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The mental health impact of COVID-19: the need for community interventions and collaboration for recovery

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Abstract

Background: Since 2019, the COVID-19 epidemic has spread across the world, affecting millions of individuals on physical, mental, and socioeconomic levels. **Materials and methods:** This qualitative study aims to map out the mental health consequences of the COVID-19 pandemic and suggest recovery strategies based on analyzing COVID-19 mental health and psychosocial impact-related comments on social/news media, participant's observations, and participant action research. The results and suggested recovery strategies were triangulated with literature survey. **Results:** In COVID sufferers, neuropsychiatric symptoms lasting months were noted while some went on to have a relapse of psychological or neurological conditions. In the general population, common consequences included common mental health disorders, changing patterns of substance abuse particularly alcohol, and increased domestic violence. Family relationships and interactions generally improved but in a minority had strained dynamics. Vulnerable groups included the elderly, women, youth, children, disabled, frontline and health workers, minorities, and severely mentally ill. At the community level, there were signs of collective (mass) hysteria from panic buying to conspiracy theories, public shaming, fake news, and disinformation spreading on social media and mass protests. There were also positive effects such as better understanding of bio-knowledge, interventions and discoveries, online learning, gratitude toward health-care workers, increased community and family cohesion, reduction in road traffic accidents, and drop in other respiratory infections with their resultant morbidity and mortality. **Conclusion:** Given the widespread mental health consequences of the COVID-19 pandemic, a community-based approach is suggested while treating more severe mental disorders at the primary care or specialist level.

Keywords: *mental health consequences, COVID-19, social media myths, mental health promotion, community strategies, psychosocial*

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1. Introduction

Similar to pandemics that have affected the world including the so-called Spanish flu of the last century and the Bubonic plagues of the past, the current COVID-19 pandemic has spread across the globe affecting millions of people physically, mentally, socially, and economically. It was, is, and will continue to be a global challenge to humanity, a health, and socioeconomic crisis played out on online and social media like none before that has drawn people and nations together, bringing out the best and worst in humanity with deaths, isolation, physical distancing, travel and relationship barriers, stigmatism, racism, and xenophobia against some communities [1]. In addition to changes to individuals, families, communities, nations, and international relationships, long-term sequelae will continue in the post-COVID era.

Starting initially in December 2019 in Wuhan province, China, COVID-19 disease gradually spread worldwide from early 2020 to be declared a pandemic by the World Health Organization

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(WHO) by March 2020 [2, 3]. The virus has caused millions of deaths globally and radically impacted human life on the planet; but its actual origin, whether it was from an animal source (zoonosis) or accidentally leaked from a laboratory, remains highly contentious politically and scientifically [4]. Human transmission of SARS-CoV-2 is mainly through respiratory droplets from an infected person, with 80% of infected persons developing mild or no symptoms [5]. As such, human interactions and their behaviors are crucial in the spread and control of the disease. Even though four years elapsed since the disease started, many parts of the world struggled to control the spread as well as the consequences of infections. Measures adapted to control the spread such as lockdowns of cities or local geographical areas; restrictions of people's movement; hotel, home, and other quarantine; testing, contact tracing, vaccination, and issues related to its rollout have also led to mental health and psychosocial (MHPS) consequences. It was further complicated by rapid changes and innervations in public health methods adapted due to the evolving crisis and available information. People found it hard to adapt to the changing rules and regulations due to the enormous information released in a short period (infodemic) of time. Long-term public health control measures and their socioeconomic repercussions are blamed for their significant impact on MHPS consequences at the individual and collective levels. However, the increase in MHPS consequences resulted not only from the control measures but also from the effects of catching an infection [6] as well as social reactions like stigmatization. Research has shown that non-pharmacological interventions [7] such as mask-wearing, physical distancing, and other "social vaccine" measures [8–10] were needed to continue despite high coverage of vaccination to overcome the pandemic. Even though new oral antiviral treatments (molnupiravir and nirmatrelvir/ritonavir combination) became available for mild to moderate community infections, equity of accessibility remains an issue [11] that has been further emphasized with the arrival of the omicron variant, which was more transmissible and caused outbreaks in various parts of the world [12]. Further, the recent BA.2.86 variant known as Pirola with many unique mutations has continued to evolve [13]. With the challenges that were posed by the unfolding COVID pandemic, this qualitative study aims to map out the psychosocial and mental health consequences of the COVID-19 pandemic in the early years of the pandemic, useful lessons that can be learned and suggest strategies for addressing common MHPS consequences of similar pandemic-related situations.

2. Material and methods

This study is a qualitative analysis of the impact of the COVID-19 pandemic including preventive measures adopted to curtail the spread of MHPS consequences among those infected, vulnerable groups and communities. Further, this study also explored suitable MHPS interventions, along with collective coping strategies that can be adapted as public health measures.

2.1. Study design and recruitment

This qualitative study was primarily based on analyzing comments and posts that appeared on social and news media. Participant's observations from working in busy health clinics, general practices, primary and community care settings, and dedicated COVID-19 acute care wards during the pandemic in Australia, the United Kingdom, and Sri Lanka and discussions with colleagues worldwide were also used in the data.

As a form of triangulation, a systematic search on Google Scholar and PubMed for reputed journal articles and reports on the COVID pandemic and its MHPS impact was done to cross-check the comments from social or news media, participant observations, and our analysis. The following keywords "COVID-19", "SARS-CoV2", "Psychosocial", "mental health", "social media", and "Pandemic" were used for the search. Few newspaper reports related to COVID-19, relevant reports, and articles that participants had read while working during the pandemic were also included according to the context.

