia (n=353)

Variables	Insomnia		Anxiety		Depression	
	parameter	<i>p</i>	parameter	<i>p</i>	parameter	<i>p</i>
Age	-0.087 ¹	0.102	-0.228 ¹	< 0.001	-0.242 ¹	< 0.001
Gender		0.681		0.078		0.363
Male and transgender	5.0 (8.0) ²		1.0 (5.0) ²		2.0 (5.0) ²	
Female	4.0 (8.0)		3.0 (6.0)		2.5 (6.0)	
Malay		0.039		0.243		0.870
No	5.0 (7.0) ²		2.0 (6.0) ²		2.5 (5.0) ²	
Yes	2.0 (8.0)		1.0 (5.0)		2.0 (6.0)	
Chinese		0.151		0.045		0.007
No	5.0 (9.0) ²		4.0 (6.0) ²		3.0 (5.0) ²	
Yes	4.0 (7.0)		2.0 (5.0)		2.0 (5.0)	
Indian		0.026		0.007		0.005
No	4.0 (7.0) ²		2.0 (5.0) ²		2.0 (5.0) ²	
Yes	6.0 (8.0)		4.0 (5.0)		4.0 (5.0)	
Marital status		0.521		0.961		0.825

Married and stable partner	4.0 (7.0) ²		2.0 (5.0) ²		2.0 (5.0) ²
Others	6.0 (8.0)		3.0 (6.0)		3.0 (5.0)
Education level		0.154		0.615	0.527
Below tertiary	5.0 (7.0) ²		2.0 (5.0) ²		3.0 (5.0) ²
Tertiary and above	4.0 (8.0)		3.0 (6.0)		2.0 (5.0)
Employment		0.978		0.012	0.143
Employed	4.0 (8.0) ²		3.0 (6.0) ²		3.0 (6.0) ²
Others	5.0 (8.0)		1.0 (4.0)		2.0 (4.0)

¹ = Spearman ranked correlation; ² = Mann-Whitney U test.

Table 5.4 continued.

Table 5.5 illustrated the factors associated with insomnia among public participants in Klang Valley during the Covid-19 pandemic. Out of six variables included in the multivariate analysis, only two remained significantly related to insomnia, namely KAP and SMACOP. Every increasing one unit of KAP score reduces the insomnia score by 0.053 units (95% CI: -0.0098, -0.007; $p = 0.025$) after accounting for SMACOP, age, Malay, Indian, and education level variables. In contrast, every unit increasing in SMACOP (social media addiction) increases the insomnia score by 0.066 units (95% CI: 0.044, 0.087) after accounting for other variables.

Table 5.5: Generalized linear model on the factors associated with insomnia using a gamma log-linked transformed score (insomnia plus one)

Factors	Crude B (95% CI)	<i>p</i>	Adjusted B (95% CI)	<i>p</i>
KAP	-0.069 (-0.116, -0.022)	0.004	-0.053 (-0.098, -0.007)	0.025
SMACOP	0.068 (0.046, 0.089)	< 0.001	0.066 (0.044, 0.087)	< 0.001
Age	-0.004 (-0.010, 0.002)	0.149	-0.004 (-0.010, 0.002)	0.239
Malay		0.102		0.832
No (R)				
Yes	-0.208 (-0.457, 0.042)		-0.027 (-0.273, 0.220)	
Indian		0.075		0.145
No (R)				
Yes	0.175 (-0.018, 0.367)		0.141 (-0.049, 0.330)	
Education level		0.453		0.814
Below tertiary (R)				
Tertiary and above	-0.072 (-0.260, 0.116)		-0.023 (-0.211, 0.166)	

B = Regression coefficient; CI = Confidence intervals; (R) = Reference group.

Omnibus test: likelihood ratio chi-square (df = 6) = 48.426, $p < 0.001$.

There were four out of seven factors that remained significantly associated with anxiety symptoms (Table 5.6). These variables were KAP, SMACOP, age, and gender. For KAP, every unit increasing in this factor effectively reduces the anxiety score by 0.069 units, with a confidence interval of -0.119 to -0.019. Similarly, increasing one unit of age decreases the anxiety score by 0.014 units (95% CI: -0.021, -0.008). On the other hand, increasing one unit on social media addiction increases the anxiety score by 0.08 units (95% CI: 0.057, 0.104). Gender-wise, being female score 0.236 (95% CI: 0.063, 0.408) unit higher in anxiety score compared to the male and other counterparts. All these significant factors were adjusted by other variables included in the multivariate analysis.

Table 5.6: Generalized linear model on the factors associated with anxiety using a gamma log-linked transformed score (anxiety plus one)

Factors	Crude B (95% CI)	<i>p</i>	Adjusted B (95% CI)	<i>p</i>
KAP	-0.102 (-0.157, -0.048)	< 0.001	-0.069 (-0.119, -0.019)	0.006
SMACOP	0.082 (0.058, 0.106)	< 0.001	0.080 (0.057, 0.104)	< 0.001
Age	-0.018 (-0.024, -0.011)	< 0.001	-0.014 (-0.021, -0.008)	< 0.001
Gender		0.095		0.008
Male (R)				
Female	0.159 (-0.028, 0.345)		0.236 (0.063, 0.408)	
Malay		0.087		0.542
No (R)				
Yes	-0.244 (-0.524, 0.036)		-0.084 (-0.354, 0.186)	
Indian		0.035		0.393

No (R)				
Yes	0.232 (0.016, 0.448)		0.089 (-0.116, 0.294)	
Employment		0.004		0.088
Employed	0.315 (0.103, 0.526)		0.179 (-0.027, 0.385)	
Others (R)				

B = Regression coefficient; CI = Confidence intervals; (R) = Reference group. Omnibus test: likelihood ratio chi-square (df = 7) = 90.915, $p < 0.001$.

Table 5.6 continued.

When investigating the factors associated with depression symptoms, only SMACOP and age consistently related to the outcome after accounting for other variables (Table 5.7). Notably, public participants who scored high in the social media addiction tool also tend to score high in the depression instrument (adjusted B = 0.048, 95% CI: 0.025, 0.070). Conversely, older participants were likely to score lower in the depression than young participants (adjusted B = -0.018, 95% CI: -0.025, -0.011).

Table 5.7: Generalized linear model on the factors associated with depression using a gamma log-linked transformed score (depression plus one)

Factors	Crude B (95% CI)	<i>p</i>	Adjusted B (95% CI)	<i>p</i>
KAP	-0.072 (-0.122, -0.022)	0.005	-0.31 (-0.80, 0.017)	0.210
SMACOP	0.049 (0.027, 0.071)	< 0.001	0.048 (0.025, 0.070)	< 0.001
Age	-0.019 (-0.025, -0.012)	< 0.001	-0.018 (-0.025, -0.011)	< 0.001
Indian		0.045		0.336
No (R)				
Yes	0.213 (0.004, 0.421)		0.099 (-0.103, 0.301)	

Employment		0.056	0.991
Employed	0.200 (-0.005, 0.405)		0.001 (-0.213, 0.215)
Others (R)			

B = Regression coefficient; CI = Confidence intervals; (R) = Reference group.

Omnibus test: likelihood ratio chi-square (df = 5) = 54.081, $p < 0.001$.

Table 5.7 continued.

The researchers noted that all Omnibus tests on the model performance from Tables 5.5, 5.6, and 5.7 were less than 0.05 significance level. The significant p-values suggest that the inclusion of factors, especially the main exposures such as KAP and social media addiction score, significantly improve the model performance compared to the null model (zero inclusion of factors).