The study period was from the start of the pandemic December 2019 to January 2022. Data extraction, collection, and categorizing of the key phrases were carried out from published reports and articles, comments from social and news media, discussions, and personal observations and cross-checked by all the investigators. The data were grouped to identify emerging themes. Thematic analysis was carried out to understand the collected data and uncover negative and positive themes representing significant public perceptions and responses toward the COVID-19 pandemic. This thematic analysis framework [14, 15] (**Figure 1**) grouped the data under the same themes summarized in **Tables S1** and **S2** (Supplementary materials). All authors agreed on the grouping through discussion.

We looked specifically into the direct mental health effects related to catching the infection, and indirect psychosocial effects on the general population including consequences from multiple

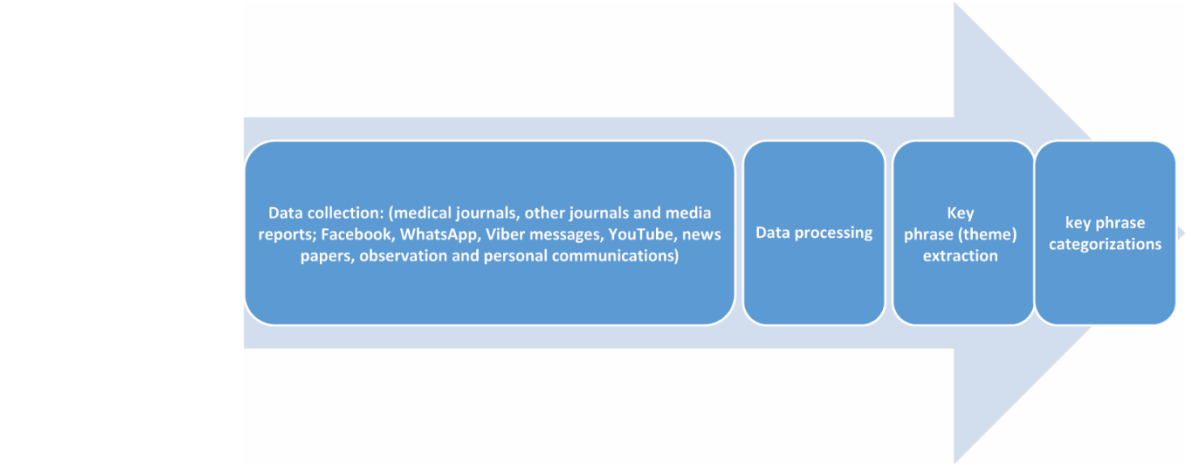

Figure 1 • Outline of methods adapted.

public health measures adopted to curtail the infection such as lockdowns, border closure, and quarantine; isolation of contacts; COVID-19 testing; and vaccination rollout.

Participant's observations and experience of working on the frontlines during the pandemic, discussions with colleagues worldwide, and experience of dealing with past disasters were used to put forward management strategies. This paper is in a way a record of the extraordinary journey of clinicians originally from the Faculty of Medicine, University of Jaffna, but now dispersed globally struggling to understand the unfolding pandemic from observations, reading social and news media, searching the literature, consulting trying to find the best treatment to patients, their families, and communities caught up in the COVID-19 crisis, a form of participatory action research (PAR).

3. Results

In this study, we analyzed news and social media comments and participant's observations of people's opinions or perceptions regarding the COVID-19 pandemic to uncover the MHPS reactions, impact, and issues. Even though some of the participant's observations were more directly relevant to health care workers (HCWs), they also indirectly applied to the general community as well. Our findings revealed negative and positive themes in MHPS consequences due to the COVID-19 pandemic as summarized in the tables and figures.

Further our review indicates that mental health consequences of COVID-19 can be usefully seen within a framework of biopsychosocial dimensions. COVID-19 infection can cause pathological changes in the brain through direct vascular injury, neurotransmitter system dysfunction, and/or thrombosis, leading to neuronal damage believed to be mediated mainly via micro thrombosis formation and cytokine storm resulting in neuropsychiatric symptoms (**Figure 2**) [16, 17] with MHPS consequences. Common symptoms reported were "anosmia, cognitive, and attention deficits (i.e., brain fog), new-onset anxiety, depression, psychosis, seizures, and even suicidal behavior" [16, 17].

3.1. Emerging negative themes

We observed overall the news media and social media comments and participant's observations indicated the negative impact caused by COVID-19 (**Table 1**, see supplement for comments).

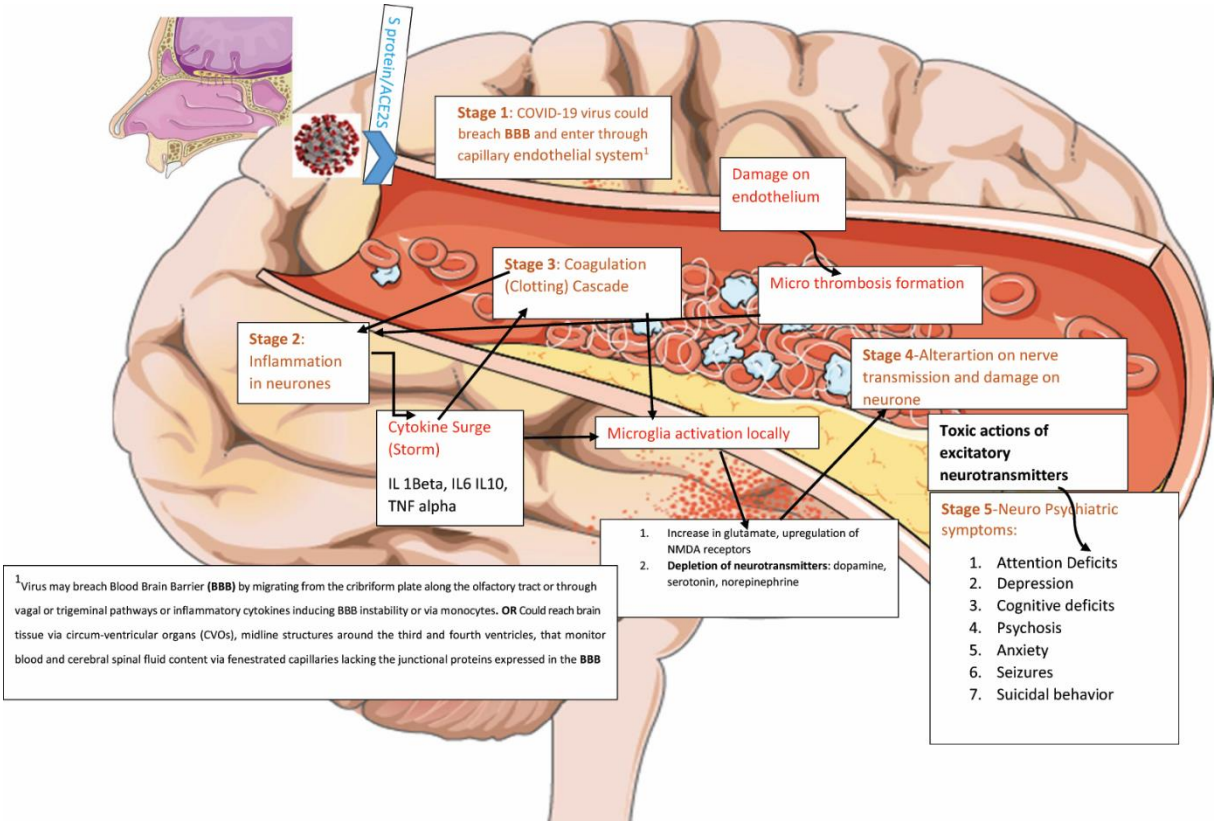

Figure 2 • Pathological changes in the brain due to COVID-19 infection.

Table 1 • Mental health and psychosocial comments: negative themes, descriptions (comments related to themes in supplement)

Theme (common stressors/reactions)	Descriptions
1. Maladaptive attitudes	Blaming, shaming people who are not obeying guidelines, travel restrictions, lockdowns
2. Conspiracy theories	Blaming certain countries, religious society, religion, industries (Big Pharma) or certain technologies (G5) as cause/origin/spread of COVID-19
3. Panic buying or hoarding	Fear and panic through social media could fuel psychological reactions in the midst of crises
4. Protests, violent outbreaks (mass hysteria)	Certain groups come together over COVID, and capitalized on the unemployment, restrictions, frustrations, anger, and uncertainty in sections of the community

5. Concern of parents of children with special needs	Imposed a greater challenge to the families with special needs, e.g., autism children. Assessing their routine services and recreational places were limited posing an effect on family dynamics
6. Health system strain/health staff burnout	**a. Hospital settings (emergency/ICU)**
	b. Primary care setting 1. COVID-19 posed several situations where primary care physicians have to refuse several requests from patient, which are against the public health advice 2. New system-related issues after COVID-19 pandemic causes significant stress on GPs 3. COVID—vaccine rollout Tier systems for COVID vaccination led to mass panic in lower end of priority risk groups as they wanted to have it quickly
	c. Mental health facilities Disruptions to mental health services for vulnerable people, to counseling and psychotherapy; critical harm reduction services; to emergency interventions, including those for people experiencing prolonged seizures; severe substance use withdrawal syndromes; and delirium to access for medications for mental, neurological, and substance use disorders and disruptions to school and workplace mental health services
7. COVID-19 stigma	Stigma related to COVID-19 testing and isolation
8. Preventing culturally appropriate rituals for COVID-19 deaths	Govt. mandated forced cremation causing unresolved and extended grief, guilt affecting the targeted community in Sri Lanka for Political victimization, reprisal
9. Misinformation, fake news spread in social media	The large volume of the message causing confusion among the public (Infodemics), which further complicated by inappropriate messages
10. Reduced social connection and support	Mainly due to lockdowns and restrictions on movement 1. People get anxious at the start of lockdowns, then their coping resources get eroded over time. Prolong lockdowns also pose strain on relationships and increase domestic violence, child abuse 2. Social isolation is particularly a problem for the elderly living alone who are not able to have visitors or family to on them 3. Boarder closure-related issues
11. Economical strain	People fear about losing their income from catching an infection and prolong admission to hospital, or self-isolation for 14 days by catching an infection according to public health, further many small businesses especially the hospitality sector forced to close their business, and many lost their employment Prolonged lockdowns causing economic stagnation; lack of movement of goods; transport restrictions, overseas trade, etc. Lots of high street starter businesses were ruined as online platforms took over everything. This caused uncertainty and anger/anxiety for those people working in those sectors. Also, the uncertainty of future job losses exacerbated mental health issues
12. Concerns children/adolescent's mental health	They lost social interaction with their peers and teachers in general. They are affected by "zoom fatigue" due to prolong online education Many children spent long hours on computers and gaming gadgets, which led to not only issues with eye sights but also wide mental health issues such as anxiety, fidgetiness, hyper arousal, poor sleep, and bad dreams as sometimes they played non-age-appropriate computer games
13.Fitness issues	The perceptions and social media messages; those doing regular activities, sports, and using gyms for a regular workout before the lockdown were greatly impacted by the COVID-19 pandemic
14. Long COVID syndrome	Various studies over the past 18 months estimate Long COVID can affect anywhere from 2.3% to 7.6% of COVID-19 cases Symptoms lasting for months; fatigue, mind fog, depression, body pain....
15. Nostalgia-retrospection and frustrations due to life disruptions	People recall life before COVID and get frustrated and due to disruption in daily activities such as household chores, sporting events suspension, high food prices, and closure of restaurants also causing frustration
16. Problems related to working from home	Disturbance from other members and from kids causes psychological stress, pain, and sleep disturbances
17. Anxiety about life after lockdown.	Mental health issues (fear, anxiety) of going back to work; socializing after long lockdowns