Universiti Malaysia

CHAPTER 6: DISCUSSION

In the context of this study being carried out, to the knowledge of the researcher, this study is considered a pioneer study in assessing psychological aspects of anxiety, depression, and insomnia in association with knowledge, attitude, and practice (KAP), and social media addiction among the public during COVID-19 pandemic. This study has identified a significant association between KAP, and social media addiction with psychological aspects of anxiety, depression, and insomnia.

6.1 Prevalence of anxiety among public during the COVID-19 pandemic

One of the psychological aspects that have been looked into in this study is anxiety. The data collection occurred during the initial phase of Malaysia's nationwide lockdown and home confinement period. In this study, a total amount of 89 participants (25.2%) among the public reported to have symptomatic anxiety. The prevalence of anxiety in this study which is significant can be attributed to the worries and uncertainties in the near future during this COVID-19 pandemic (Holmes et al., 2020). Also, this can be a possible representation of the initial emotional response to the early phase of the COVID-19 pandemic and nationwide lockdown (Bults et al., 2011).

The findings from this study correlate with outcomes from previous studies in China which revealed people having mental health stress including worries of falling ill and dying which leads to fears and anxiety (Bao et al., 2020; Wang, Horby, et al., 2020). This is also in keeping with the outcomes of systematic review by (Brooks et al., 2020; Salari et al., 2020).

In this study, it is shown that the younger the age, the more significant it is associated with higher anxiety levels. Previous studies in Spain by González-Sanguino et al. (2020) and Ozamiz-Etxebarria et al. (2020) have shown that this findings is consistent with the results of higher scores of anxiety, stress and depressive symptoms in the younger population as compared to older ages. Similarly in Taiwan, a previous study is shown to have similar outcomes of high prevalence of anxiety symptoms to be inversely proportional to the age of subjects during the SARS outbreak (Su et al., 2007).

In this study, 60 out of 353 participants are aged 60 and above. One can argue that people with increasing age group such as those 60 and above may and should have a higher score in anxiety symptoms during the COVID-19 pandemic as it is shown that this age group has a significantly higher morbidity and mortality with COVID-19 infections as revealed in Italy and China (Onder et al., 2020; Team, 2020). In addition, it has been widely emphasized for this group of population to take stricter measures with social distancing as they are likely to have higher prevalence of medical comorbidities. It indeed should have been expected for them to be more distressed during COVID-19 pandemic. However, this group of population are also more seasoned and experienced as they have possibilities of living through past pandemics or epidemics, and various major life events in the past, which can increase their resilience (Nwachukwu et al.). Also, they are less inclined to be socially mobile than younger population, therefore possibly explaining the lower score on GAD-7.

As for the younger population, this group have increased anxiety levels as they may have the possibility of feeling their prospects in occupation, economy, academy and social to be threatened by COVID-19 pandemic as compared to the elder age group (Huang & Zhao, 2020; Wang et al., 2021). Also, it can be postulated that the younger population, especially those under 25 years of age, has been found to spend more time on social media and news

outlets. In a US study done in 2019 (Clement, 2020), 90% of people active on social media are aged between 18 to 29 while people aged over 65 years only constitutes 45%. As mentioned, high levels of news about COVID-19 pandemic being consumed is associated with increased distress levels (Gao et al., 2020).

6.2 Prevalence of insomnia among public during the COVID-19 pandemic

Another psychological aspect that has been looked into in this study is insomnia. Insomnia is a complaint of having sleeping difficulties in the form of staying or falling asleep (DSM-5, 2013). It is associated with significant distress or impairment in daily functioning. A study by Johnson et al. in 2006 showed that insomnia is a risk factor and co-occurs with psychiatric conditions such as major depression and anxiety disorders (Johnson et al., 2006). There are evidence that suggests that the relationship between insomnia and psychiatric illnesses are bidirectional (Sarsour et al., 2010).

In this study, the prevalence of insomnia was found to be 34% among the subjects. Insomnia among the public was also found to be significantly associated with knowledge, attitudes, and practices (KAP), and social media addiction. The higher the score for KAP, the lower the complaints reported for insomnia. While for social media addiction, the higher scores for SMACOP, the higher the complaints reported for insomnia.

The findings from this study correlates with previous studies among healthcare workers that revealed higher rates of insomnia (34%-36%), depressive symptoms (50%), and anxiety (45%) (Lai et al., 2020; C. Zhang et al., 2020). Also, another study in China by Lin and colleagues investigated the early impact of COVID-19 pandemic on sleep and psychological symptoms (Lin et al., 2021) in a large sample of adults (N=5641), reported clinically significant high rates of insomnia (20%). Lastly, a study by Morin and Carrier

(2021) documented significant levels of insomnia and psychological symptoms in response to the COVID-19 pandemic

The occurrences of insomnia and psychological distress can be expected in response to stressful life events such as COVID-19 pandemic. However, the addition of changes in daily routines which involved home confinement and isolation during COVID-19 pandemic has brought about additional burden to this crisis that might explain the increased incidences of insomnia (Morin & Carrier, 2021)

6.3 Prevalence of depression among public during the COVID-19 pandemic

Depression is another psychological aspect that has been looked into in this study. In this study, the total amount of participants among the public that have reported to have depression is 113 participants (32%). As having similarly being studied as a possible psychological impact during COVID-19, the prevalence of depression among public can also be related to concerns and uncertainties about future events (Holmes et al., 2020).

The findings from this study correlate with outcomes from previous studies in the United States of America. Czeisler et al. (2020), reported at least one adverse mental or behavioural health condition, including anxiety disorder or depressive disorder among the respondents (30.9%) during the COVID-19 pandemic. There is a specific group of population being affected in terms of mental health conditions which are the younger adults (Czeisler et al., 2020). Correspondingly in this study, the older participants were likely to score lower in depression than young participants. Again, the postulation remains similar to that of anxiety regarding this group of population being more resilient in life due to experiences in surviving major life events in the past and possible past epidemics or pandemics (Nwachukwu et al., 2020).

This finding of depression being associated with COVID-19 pandemic highlights to us the vast impact that the pandemic can inflict on individuals. Therefore, it is indeed imperative to prevent, identify, and treat these conditions of mental health conditions. The identification of populations at risk for psychological distress can be an alarm for policy makers to address mental health issues in a wider scale. Methods such as increasing accessibility to resources for clinical diagnoses and treatment options can be escalated. Expansion of outreach programs such as use of teleconsultation and telehealth can be an effective way of delivering treatment for mental health conditions (Hailey et al., 2008).

6.4 Socio-demographic association with anxiety, depression and insomnia, among public during the COVID-19 pandemic

This study has recruited a total of 353 participants. The mean age of the participants is 41.7 years (SD = 13.5 years). The total amount of female participants is 63.5% (n=224), whereas the male participant is 36.3% (n=128). More than the amount of participants were married at 58.9% (n=208) and more than 70% had tertiary educational level. There is an approximate of 77% of participants who are employed.

The study showed that the Malay and Indian race were significantly associated with insomnia in a univariate analysis. In terms of anxiety, four variables were significantly associated with the outcome. These variables are namely age, the Chinese and Indian race, and employment. In a multivariate analysis, 4 variables were significantly associated with anxiety symptoms namely, KAP, SMACOP, age, and gender. The higher the age increases, the lower the anxiety score. The female gender has an anxiety score of 0.236 units higher than male and other counterparts. A study published by Hou et al. (2020), it is revealed that the scores in Generalized Anxiety Disorder – 2 (GAD-2) and self-rated stress were higher in

females than males, signifying that females were experiencing more severe anxiety symptoms.