For example, hospital admission due to infection significantly caused stress on patients, which led to mental health consequences. One of the participant observation comments regarding the enormous stress on COVID-19 patients in hospitals is as follows:

"I had a GP (General Practitioner) and his patient was in the same ward opposite to each other. Sadly GP died within a few days and the patient witnessed the death. That gave him huge anxiety. But he later survived". **PO5**

In addition, surging admissions caused significant stress on health staff and we observed several examples:

"I have witnessed doctors and Nurses (mainly working in Intensive Therapy Unit (ITU) and Respiratory wards) struggled to cope with the sheer volume of deaths within a short period". **PO1**

"One of my colleagues is currently off sick due to PTSD and getting treatment. Junior doctors needed support from Psychologists". **PO3**

Further many worried about children/adolescent's mental health due to the lockdown and closure of schools, sports activities, and reduced social connections. Some example comments are as follows:

"Her world contracted. She began living on social media, seeing her peers' interstate and overseas living their best lives". **C45**

"Many other families are doing it much worse with their kids who already had difficult circumstances to deal with before the pandemic". **C46**

"In Sri Lanka, at quarantine centres children were not allowed and they were left alone at home with grandparents while parents are kept alone for 10 days. That has created lot of psychological issues". **PO7**

Another common observation was substance use, particularly the use of alcohol increased during lockdown imposed to curtail the virus spread. One of our observations as below may explain a contribution to increasing alcohol use in Sri Lanka.

"Alcohol outlets were opened for business even after listing lockdown of cities and travel restrictions for people movements in Sri Lanka during initial months of the outbreak". **PO10**

3.2. Consequences at the community or collective level

Mental health issues among the HCWs due to an overstretched health system were one of the common collective negative themes in our qualitative exploration. The following are sample comments:

"Mental health specialists closing books as demand peaks during COVID-19 pandemic-The ABC has spoken to several GPs who are frustrated and concerned they can no longer refer people to psychologists or psychiatrists". **C29**

"Sydney hospitals erect emergency tents as COVID-19 cases hit record, paramedics were given a choice to wait in their vehicles with infected people or wait outside in the freezing rain due to the rise in patients". **C19**

During the initial stage of the pandemic, many countries adopted travel restrictions and border control as a public health response and many blamed this for mental health consequences as mentioned in the following comment:

"From March [2020] onward it was total lockdown," she says. Because of continuing travel restrictions, she fears it might be another year before they can reunite. "It's going to be heartbreaking". **C41**

Many comments in our analysis indicated the common negative theme as "Economical strain" especially in developing countries such as Sri Lanka, which was the main reason for poor mental health during a pandemic. Following are sample comments:

"Bills keep coming in, real estate agent asks for deferred rent to be repaid in full… daughter needs glasses, other daughter has anxiety and becomes depressed". **C42**

"The government does not see that mental impact of being unemployed and getting the distinct feeling you are seen as scum". **C43**

Participant's observations attributed economic hardships and poverty to increasing suicide rates during 2021 in Jaffna. Comparatively, it was observed that in Australia and the United Kingdom, there were effective economic support and packages that could have been one factor for the lower suicide rates there.

At the community level, the stigma of being identified as an individual with COVID-19 caused significant stress, especially in developing countries but also observed in developed countries as mentioned in the following comments:

"It's like a shock for them as they believed they arrived in a free country and they say, 'we face the same what we face in our (home) country". **C6**

"Shame, stigma barriers to COVID-19 testing for young and culturally diverse". **C33**

The main findings of our analysis were of collective level consequences, community reactions in several countries that appeared in the media during the COVID-19 pandemic, for example, resulting in mass panic reactions:

"People in NSW are panic-buying toilet paper again after larger area were placed into a two-week lockdown on Saturday". **C11**

Further, politically motivated divisions were observed in some developed nations such as the United States during the 2020 election. Following are sample comments:

"'It's almost like grooming': how anti-vaxers, conspiracy theorists, and the far-right came together over COVID-19". **C14**

"Public opinion about coronavirus is more politically divided in the U.S. than in other advanced economies". **C15**

We also found media reports that related religious preaching of beliefs and conspiracy theories to vaccine hesitancy leading to the emergence of new variants such as "Omicron".

"It's your democratic right to choose [but] I just say that life and death is in the hands of God". **C7**

"Omicron variant hits South Africa, as country encounters vaccine hesitancy, conspiracy theories". **C8**

As Long COVID was a new concept in the initial years, participants mentioned they got vague answers from health workers:

"No one can tell you anything about it or when it might end. You're just existing in the unknown". **C49**

3.3. Emerging positive themes

Even though many media comments highlighted negative themes, our analysis showed positive themes, which can be used as interventions (**Table 2**, see supplement for comments).

Table 2 • Mental health and psychosocial comments: positive themes, descriptions (comments related to themes in Supplement)

Themes	Descriptions
1. Gratitude toward Health Care	Increase in positive attitude toward health care workers
2. Reduce morbidities and mortalities	Respiratory illnesses such as Flu reduced significantly due to public health measures and death due to that Also, the suicide rate reduced during pandemics (increased social cohesion), reduced numbers of RTA, and their deaths and injuries (due to decreased mobility, lockdowns) Reduced COVID morbidity and mortality in some countries by strict public health measures—"social vaccine" (International entry bans, lockdowns, etc.—Australia), aggressive vaccination Reduced inter and intra-state, civil wars, and conflict
3. Gratitude	People expressed gratitude toward frontline workers
4. Increased family/community cohesion	Increased relationships, understanding, family activities (lockdowns made more time to reflect on family needs)
5. Discovery of health interventions	The discovery of the mRNA vaccines in a short time changed pandemic management; vaccines developed at a faster time, more motivation within research teams Innovative contact tracing including online "check-in (QR code)"; mobile phone app
6. Health system lessons-improvements	Contact tracing innovations, more allocation for mental health and tele-health services
7. Online learning/webinars/seminars/conferences/meetings	Online learning during COVID-19 produced equivalent or better student course performance as compared with pre-pandemic
8. Online health promotion activities	Various online health promotion activities during the pandemic with new dimensions on it
9. Philanthropy	General online generosity; people who got COVID-19 or were directly affected by the disease, either by losing loved ones or having close friends or relatives become infected by the coronavirus, are more likely to give to a charity to support pandemic relief
10. Various community-level creative activities including spiritual	We observed various community-level activities keep the community connected and created a better environment for recover
11. International collaborations	Several international collaborations established sharing scientific findings and such sharing viral sequencing and ensure the vaccine equitable access such as the COVAX facility
12. Economic opportunities	Homemade protective equipment Online shopping and markets
13. Opportunity to be involved in physical activity	
14. Urge for Better preparation for next time	Calls for funding for research of vaccine and treatment and industrial capacity building better use of technology to provide tele-health (virtual platforms) for better integration of the public and private health systems so that to prepare for future crises and other health issues, such as mental health
15. Benefits related to working from home	Some suggested working from home provided flexibility to work as well as improved productivity and it may go beyond the pandemic in some sectors
16. Solidarity is coming together with social common good	Public International/regional/national solidarity in many ways
17. Increased bio knowledge; awareness of disease and evidence of disease recovery; ecology	People quickly came to know the symptoms, disease process and ways of avoiding it, and so on. People were well-informed

Some comments indicated they had more time to do exercise and other activities during lockdown than the usual working period. The following comment is an example that how some get more opportunities to do fitness activities during the pandemic:

"It's allowed me to get out and about and do a lot more physical exercise than I normally would, And so now, a normal day might begin with a 14-kilometre run". **C96**

Further, we noted reports regarding increased gratitude toward HCWs. Following comments were some examples observed in our study regarding positive gratitude toward HCWs:

"Doctors lead international 'most trusted' profession poll.

Faith in doctors has risen even higher since the pandemic began, seeing the profession overtake scientists for the first time". **C64**

"India's COVID-19 health workers showered in flower petals as military thanks 'warriors'". **C65**

Online learning was introduced in schools during outbreaks of COVID-19 for the first time in many countries such as Sri Lanka:

"Online learning and distance learning were at a primitive level in Sri Lanka in the pre-covid era however that pandemic had a great impact on that. Almost all the school and private tuition centres now highly depend on that. Students too feel it is more effective in terms of time and cost. It has provided ample opportunity to learn from remote areas Northern Sri Lanka". **PO12**

Further in the health sector, tele-health introduced during this pandemic to mitigate the risk of face-to-face contact was one of the useful interventions, which may continue beyond the pandemic as mentioned in the comment:

"Tele-health should become another plank of the healthcare system". **C84**

Despite concerns raised by many that the pandemic caused family relationship strain and increased domestic violence, our analysis indicates that overall, family relationships improved during the pandemic as mentioned in the following comments:

"The pandemic has allowed my husband, daughter, and I to spend much more time together-As a couple, we've been able to communicate frequently and as parents, we've been able to play with our daughter a lot more. So, I think we've emerged out of this crisis as a closer and more tight-knit family". **C78**

"It has stopped our lives to spending more time together has strengthened bonds". **C81**

We noted a reduction in morbidity and mortality due to other respiratory infections, deaths due to road traffic accidents (RTA), and even reduced suicide rates following the pandemic as indicated in the following reports:

"COVID-19 pandemic drove flu to historic lows, and may have eliminated one virus type". **C65**

"UK road deaths drop 16% during the pandemic year". **C70**

"Australian suicide rates down during COVID-19-The Australian Government welcomes the release of the Australian Bureau of Statistics (ABS) Causes of Death, Australia, 2020 report today, with Australia recording the greatest drop of deaths in the last decade". **C69**

We also noted various community and religious organizations that offered various health promotion activities during the pandemic:

"BBC 3CR Sunday 19SEP21 Dr. S talks about 'Chatterbox' a recent initiative at Cross and Stable Church in Downs Barn Milton Keynes which enables people who are isolated or alone to come together and enjoy coffee and cake and a chat. Broadcast on BBC Three Counties Radio Sunday Breakfast 19th September 2021". **C89**

Our analysis found common calls for improved public health campaigns and international collaboration as mentioned in the following comments:

"It's vital that we learn from COVID-19 so that next time a public health crisis emerges we are ready with a comprehensive, well-targeted, nationwide campaign". **C99**

"Expanding global vaccine coverage with ensuring equitable distribution, and combating hesitancy and misinformation remains critical to limit overall viral evolution, protect vulnerable people and l to prevent mutation of viruses all of which can directly or indirectly lower the risks of new variants emerging". **C93**

4. Discussion

Our analysis suggests that social media comments during the initial years of the COVID-19 pandemic (December 2019 to January 2022) contain a significant amount of MHPS-related expressions. Further literature review supports increased risk of mental health disorders including anxiety disorders (adjustment disorder, generalized anxiety disorder, and panic disorder), depression, post-traumatic stress disorder (PTSD), substance abuse, and sleep disorders, which were observed among the COVID-19 survivors [18, 19]. One-third of patients develop a psychiatric or neurologic condition within six months of COVID-19 infection [18]. Hospital or intensive care unit (ICU) admission increased the risk for mental illness due to the stress in the hospital and the effect of the virus on the brain [20], in particular, PTSD after ICU admission and severe COVID-19, dementia, myalgia encephalomyelitis/chronic fatigue syndrome (ME/CFS), or "Long COVID" [21]. Long COVID symptoms lasting long after a person has recovered from COVID infection are characterized by general weakness, difficult thinking and concentrating (brain fog), and low-grade fever and malaise. Patients with pre-existing psychiatric disorders have worsening psychiatric symptoms [20, 22]. Further recent longitudinal comparative study revealed COVID-19 infection was associated with deterioration of smell and memory, even when the infection was mild [23].

Social and news media expressions indicated fear of getting an infection was common among many individuals and generally in the community and caused acute and prolonged stress. A theme that emerged in the study was "COVID-19 stigma" where fear and ostracization were directed at those who had been infected, quarantined, and extended to even innocent minority communities. With availability difficulties, changing patterns of substance abuse were reported [24]. There was increased alcohol use as a way of coping, and with lockdowns and transport restrictions leading to unavailability, a tendency for home or illicit brewing [25]. In a survey in China, authors found so-called coping behavior (online use, smoking, and alcohol)-related risks such as substance use and internet addiction were increased during the COVID-19 pandemic. For example, among 6,416 respondents on this survey, 46.8% reported internet use increase (dependence), and 16.6% said they were using it for longer hours [26]. The

negative effect of COVID-19 pandemic (with physical distancing, lockdowns, and other travel barriers and consequent socio-economic hardships) on relationships, especially in family relationships which in turn increased domestic violence, child abuse, and alcoholism; causing strains on the family level appeared in our analysis which was confirmed in the literature [20, 27]. This may be one of the reasons the British roadmap to COVID recovery identify women, youth, and children as a vulnerable group in addition to several other vulnerable groups such as the elderly (increased risk of morbidity and mortality, isolation, loneliness, dementia); disabled; frontline and health workers; and ethnic groups and severely mentally ill [19, 20].

Health staff burnout appeared as one of the negative theme in our analysis. Recent systemic reviews of studies among HCWs found that depression, anxiety, psychological distress, burnout, and poor sleep quality were prevalent after the pandemic [28]. Further, a study based on self-reports of "stress, resilience, and coping" among HCWs during the COVID-19 pandemic showed "moderate-high stress scores" with normal levels of "resilience and coping"; but showed inter-professional differences where the MD/NP/PA (medical doctor/nurse practitioners/physician assistant) group having the highest resilience, compared to nurses [29].

During the initial stage of the pandemic, many countries adopted strict public health measures such as lockdowns of local government areas, cities, or entire countries to curtail the spread which were blamed to be the cause of high mental health fallout. For example, in Assam province of India, a survey revealed the prevalence of "depression, anxiety, and stress" among the population during lockdowns was quite high compared to a national survey conducted in 2016 [30]. A longitudinal study in the United States reported that "boredom, anxiety, fear, and worry" were common symptoms during a pandemic lockdown [31]. Further pandemic security measures and social distancing affected how people handled interpersonal relationships and empathy with others, which were perceived as breaking relationships [32]. A recent study among 1,005 participants found that the prevalence of symptoms of depression increased according to "relationship quality" from 13% to 35% during COVID-19 [33]. A study conducted among Australian adults during the pandemic reported impairments in work and social functioning with elevations in depression and anxiety symptoms and decreased psychological well-being [34].

Economical strain due to the pandemic was a key correlate of poorer mental health [35] and which appeared in our analysis as a negative theme, especially in Sri Lanka where it was linked to a rise in suicides, due to the impact on small and medium scale enterprises where employees not only lost their income, they found it hard to repay loans resulting in severe mental health consequences [36, 37]. A recent study in the United States investigating school closure and children's mental health well-being pointed out that older children with a "Black and Hispanic" background and from lower-income families showed more impact on mental health than "white", younger, and higher-income counterparts [38]. Another study from the United States found that the "prevalence of depression and anxiety differ across states of loss of employment income (job loss, and/or reduced work hours, wage cuts)" [39]. A study among 1,807 males reported that economic status deterioration due to the COVID-19 pandemic was associated with emotional eating, adjustment difficulties, and distress (as measured by depression, anxiety, and stress) [40].