As for depressive symptoms, in a multivariate analysis, only SMACOP and age were consistently related to the outcome. The older the participants, the lower the score in depression as compared to younger participants. This results coincides with the reasoning revealed by Nwachukwu and colleagues (Nwachukwu et al., 2020).

6.5 Association between knowledge, attitudes, and practices (KAP) of COVID-19 pandemic among public and anxiety, depression and insomnia.

With the adaptation from a study in China, a survey was developed to assess the knowledge, attitudes and practices towards COVID-19 pandemic among Malaysians public. The survey consisted of 18 questions which were subdivided into Knowledge section (11 items, K1-K11), Attitudes section (3 items, A1-A3), and Practice section (4 items, P1-P4).

This study has looked into the association between KAP of COVID-19 pandemic and anxiety, depression, and insomnia. The median score for KAP is 15.0. The majority of participants (77.3%, $n = 273$) were equipped with adequate KAP (score > 13) towards this pandemic. The total KAP was significantly negatively correlated with anxiety, depression, and insomnia ($\rho = -0.187, -0.169, -0.211$) respectively.

In terms of association between KAP and insomnia, every increasing unit of KAP by one score, reduced the insomnia score by 0.053 units (95% CI: -0.0098, -0.007; $p = 0.025$). Whereas in terms of association between KAP and anxiety, every increasing unit of KAP effectively reduced anxiety score by 0.069 unit, with a confidence interval of (-0.119 to -0.019). However, in terms of depressive symptoms, KAP has no association with depression

as described in the multivariate analysis (adjusted B = -0.31, 95% CI: -0.80, 0.017, p of 0.210). A plausible cause leading to this result is that the data collection period for this study was done between April 2020 to June 2020. Being the early phase of COVID-19 pandemic in Malaysia, anxiety symptoms of the unknown would be suggestively more prominent as revealed in the results as compared to having depressive symptoms. This could be contributed by the panic and stress experienced during the initial phase of the pandemic.

A study in China revealed similar results to this study in which the level of KAP regarding COVID-9 was negatively correlated significantly with anxiety symptoms (Jia et al., 2021). Another previous study in China revealed that the knowledge of effectiveness and availability of medicines for COVID-19 was correlated negatively with higher anxiety levels (Wang, Pan, et al., 2020). Other studies done in Africa and Iran found that participants with inadequate knowledge experienced anxiety (Nemati et al., 2020; Rakhmanov & Dane, 2020). Apart from that, a positive attitude which can be reflected in a higher KAP score can contribute to a lower level of anxiety (Lin et al., 2020). In Indonesia, individuals that have a negative attitude towards COVID-19 experienced higher levels of anxiety (Rias et al., 2020).

The higher the level of KAP in an individual can be reflected as the person having a better understanding and grasp of the COVID-19 pandemic. With proper knowledge, individuals would be less prone to be swayed by misinformation and disinformation which are spreading and rumoured via social media. Consequently, the attitudes and practices of the individual would show confidence in having behaviour changes to cope with reducing the spread of COVID-19. Such individuals would also be more compliant to the measures taken by public health authorities to curb the spread of COVID-19 with reduced panic and worries. In other words, the resilient behaviour equipped by adequate levels of KAP indeed helps improve the mental health of individuals.

Apart from that, the KAP towards COVID-19 in this study were seemingly protective factors against anxiety symptoms. Thus, the improvement in the levels of knowledge regarding COVID-19 among public and enhancing their belief in fighting against COVID-19 can be considered beneficial for mental health.

6.6 Association between social media addiction to COVID-19 pandemic (SMACOP) related news among public, and anxiety, depression and insomnia.

With the adaptation from Bergen Social Media Addiction Scale (BSMAS), the SMACOP scale was developed by a group of Malaysian researchers to measure social media addiction among public in Malaysia in relation to COVID-19 pandemic. SMACOP is a self-report scale with 5 items to quantify social media addiction in relation to COVID-19 pandemic within a 1-month recall period. The development of the scale has been accepted and pending publication in *Medicine & Health journal* (ISSN 2289-5728) with the title of “Development of Social Media Addiction Scale for COVID-19 Pandemic (SMACOP).

In this study, about half of the participants, 45.6% (n=161) were classified as having social media addiction. Social media addiction had a fair to moderate positive correlation with insomnia ($\rho = 0.315$; $p < 0.01$), anxiety ($\rho = 0.318$; $p < 0.01$), and depression ($\rho = 0.244$; $p < 0.01$). SMACOP showed to be significantly associated with insomnia. Every unit of increase in SMACOP will increase the insomnia score by 0.066 units (95% CI: 0.044, 0.087) after accounting for other variables. In terms of anxiety, SMACOP also showed significant association in which the increment of a unit on social media addiction scores will increase the anxiety score by 0.08 units (95% CI: 0.057, 0.104). For depression, SMACOP is significantly associated. Participants who scored high in SMACOP also scored high in depression (adjusted B = 0.048, 95% CI: 0.025, 0.070).

These findings are consistent with the study by Gao and colleagues which reported high prevalence of mental health issues associated with regular social media exposure during COVID-19 pandemic (Gao et al., 2020). A study by Hammad et al. found that participants with high exposure to social media had higher levels of anxiety, depression, and social isolation. Social media exposure was correlated with anxiety, depression, and social isolation (Hammad & Alqarni, 2021). Another study in China showed that problematic social media use was associated positively with the anxiety level of participants (Jiang, 2021).

Social media indeed has become a primary source of COVID-19 information and updates (Cinelli et al., 2021). The abundance of information via social media such as Facebook, WhatsApp, Instagram, Twitter, and YouTube thrived during the pandemic (Pennycook et al., 2020). During the outbreak of the COVID-19 pandemic, with the added public measures of home confinement and social isolation, public is at a higher tendency of succumbing to regular social media use to obtain information. This inherently exposes public to the widespread of false information, misleading rumours, and conspiracy theories about COVID-19. This has resulted in malpractices such as excessive purchase of goods and forced storage (Thelwall & Thelwall, 2020). The false propaganda, rumours, inaccurate information can indeed provoke anxiety (Lei et al., 2020). Some examples include the propaganda that COVID-19 is a plot by superior countries into manipulating weaker countries to succumb to their power, disinformation regarding the severe drawbacks of COVID vaccination such as blood clotting by anti-vaxxers, and many more.

Therefore, it is vital to observe and reduce the adverse psychological and social effects on people. These measures can help them manage the pandemic better within communities (Merchant & Lurie, 2020).

6.7 Clinical Implications

The results in this study showed the prevalence of anxiety, depression and insomnia among public during the COVID-19 pandemic. As a result, this information should be made aware to the public, mental health care providers, and health authorities. Dissemination of information regarding awareness of mental health during the COVID-19 pandemic can be done via social media through proper channeling and even advertisements. Mental health care workers in psychiatry department have to be equipped with this knowledge in order to have a better screening acumen and intuition while seeing patients or even consulting via teleconsultation. Assessment for anxiety, depression and insomnia should not be taken lightly by healthcare providers. At primary care levels, health care workers should be given proper education on the screening for anxiety, depression and insomnia during this pandemic. Health authorities can be encouraged to mobilized resources in order to enforce and promote better health care awareness among the public. Thereafter, proper management should be administered to the public individuals who are suffering from symptoms of anxiety, depression and insomnia – be it pharmacological or psychosocial intervention.