A study found community-level stigma related to having had or spreading the infection was an issue during this pandemic; however, this is not only common to COVID-19 but was also observed in several pandemics or outbreaks in the past, which cause stigmatization of patients and marginalized populations [41, 42]. Misconceptions and rumors that COVID-19 infections are more prevalent among certain marginalized socioeconomic groups and religious minorities such as Muslims, lower-caste groups, rural-poor population, and frontline workers (healthcare, police) [43] lead to community stereotyping, discrimination, unrest, and conflict. For example, in Sri Lanka, politically motivated stigmatizing and stereotyping led to communal discriminatory practices as mirrored in this comment:

> *"Sri Lanka: COVID-19 forced cremation of Muslims. Discriminatory baseless public health claims smoke screen for persecuting minority".* **C35**

The pandemic brought out collective phenomena as a result of fake news, misinformation, disinformation, and exaggerations that spread through social media and online platforms manifesting as unfound rumors [44, 45], panic buying (e.g., in Australia of toilet paper and other "essentials" [46], hoarding (including ventilators and oxygen cylinders in India), naming and shaming [47], conspiracy (the virus is a hoax, that it is caused by 5G, that tracking microchips are being implanted with the vaccine, that the virus is a scam for big pharma to make money, that big media is in cahoots with big pharma) and QAnon theories (the world is run by a global cabal of Satan-worshipping pedophiles who control American politics and the media) [48], doomsday predictions, and mass protests (anti-vaxers, far-right against mask-wearing, COVID-19 vaccination, and lockdowns). These phenomena of group or herd behaviors could be termed "mass hysteria" in times of heightened fear, mass anxiety, heightened emotions, uncertainty, and frustrations with increased vulnerability and extreme suggestibility to misinformation [49]. Groups become easy prey to influence where pent-up emotions and anger are channeled or directed in pathological ways [50]. As a phenomenon of collective or herd behavior, toilet paper became a target of panic buying for people frightened of contracting COVID-19 [51]. A subsequent study found perceptual abnormalities and "persecutory ideation" in psychotic-like experiences were associated with conspiracy theories [52]. The need for further research on the impact of COVID-19 on the diagnosis and management of panic disorders was highlighted by a recent review [53]. Many complained that their freedom was compromised but researchers pointed out that elimination strategies such as lockdown have been viewed as a civic solidarity approach to restore perceived civil liberties sooner compared to catching an infection and living with long-term effects such as "Long COVID" [54].

Inflammatory speeches like that from an Australian parliamentarian likening ("state and territory COVID-19 restrictions to the despotic regimes of Nazi Germany and Cambodia, calling for civil disobedience as a response") was a call to arms that whip up collective behavior, mass protests, frenzy, and hysteria. Some of his comments were featured on the Info wars web series hosted by a far-right American conspiracy theorist, who had been banned from social media sites such as Facebook, Instagram, and YouTube for violating hate speech policies [55]. Even doctor groups [56] and other reputable professionals [57] including

powerful and influential world leaders [58] propagated conspiracy theories that went viral through social media during the pandemic. There were some evidence in the United States that conservative media enhanced beliefs in conspiracies that made COVID-19 control difficult [59].

Our study showed increased vulnerability to MHPS consequences among children and youth. In the United States, around 150,000 youths lost their caregiver (parent or grandparent) to COVID-19 from early 2020 to mid-2021 [60]. Seeing a parent grasping for breathing and continuing to suffer for a month before death is a very traumatic experience for a child. This leads to "depression; PTSD; suicidal ideation and attempts; an increased risk of substance abuse, violence, risky sexual behaviors, and sexual abuse; and shorter schooling" [60]. Further, due to school closures and lack of community sports activities, many worried about children and adolescents' mental health [61], which appeared as a common theme in our analysis: "Concerns about children/adolescent's mental health". Similarly, another study found that female caregivers reported higher COVID stress/disruption compared to males [62].

A national survey found that approximately 20% of Australian children showed "disruptive behaviors, disturbed sleep, or symptoms of anxiety or depression" during the public health restriction period, and "Children's Health Queensland's COVID-19 Unmasked (Young Children)" study found that to recover from this impact up to 10% of children may need specialized mental health support [63]. In a qualitative research among parents regarding parent-child relationships, participants reported increased fear, anxiety, uncertainty, and stress due to pandemic-generated threats that had to be navigated with restrictions from public health orders within the context of parent-child relationships [64].

Despite the negative impact on mental health, we noticed some positive themes during analysis that can be considered when planning to counteract the negative MHPS consequences of the COVID-19 pandemic. Positive, proactive, pro-social behaviors were also in evidence, such as encouragement, help, and support for others; gratitude toward HCWs; increased concern for a cleaner environment and ecological causes; awareness of bio-knowledge (vectors, viruses, vaccines, immunity); charity and spiritual support; and innovative research observed during a pandemic, which can be used as social intervention tools in recovery strategies [65].