This study has also identified the association between anxiety, depression, and insomnia, with KAP and SMACOP during the COVID-19 pandemic. In view of widespread of misinformation and disinformation via social media, the public can be affected if it invokes a sense of uncertainty and worry which can ultimately lead to anxiety, depression and insomnia. Media coverage should be monitored by authorities to ensure news outlets are being disseminated properly. Enforcement of punishments to the source of disinformation can further help curb the plague of wrong information via social media. By ensuring this, proper educational information and news regarding COVID-19 pandemic can be received by the public. In turn, it will help equipped the public with proper knowledge which will

eventually affect a positive attitude and practice towards COVID-19 thereby reducing the risk of developing anxiety, depression and insomnia. Apart from that, authorities can provide additional mythbusters to dispel all identified misinformation and disinformation available on the internet which can aid in reducing unnecessary worry, panic, fear and anxiety. The existing available sources such as sebenarnya.my have been addressing up-to-date myths which are readily available, however, having more in various platforms would possibly be deemed more effective in battling this.

6.8 Limitations

There are multiple limitations in this study to be acknowledged

- This study is a cross sectional study. The structure of it makes it challenging to produce a causal relationship between anxiety, depression and insomnia during COVID-19 pandemic in association with KAP and SMACOP. Studies which are longitudinal can be done in the future.
- This study was carried out during the home-confinement period of lockdown in Malaysia's MCO period. Due to the restrictions of having the freedom to be able to conduct the study in person with participants, the study was conducted remotely via online social media instead. This method of data collection via online surveys which are self-reported does not eliminate the possibilities of response bias among the participants.
- Majority of the instruments used in this study were self-reported. In future studies, clinical-rated scales which are considered 'Gold Standard' measures can be utilized instead to eliminate any possible response bias from participants.

- This study being an online survey does not encompass the population in public that has limited resources to be able to access the internet for its participation. Therefore, the generalizability of the findings has been restricted.

6.9 Strengths

- This can be considered the first study conducted to determine the association between KAP and SMACOP with anxiety, depression, and insomnia among the public in Malaysia during the COVID-19 pandemic
- The amount of sample in this study is considered adequate with sample size of 353. Statistical analysis was made possible to be carried out consequently.
- The instruments used in this study such as GAD-7 and PHQ-9 were bilingual (Malay and English) and was made more accessible to a wider range of sample population
- The instruments used to cater to the local population in Malaysia such as KAP was validated and translated (Puwaneswarry et al., 2020). While SMACOP has been accepted and pending for publication in journal of Medicine & Health. Both instruments are also bilingual.

CHAPTER 7: CONCLUSION

In conclusion, several findings have been observed in this study;

- There is significant prevalence of anxiety, depression and insomnia among the public during the COVID-19 pandemic

- The higher the levels of knowledge, attitudes, and practices towards COVID-19, the lower the levels of anxiety and insomnia among the public during the COVID-19 pandemic.
- The higher the levels of social media addiction, the higher the levels of anxiety, depression and insomnia among the public during the COVID-19 pandemic.

REFERENCES:

Abdullah, M. F. I. L. B., Yusof, H. A., Shariff, N. M., Hami, R., Nisman, N. F., & Law, K. S. (2021). Depression and anxiety in the Malaysian urban population and their association with demographic characteristics, quality of life, and the emergence of the COVID-19 pandemic. *Current Psychology*, 1-12.

- Ahmad, A. R., & Murad, H. R. (2020). The impact of social media on panic during the COVID-19 pandemic in Iraqi Kurdistan: online questionnaire study. *Journal of Medical Internet Research*, 22(5), e19556. <https://doi.org/10.2196/19556>
- Al-Dmour, H., Salman, A., Abuhashesh, M., & Al-Dmour, R. (2020). Influence of social media platforms on public health protection against the COVID-19 pandemic via the mediating effects of public health awareness and behavioral changes: integrated mode. *Journal of Medical Internet Research*, 22(8), e19996. <https://doi.org/10.2196/19996>
- Ammar, A., Chtourou, H., Boukhris, O., Trabelsi, K., Masmoudi, L., Brach, M., Bouaziz, B., Bentlage, E., How, D., Ahmed, M., & Mueller, P. (2020). COVID-19 home confinement negatively impacts social participation and life satisfaction: a worldwide multicenter study. *International Journal of Environmental Research and Public Health*, 17(17), 6237.
- Ammar, A., Mueller, P., Trabelsi, K., Chtourou, H., Boukhris, O., Masmoudi, L., Bouaziz, B., Brach, M., Schmicker, M., Bentlage, E., & How, D. (2020). Psychological consequences of COVID-19 home confinement: The ECLB-COVID19 multicenter study. *PLoS One*, 15(11), e0240204. <https://doi.org/https://doi.org/10.1371/journal.pone.0240204>
- Andreassen, C. S. (2015). Online social network site addiction: A comprehensive review. *Current Addiction Reports*, 2(2), 175-184.
- Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviors*, 30(2), 252-262.
- Bao, Y., Sun, Y., Meng, S., Shi, J., & Lu, L. (2020). 2019-nCoV epidemic: address mental health care to empower society. *Lancet* 22(395), e37–e38.
- Bastien, C. H., Vallières, A., & Morin, C. M. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine*, 2(4), 297-307.
- BBC. (2020). Coronavirus: The psychology of panic buying. URL: <https://www.bbc.com/worklife/article/20200304-coronavirus-covid-19-update-why-people-are-stockpiling>

- Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*, 51(6), 843-857.
- Bethell, J., O'Rourke, H. M., Eagleson, H., Gaetano, D., Hykaway, W., & McAiney, C. (2021). Social Connection is Essential in Long-Term Care Homes: Considerations During COVID-19 and Beyond. *Canadian Geriatrics Journal (CGJ)*, 24(2), 151–153. <https://doi.org/https://doi.org/10.5770/cgj.24.488>
- Bradshaw, S. A., Playford, E. D., & Riazi, A. (2021). Living well in care homes: a systematic review of qualitative studies. *Age and Ageing*, 41(4), 429-440.
- Brailovskaia, J., Velten, J., & Margaf, J. (2019). Relationship between daily stress, depression symptoms, and Facebook addiction disorder in Germany and in the United States. *Cyberpsychology, Behavior, and Social Networking*, 22(9), 610-614.
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. . *Lancet*, Mar 14 (10227), 912-920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Budd, J., Miller, B. S., Manning, E. M., Lampos, V., Zhuang, M., Edelstein, M., Rees, G., Emery, V. C., Stevens, M. M., Keegan, N., & Short, M. J. (2020). Digital technologies in the public-health response to COVID-19. *Nature Medicine*, 26(8), 1183-1192. <https://doi.org/https://doi.org/10.1038/s41591-020-1011-4>
- Bults, M., Beaujean, D. J., de Zwart, O., Kok, G., van Empelen, P., van Steenberghe, J. E., Richardus, J. H., & Voeten, H. A. (2011). Perceived risk, anxiety, and behavioural responses of the general public during the early phase of the Influenza A (H1N1) pandemic in the Netherlands: results of three consecutive online surveys. *BMC Public Health*, 11(1), 1-13.
- Bunker, D. (2020). Who do you trust? The digital destruction of shared situational awareness and the COVID-19 infodemic. *International Journal of Information Management*, 55, 102201.
- Center for Disease Control, C. (2018). <https://www.cdc.gov/>
- Center for Disease Control, C. (2020). Coronavirus disease 2019 (COVID-19). <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/summary.html>

- Centers for Disease Control and Prevention, C. (2017). *Quarantine and isolation*. Retrieved September, 5, 2021 from <https://www.cdc.gov/quarantine/index.html>
- Centres for Disease Control and Prevention, C. (2020). *Pandemic Influenza*. <https://www.cdc.gov/flu/pandemic-resources/index.htm>
- Cicognani, E., Pirini, C., Keyes, C., Joshanloo, M., Rostami, R., & Nosratabadi, M. (2008). Social participation, sense of community and social well being: A study on American, Italian and Iranian university students. *Social Indicators Research*, 89(1), 97-112.
- Clement, J. (2020). *Percentage of US population who currently use any social media from 2008 to 2019*.
- Coombs, W. T. (210). Parameters for crisis communication. The handbook of crisis communication. In (pp. 17-53).
- Czeisler, M. É., Lane, R. I., Petrosky, E., Wiley, J. F., Christensen, A., Njai, R., Weaver, M. D., Robbins, R., Facer-Childs, E. R., Barger, L. K., & Czeisler, C. A. (2020). Mental health, substance use, and suicidal ideation during the COVID-19 pandemic—United States, June 24–30, 2020. *Morbidity and Mortality Weekly Report*, 69(32), p.1049, 69(32), 1049. <https://doi.org/10.15585/mmwr.mm6932a1>
- Del Bono, E., Sala, E., Hancock, R., Gunnell, C., & Parisi, L. (2007). Gender, older people and social exclusion: A gendered review and secondary analysis of the data. *ISER Working Paper Series, 2007-13*. <https://doi.org/http://hdl.handle.net/10419/92193>
- Deng, J., Zhou, F., Hou, W., Silver, Z., Wong, C. Y., Chang, O., Huang, E., & Zuo, Q. K. (2021). The prevalence of depression, anxiety, and sleep disturbances in COVID-19 patients: a meta-analysis. *Annals of the New York Academy of Sciences*, 1486, 90–111. <https://doi.org/https://doi.org/10.1111/nyas.14506>
- Depoux, A., Martin, S., Karafillakis, E., Preet, R., Wilder-Smith, A., & Larson, H. (2020). The pandemic of social media panic travels faster than the COVID-19 outbreak. *Journal of Travel Medicine*, 27(3), taaa031. <https://doi.org/https://doi.org/10.1093/jtm/taaa031>

- DSM-5. (2013). *Diagnostic and statistical manual of mental disorders* (Fifth Edition ed.). American Psychiatric Publishing.
- Fouques, D., Castro, D., Mouret, M., Julien-Sweerts, S., & Romo, L. (2021). Perceptions of the Post First-Lockdown Era in the Current Covid-19 Pandemic: Quantitative and Qualitative Survey of the French Population. *Front in Psychology Jun* 28(12:668961). <https://doi.org/10.3389/fpsyg.2021.668961>. PMID: 34262509; PMCID: PMC8273336
- Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H., & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PLoS One*, 15(4), p.e0231924.
- Garrett, L., 2020. COVID-19: the medium is the message. *The lancet*, 395(10228), pp.942-943. (2020). COVID-19: the medium is the message. *The Lancet*, 395(395), 942-994.
- González-Sanguino, C., Ausín, B., Castellanos, M. Á., Saiz, J., López-Gómez, A., Ugidos, C., & Muñoz, M. (2020). Mental health consequences during the initial stage of the 2020 Coronavirus pandemic (COVID-19) in Spain. *Brain, Behavior, and Immunity*, 87, 172-176.
- Griffiths, M. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use*, 10(4), 191-197.
- Hailey, D., Roine, R., & Ohinmaa, A. (2008). The effectiveness of telemental health applications: a review. *The Canadian Journal of Psychiatry*, 53(11), 769-778. <https://doi.org/https://doi.org/10.1177/070674370805301109>
- Hammad, M. A., & Alqarni, T. M. (2021). Psychosocial effects of social media on the Saudi society during the Coronavirus Disease 2019 pandemic: A cross-sectional study. *PLoS One*, 16(3), p.e0248811. <https://doi.org/https://doi.org/10.1371/journal.pone.0248811>
- Hashim JH, Adman MA, Hashim Z, Mohd Radi MF and Kwan SC (2021) COVID-19 Epidemic in Malaysia: Epidemic Progression, Challenges, and Response. *Front. Public Health* 9:560592. <https://doi: 10.3389/fpubh.2021.560592>
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R. C., Everall, I., & Ford, T. (2020). Multidisciplinary

research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry*, 7(6), 547-560.
[https://doi.org/https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/https://doi.org/10.1016/S2215-0366(20)30168-1)

Hou, F., Bi, F., Jiao, R., Luo, D., & Song, K. (2020). Gender differences of depression and anxiety among social media users during the COVID-19 outbreak in China: a cross-sectional study. *BMC Public Health*, 20(1), 1-11.

Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Research*, 288, 112954.
<https://doi.org/https://doi.org/10.1016/j.psychres.2020.112954>

Huber, M., Knottnerus, J. A., Green, L., Van Der Horst, H., Jadad, A. R., Kromhout, D., Leonard, B., Lorig, K., Loureiro, M. I., Van Der Meer, J. W., & Schnabel, P. (2011). How should we define health? *BMJ* 343:d4163. <https://doi.org/https://doi.org/10.1136/bmj.d4163>

Ibn-Mohammed, T., Mustapha, K. B., Godsell, J., Adamu, Z., Babatunde, K. A., Akintade, D. D., Acquaye, A., Fujii, H., Ndiaye, M. M., Yamoah, F. A., & Koh, S. C. L. (2021). A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies. *Resources, Conservation and Recycling*, 164, 105169.
<https://doi.org/https://doi.org/10.1016/j.resconrec.2020.105169>

Ishmaev, G., Dennis, M., & van den Hoven, M. J. (2021). Ethics in the COVID-19 pandemic: myths, false dilemmas, and moral overload. *Ethics and Information Technology*, 1-16.

Islam, M. S., Sujjan, M. S. H., Tasnim, R., Ferdous, M. Z., Masud, J. H. B., Kundu, S., Mosaddek, A. S. M., Choudhuri, M. S. K., Kircaburun, K., & Griffiths, M. D. (2020). Problematic internet use among young and adult population in Bangladesh: Correlates with lifestyle and online activities during the COVID-19 pandemic. *Addictive Behaviors Reports*, 12, 100311.

Jernigan, D. B. (2020). *100 Years Since 1918: Are We Ready for the Next Pandemic?*
<https://www.cdc.gov/flu/pandemic-resources/1918-commemoration/pdfs/1918-pandemic-webinar.pdf>

- Jia, Y., Qi, Y., Bai, L., Han, Y., Xie, Z., & Ge, J. (2021). Knowledge–attitude–practice and psychological status of college students during the early stage of COVID-19 outbreak in China: a cross-sectional study. *BMJ Open*, *11*(2), p.e045034. <https://doi.org/http://dx.doi.org/10.1136/bmjopen-2020-045034>
- Jiang, Y. (2021). Jiang, Y. *Frontiers in Psychology*, *12*, 76.
- Johnson, E. O., Roth, T., & Breslau, N. (2006). The association of insomnia with anxiety disorders and depression: exploration of the direction of risk. *Journal of Psychiatric Research*, *40*(8), 700-708.
- Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, *53*(1), 59-68.
- King, D., Koster, E., & Billieux, J. (2019). Study what makes games addictive. *Nature*, *573*(7774), p.346. *Nature*, *573*(7774), 346.
- King, D. L., Delfabbro, P. H., Billieux, J., & Potenza, M. N. (2020). Problematic online gaming and the COVID-19 pandemic. *Journal of Behavioral Addictions*, *9*(2), 184-186. <https://doi.org/https://doi.org/10.1556/2006.2020.00016>
- Kouzy, R., Abi Jaoude, J., Kraitem, A., El Alam, M. B., Karam, B., Adib, E., Zarka, J., Traboulsi, C., Akl, E. W., & Baddour, K. (2020). Coronavirus goes viral: quantifying the COVID-19 misinformation epidemic on Twitter. *Cureus*, *12*(3), e7255. <https://doi.org/10.7759/cureus.7255>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure *Journal of General Internal Medicine*, *16*(9), 606-613.
- Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Wu, J., Du, H., Chen, T., Li, R., & Tan, H. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open*, *3*(3), e203976-e203976.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.

- Le, X. T. T., Dang, K. A., Toweh, J., Nguyen, Q. N., Le, H. T., Toan, D. T. T., Phan, H. B. T., Nguyen, T. T., Pham, Q. T., Ta, N. K. T., & Nguyen, Q. T. (2020). Evaluating the psychological impacts related to COVID-19 of Vietnamese people under the first nationwide partial lockdown in Vietnam. *Frontiers in Psychiatry, 11*, 824.
- Lee, J. J., Kang, K. A., Wang, M. P., Zhao, S. Z., Wong, J. Y. H., O'Connor, S., Yang, S. C., & Shin, S. (2020). Associations between COVID-19 misinformation exposure and belief with COVID-19 knowledge and preventive behaviors: cross-sectional online study. *Journal of Medical Internet Research, 22*(11), e22205.
- Lei, L., Huang, X., Zhang, S., Yang, J., Yang, L., & Xu, M. (2020). Comparison of prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 epidemic in Southwestern China. *International Medical Journal of Experimental and Clinical Research, 26*, e924609-924601.
- Li, X., & Liu, Q. (2020). Social media use, eHealth literacy, disease knowledge, and preventive behaviors in the COVID-19 pandemic: Cross-sectional study on Chinese netizens. *Journal of Medical Internet Research, 22*(10), e19684. <https://doi.org/10.2196/19684>
- Lin, L. Y., Wang, J., Ou-Yang, X. Y., Miao, Q., Chen, R., Liang, F. X., Zhang, Y. P., Tang, Q., & Wang, T. (2021). The immediate impact of the 2019 novel coronavirus (COVID-19) outbreak on subjective sleep status. *Sleep Medicine, 77*, 348-354.
- Lin, Y., Hu, Z., Alias, H., & Wong, L. P. (2020). Knowledge, attitudes, impact, and anxiety regarding COVID-19 infection among the public in China. *Frontiers in Public Health, 8*, 236. <https://doi.org/https://doi.org/10.3389/fpubh.2020.00236>
- Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Medical Care, 266*-274.
- Margetić, B., Peraica, T., Stojanović, K., & Ivanec, D. (2021). Predictors of emotional distress during the COVID-19 pandemic; a Croatian study. *Personality and Individual Differences 175*(110691). <https://doi.org/10.1016/j.paid.2021.110691>. Epub 2021 Jan 26. PMID: 33518867; PMCID: PMC7837615
- Marty, A. M., & Jones, M. K. (2020). The novel Coronavirus (SARS-CoV-2) is a one health issue. *One Health, 9*(100123). <https://doi.org/https://doi.org/10.1016/j.onehlt.2020.100123>

- Mazza, C., Ricci, E., Biondi, S., Colasanti, M., Ferracuti, S., Napoli, C., & Roma, P. (2020). A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: immediate psychological responses and associated factors. *International Journal of Environmental Research and Public Health*, 17(9), 3165. <https://doi.org/10.3390/ijerph17093165>
- Meo, S. A., Alhowikan, A. M., Al-Khlaiwi, T., Meo, I. M., Halepoto, D. M., Iqbal, M., Usmani, A. M., Hajjar, W., & Ahmed, N. (2020). Novel coronavirus 2019-nCoV: prevalence, biological and clinical characteristics comparison with SARS-CoV and MERS-CoV. *European Review for Medical Pharmacological Sciences* 24(4), 2012-2019.
- Merchant, R. M., & Lurie, N. (2020). Social media and emergency preparedness in response to novel coronavirus. *JAMA*, 323(20), 2011-2012.
- Mohamad, E., & Azlan, A. A. (2020). COVID-19 and communication planning for health emergencies. *Jurnal Komunikasi: Malaysian Journal of Communication*, 36, 1.
- Morin, C. M., & Carrier, J. (2021). The acute effects of the COVID-19 pandemic on insomnia and psychological symptoms. *Sleep Medicine*, 77, 346-347. <https://doi.org/10.1016/j.sleep.2020.06.005>
- Motta, M., Stecula, D., & Farhart, C. (2020). How right-leaning media coverage of COVID-19 facilitated the spread of misinformation in the early stages of the pandemic in the US. *Canadian Journal of Political Science/Revue canadienne de science politique*, 53(2), 335-342.
- Munk, A. J., Schmidt, N. M., Alexander, N., Henkel, K., & Hennig, J. (2020). Covid-19—Beyond virology: Potentials for maintaining mental health during lockdown. *PLoS One*, 15(8), p.e0236688.
- Nabi, R. L., Torres, D. P., & Prestin, A. (2017). Guilty pleasure no more. *Journal of Media Psychology*, 19(3), 126–136. <https://doi.org/10.1027/1864-1105/a000223>
- Nemati, M., Ebrahimi, B., & Nemati, F. (2020). Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. *Archives Clinical Infectious Disease*, 15 (COVID-19). <https://doi.org/10.5812/archcid.102848>
- New Straits Times. (2020). Covid-19: Movement Control Order imposed with only essential sectors operating. *New Straits Times*.

- Ni, M. Y., Yang, L., Leung, C. M., Li, N., Yao, X. I., Wang, Y., Leung, G. M., Cowling, B. J., & Liao, Q. (2020). Mental health, risk factors, and social media use during the COVID-19 epidemic and cordon sanitaire among the community and health professionals in Wuhan, China: cross-sectional survey. *JMIR Mental Health*, 7(5), p.e19009. <https://doi.org/https://mental.jmir.org/2020/5/e19009>
- Nimrod, G. (2020). Changes in internet use when coping with stress: older adults during the COVID-19 pandemic. *The American Journal of Geriatric Psychiatry*, 28(10), 1020-1024.
- Nwachukwu, I., Nkire, N., Shalaby, R., Hrabok, M., Vuong, W., Gusnowski, A., Surood, S., Urichuk, L., Greenshaw, A. J., & Agyapong, V. I. COVID-19 pandemic: age-related differences in measures of stress, anxiety and depression in Canada. *International Journal of Environmental Research and Public Health*, 17(17), 6366. <https://doi.org/10.3390/ijerph17176366>
- Nwachukwu, I., Nkire, N., Shalaby, R., Hrabok, M., Vuong, W., Gusnowski, A., Surood, S., Urichuk, L., Greenshaw, A. J., & Agyapong, V. I. (2020). COVID-19 pandemic: age-related differences in measures of stress, anxiety and depression in Canada. *International Journal of Environmental Research and Public Health*, 17(17), 6366. <https://doi.org/10.3390/ijerph17176366>
- Okan, O., Bollweg, T. M., Berens, E. M., Hurrelmann, K., Bauer, U., & Schaeffer, D. (2020). Coronavirus-related health literacy: A cross-sectional study in adults during the COVID-19 infodemic in Germany. *International Journal of Environmental Research and Public Health*, 17(15), 5503.
- Olagoke, A. A., Olagoke, O. O., & Hughes, A. M. (2020). Exposure to coronavirus news on mainstream media: the role of risk perceptions and depression. *British Journal of Health Psychology*, 25(4), 865-874.
- Onder, G., Rezza, G., & Brusaferro, S. (2020). Onder, G., Rezza, G. and Brusaferro, S., 2020. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*, 323(18), 1775-1776.
- Ozamiz-Etxebarria, N., Dosil-Santamaria, M., Picaza-Gorrochategui, M., & Idoiaga-Mondragon, N. (2020). Stress, anxiety, and depression levels in the initial stage of the COVID-19 outbreak in a population sample in the northern Spain. *Cadernos de Saude Publica*, 36(4). <https://doi.org/https://doi.org/10.1590/0102-311X00054020>

- Pal, K., & Danda, S. (2021). Stress, Anxiety Triggers and Mental Health Care Needs Among General Public Under Lockdown During COVID-19 Pandemic: a Cross-Sectional Study in India. *International Journal of Mental Health and Addiction*, 1-12. <https://doi.org/https://doi.org/10.1007/s11469-021-00596-x>
- Park, C. L., Russell, B. S., Fendrich, M., Finkelstein-Fox, L., Hutchison, M., & Becker, J. (2020). Americans' COVID-19 stress, coping, and adherence to CDC guidelines. *Journal of General Internal Medicine*, 35(8), 2296-2303.
- Pearman, O., Boykoff, M., Osborne-Gowey, J., Aoyagi, M., Ballantyne, A. G., Chandler, P., Daly, M., Doi, K., Fernández-Reyes, R., Jiménez-Gómez, I., & Nacu-Schmidt, A. (2021). COVID-19 media coverage decreasing despite deepening crisis. *The Lancet Planetary Health*, 5(1), e6-e7.
- Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Pennycook, G., McPhetres, J., Zhang, Y., Lu, J.G. and Rand, D.G., 2020. Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science*, 31(7), 770-780.
- Person, B., Sy, F., Holton, K., Govert, B., & Liang, A., 2004. Fear and stigma: the epidemic within the SARS outbreak. *Emerging infectious diseases*, 10(2), p.358. (2004). Fear and stigma: the epidemic within the SARS outbreak. *Emerging Infectious Diseases*, 10(2), 358-363. <https://doi.org/10.3201/eid1002.030750>
- Pfefferbaum, B., & North, C. S. (2021). Mental Health and the Covid-19 Pandemic. *The New England Journal of Medicine*, 383(6), 510-512. <https://doi.org/DOI:10.1056/NEJMp2008017>
- Prilleltensky, I., Nelson, G., & Peirson, L. (2001). The role of power and control in children's lives: An ecological analysis of pathways toward wellness, resilience and problems. *Journal of Community & Applied Social Psychology*, 11(2), 143-158.
- Puwaneswary, M., Ayeshah, Z. N., Gaaitheri, K., Lim, K. Q., Wong, Y. H., Tang, S. L., & Ng, C. G. (2020). Development of Knowledge, Attitudes, and Practices (KAP) Towards COVID-19 Pandemic in Malaysia. *Medicine and Health-Kuala Lumpur*, 262-275.
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic:

implications and policy recommendations. *General Psychiatry*, 33(2). <https://doi.org/e100213corr1>

- Rakhmanov, O., & Dane, S. (2020). Knowledge and anxiety levels of African university students against COVID-19 during the pandemic outbreak by an online survey. *Journal of Research in Medical and Dental Science*, 8(3), 53-56.
- Rias, Y. A., Rosyad, Y. S., Chipojola, R., Wiratama, B. S., Safitri, C. I., Weng, S. F., Yang, C. Y., & Tsai, H. T. (2020). Effects of spirituality, knowledge, attitudes, and practices toward anxiety regarding COVID-19 among the general population in Indonesia: a cross-sectional study. *Journal of Clinical Medicine*, 9(12).
- Richter, D., Riedel-Heller, S., & Zuercher, S., 2021. (2021). Mental health problems in the general population during and after the first lockdown phase due to the SARS-Cov-2 pandemic: Rapid review of multi-wave studies. *Epidemiology and Psychiatric Sciences*, 30 e27, 1-17. <https://doi.org/https://doi.org/10.1017/S2045796021000160>
- Rubin, G. J., & Wessely, S. (2020). The psychological effects of quarantining a city. *BMJ*, 368. <https://doi.org/https://doi.org/10.1136/bmj.m313>
- Sadeh, A. (2015). Sleep assessment methods. *Monographs of the Society for Research in Child Development*, 80(1), 33-48.
- Sahni, H., & Sharma, H. (2020). Role of social media during the COVID-19 pandemic: Beneficial, destructive, or reconstructive? *International Journal of Academic Medicine*, 6(2), 70-74. 243.130.185.216]
- Salari, N., Hosseinian-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., Rasoulpoor, S., & Khaledi-Paveh, B. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health*, 16(57). <https://doi.org/https://doi.org/10.1186/s12992-020-00589-w>
- Sánchez-Sánchez, E., Díaz-Jimenez, J., Rosety, I., Alférez, M. J. M., Díaz, A. J., Rosety, M. A., Ordonez, F. J., & Rosety-Rodriguez, M. (2021). Perceived stress and increased food consumption during the ‘Third Wave’ of the COVID-19 Pandemic in Spain. *Nutrients*, 13(7), 2380. <https://doi.org/https://doi.org/10.3390/nu13072380>

- Sarsour, K., Morin, C. M., Foley, K., Kalsekar, A., & Walsh, J. K. (2010). Sarsour, K., Morin, C.M., Foley, K., Kalsekar, A. and Walsh, J.K., 2010. Association of insomnia severity and comorbid medical and psychiatric disorders in a health plan-based sample: insomnia severity and comorbidities *Sleep Medicine*, *11*(1), 69-74.
- Schnell, T., & Krampe, H. (2020). Meaning in life and self-control buffer stress in times of COVID-19: moderating and mediating effects with regard to mental distress. *Frontiers in Psychiatry*, *11*, 983.
- Sharma, M. K., Anand, N., Vishwakarma, A., Sahu, M., Thakur, P. C., Mondal, I., Singh, P., & S, A. (2020). Mental health issues mediate social media use in rumors: implication for media based mental health literacy. *Asian Journal of Psychiatry*, *53*, 102132. <https://doi.org/https://doi.org/10.1016/j.ajp.2020.102132>
- Sherina, M. S., Arroll, B., & Goodyear-Smith, F. (2012). Criterion validity of the PHQ-9 (Malay version) in a primary care clinic in Malaysia. *The Medical Journal of Malaysia*, *67*(3), 309-315.
- Shi, L., Lu, Z. A., Que, J. Y., Huang, X. L., Liu, L., Ran, M. S., Gong, Y. M., Yuan, K., Yan, W., Sun, Y. K., & Shi, J. (2020). Prevalence of and risk factors associated with mental health symptoms among the general population in China during the coronavirus disease 2019 pandemic. *JAMA Network Open*, *3*(7), e2014053-e2014053.
- Sidik, S. M., Arroll, B., & Goodyear-Smith, F. (2012). Validation of the GAD-7 (Malay version) among women attending a primary care clinic in Malaysia. *Journal of Primary Health Care*, *4*(1), 5-11.
- Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*, *166*, 1092-1097.
- Su, T. P., Lien, T. C., Yang, C. Y., Su, Y. L., Wang, J. H., Tsai, S. L., & Yin, J. C. (2007). Prevalence of psychiatric morbidity and psychological adaptation of the nurses in a structured SARS caring unit during outbreak: a prospective and periodic assessment study in Taiwan. *Journal of Psychiatric Research*, *41*(1-2), 119-130. <https://doi.org/https://doi.org/10.1016/j.jpsychires.2005.12.006>
- Su, Z., McDonnell, D., Wen, J., Kozak, M., Abbas, J., Šegalo, S., Li, X., Ahmad, J., Cheshmehzangi, A., Cai, Y., & Yang, L. (2021). Mental health consequences of COVID-19 media coverage: the need for effective crisis communication practices. *Globalization and Health*, *17*(1), 1-8. <https://doi.org/https://doi.org/10.1186/s12992-020-00654-4>

- Sun, J., He, W. T., Wang, L., Lai, A., Ji, X., Zhai, X., Li, G., Suchard, M. A., Tian, J., Zhou, J., & Veit, M. (2020). COVID-19: Epidemiology, evolution, and cross-disciplinary perspectives. *Trends in Molecular Medicine*, 26(5), 483-495.
- Sun, Y., Li, Y., Bao, Y., Meng, S., Sun, Y., Schumann, G., Kosten, T., Strang, J., Lu, L., & Shi, J. (2020). Brief report: increased addictive internet and substance use behavior during the COVID-19 pandemic in China. *The American Journal On Addictions*, 29(4), 268-270.
- Team, E. (2020). The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19)—China, 2020. *China CDC Weekly*, 2(8), 113–122.
- Tee, M. L., Tee, C. A., Anlacan, J. P., Aligam, K. J. G., Reyes, P. W. C., Kuruchittham, V., & Ho, R. C. (2020). Psychological impact of COVID-19 pandemic in the Philippines. *Journal of Affective Disorders*, 227, 379-391.
- Thelwall, M., & Thelwall, S. (2020). Retweeting for COVID-19: Consensus building, information sharing, dissent, and lockdown life. *arXiv preprint arXiv:2004.02793*, 10.
- Toussaint, A., Hüsing, P., Gumz, A., Wingenfeld, K., Härter, M., Schramm, E., & Löwe, B. (2020). Sensitivity to change and minimal clinically important difference of the 7-item Generalized Anxiety Disorder Questionnaire (GAD-7). *Journal of Affective Disorders*, 265, 395-401.
- van Ingen, E., Utz, S., & Toepoel, V. (2016). Measurement, prevalence, and relation with internet activities and well-being. *Social Science Computer Review*, 34(5), 511-529.
- Wang, C., Horby, P. W., Hayden, F. G., & Gao, G. F. (2020). A novel coronavirus outbreak of global health concern. *The Lancet*, 395(10223), 470-473.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17(5), 1729. <https://doi.org/https://doi.org/10.3390/ijerph17051729>

- Wang, Y., Di, Y., Ye, J., & Wei, W. (2021). Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China. *Psychology, Health & Medicine*, 26(1), 13-22. <https://doi.org/https://doi.org/10.1080/13548506.2020.1746817>
- Wathelet, M., Duhem, S., Vaiva, G., Baubet, T., Habran, E., Veerapa, E., Debien, C., Molenda, S., Horn, M., Grandgenèvre, P., & Notredame, C. E. (2020). Factors associated with mental health disorders among university students in France confined during the COVID-19 pandemic. *JAMA Network Open*, 3(10), pp.e2025591-e2025591.
- WHO, W. H. O. (2020). *Coronavirus disease (COVID-19) pandemic*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- Wiederhold, B. K. (2020). Using social media to our advantage: alleviating anxiety during a pandemic. *Cyberpsychology, Behavior, and Social Networking*, 23(4), 197-198.
- Wong, L. P., & Alias, H. (2021). Temporal changes in psychobehavioural responses during the early phase of the COVID-19 pandemic in Malaysia. *Journal of Behavioral Medicine*, 44(1), 18-28. <https://doi.org/https://doi.org/10.1007/s10865-020-00172-z>
- World Health Organization, W. (2002). *Active ageing: A policy framework*. World Health Organization. Retrieved September 5, 2021 from
- World Health Organization, W. (2020a). *Coronavirus disease (COVID-19) pandemic*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- World Health Organization, W. (2020b). *Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19)* <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>.
- World Health Organization, W. (2020c). *Rolling Updates on Coronavirus Disease (COVID-19)*.
- Wu, Y. C., Chen, C. S., & Chan, Y. J. (2020). The outbreak of COVID-19: An overview. *Journal of the Chinese Medical Association*, 83(3), 217-220.
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on

mental health in the general population: A systematic review. *Journal of Affective Disorders*, 277, 55-64. <https://doi.org/https://doi.org/10.1016/j.jad.2020.08.001>

- Xu, Z., Shi, L., Wang, Y., Zhang, J., Huang, L., Zhang, C., Liu, S., Zhao, P., Liu, H., Zhu, L., & Tai, Y. (2020). Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *The Lancet Respiratory Medicine*, 8(4), 420-422.
- Zainudeen, Z. T., Abd Hamid, I. J., Azizuddin, M. N. A., Bakar, F. F. A., Sany, S., Zolkepli, I. A., & Mangantig, E. (2021). Psychosocial impact of COVID-19 pandemic on Malaysian families: a cross-sectional study. *BMJ Open*, 11(8), e050523.
- Zhang, C., Yang, L., Liu, S., Ma, S., Wang, Y., Cai, Z., Du, H., Li, R., Kang, L., Su, M., & Zhang, J. (2020). Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Frontiers in Psychiatry*, 11. <https://doi.org/https://doi.org/10.3389/fpsyt.2020.00306>
- Zhang, J., Lu, H., Zeng, H., Zhang, S., Du, Q., Jiang, T., & Du, B. (2020). The differential psychological distress of populations affected by the COVID-19 pandemic. *Brain, Behavior, and Immunity*, 87, 49.
- Zheng, Y., Goh, E., & Wen, J. (2020). The effects of misleading media reports about COVID-19 on Chinese tourists' mental health: a perspective article. *Anatolia*, 31(2), 337-340.
- Zhong, B. L., Luo, W., Li, H. M., Zhang, Q. Q., Liu, X. G., Li, W. T., & Li, Y. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *International Journal of Biological Sciences*, 16(10).
- Zimmerman, S., Scott, A. C., Park, N. S., Hall, S. A., Wetherby, M. M., Gruber-Baldini, A. L., & Morgan, L. A. (2003). Social engagement and its relationship to service provision in residential care and assisted living. *Social Work Research*, 27(1), 6-18. <https://doi.org/https://doi.org/10.1093/swr/27.1.6>
- Zürcher, S. J., Kerksieck, P., Adamus, C., Burr, C. M., Lehmann, A. I., Huber, F. K., & Richter, D. (2000). Prevalence of mental health problems during virus epidemics in the general public, health care workers and survivors: a rapid review of the evidence. *Frontiers in Public Health*, 8:560389. <https://doi.org/10.3389/fpubh.2020.560389>