At the family level, improved understanding, support, family activities, and cohesion during lockdowns were evident on social media and observable. Strategies to heal relationship difficulties and ways of coming out of social isolation (managing social phobia/anxiety) can be the basis for post-COVID recovery. Compared to no relationship, good relationship quality was a protective factor for mental health and well-being [32]. Further, the closure of licensed pubs and social distancing measures in Australia in response to COVID-19 appeared to have reduced harmful alcohol consumption in younger drinkers, particularly young women [66]. The COVID-19 pandemic has generally reduced the numbers of RTA, and their deaths and injuries despite the relative increase in severity of injury and death [67]. Several suicides related directly or indirectly to the COVID-19 pandemic have been reported, particularly from India, due to fear of infection, financial hardships, and other reasons [68]. However, overall, total suicide rates appear to have declined. Drops in suicide rates were reported during the COVID-19 pandemic, for example, a 7% decrease in suicide rates was observed in Taiwan compared to pre-pandemic levels [69]. Similarly, data from the Australian Bureau of Statistics (ABS) show that the rate of suicide in 2020 dropped when compared with previous years [70]. Further reports from several countries mostly from high- and middle-income countries confirmed that suicide rates have not risen including England [71, 72]. Similarly in Sri Lanka, where some of the authors are practicing, observed a marginal reduction in suicide rate [73] (**Table 3**). Further, a recent systematic review that investigated suicidal rates in middle- and low-income countries also concluded that suicide rates were not changed from 2019 to 2020 with the limited studies available [74]. However, in Jaffna, where some of the authors are practicing, we noticed from local data an increase in the rate of suicides in 2021 (**Figure 3**). Our observations point to economic strains caused by the pandemic COVID-19 as a contributing causative factor in a community just recovering from a long-lasting (more than 30 years) civil war that ended in 2009.

Non-COVID respiratory infections in Sri Lanka decreased during the pandemic [75]. Flu incidences were historically low in Australia during the pandemic years due to preventive measures adopted to combat COVID-19 and the community's adherence to public health messages [76]. Similarly, the incidence of dengue infections decreased in Sri Lanka during the period of strict lockdowns and other public health measures implemented for COVID-19 but has shown a subsequent resurgence with the relaxation of these measures during the recovery phase [77]. The ABS also reported a decrease in overall death rates in 2020 [70]. These facts would be an argument for supporting the social distancing and public health measures as "social vaccine" in the political process of reopening the pubs and borders for economic reasons. It was argued that the "social vaccine"—social distancing, travel restrictions, and border closures—was the most powerful and effective measure to control the spread of COVID-19 before the biological vaccines became available [8–10]. It could well continue to be useful as an additional measure, particularly in the context of the possible evolution of newer, more infectious, deadlier, and/or vaccine-resistant variants.

Table 3 • Impact of the pandemic on suicides in author's practicing area

	2019 (pre-pandemic year)		2020 (immediate post-pandemic year)	
Place	**Number of suicides**	**Suicide rate (per 100,000)**	**Number of suicides**	**Suicide rate (per 100,000)**
Australia[1]	3,318	12.9	3,139	12.1
England[2]	5,316	10.8	4,912	10.0
Sri Lanka[3]	3,135	14.4	3,074	14.1

Source: [1]ABS [65], [2]Samaritans [67], [3]Sri Lanka Police [68].

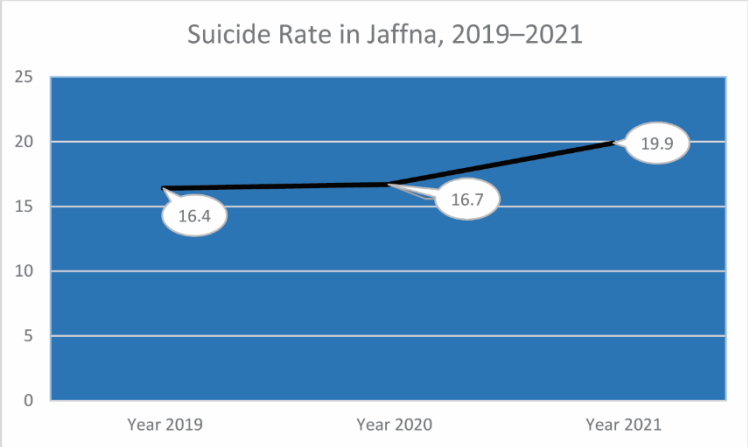

Figure 3 • The suicide rate in Jaffna, Sri Lanka.Source: Authors" monitored.

In times of distress, the first point of contact for many patients is family physicians/GPs and primary HCWs. So they can be encouraged to manage mental health issues with additional support from the government. They can prevent their burnout by being reflective on their vulnerabilities and seeking help when needed. There were calls for strengthening the primary care system to navigate the mental health consequences during and after the pandemic [78]. Spirituality, considered as one dimension of health by WHO since 1995 [79], might be considered as a valuable coping mechanism for HCWs and the general public exposed to extremely stressful conditions during the COVID-19 pandemic [80]. The COVID-19 pandemic and public health responses have affected social domains such as networks, relationships, interaction, and intimacy. Economically, the rich have become richer while the poor have become poorer with widening gender, and racial inequalities as well as inequalities between countries [81]. For long-term social recovery, rebuilding locally sustainable stronger communities should be one of the key aspects of public health policy [82]. As shown in **Figure 4**, a policy-level agenda addressing the wider social determinants of health highlighting the importance of mental health promotion as central to successfully counteract the effects of COVID-19 and as a means to addressing health inequality created by the COVID-19 pandemic [83] would be beneficial. Economic recovery, with jobs, occupational training opportunities, noninterest loans, financial incentives, and stimulus packages will also impact positively on mental health increasing motivation and well-being of individuals, families, and communities. Recovering from the COVID-19 pandemic could well become a golden opportunity to rebuild better with a more equitable society [81].

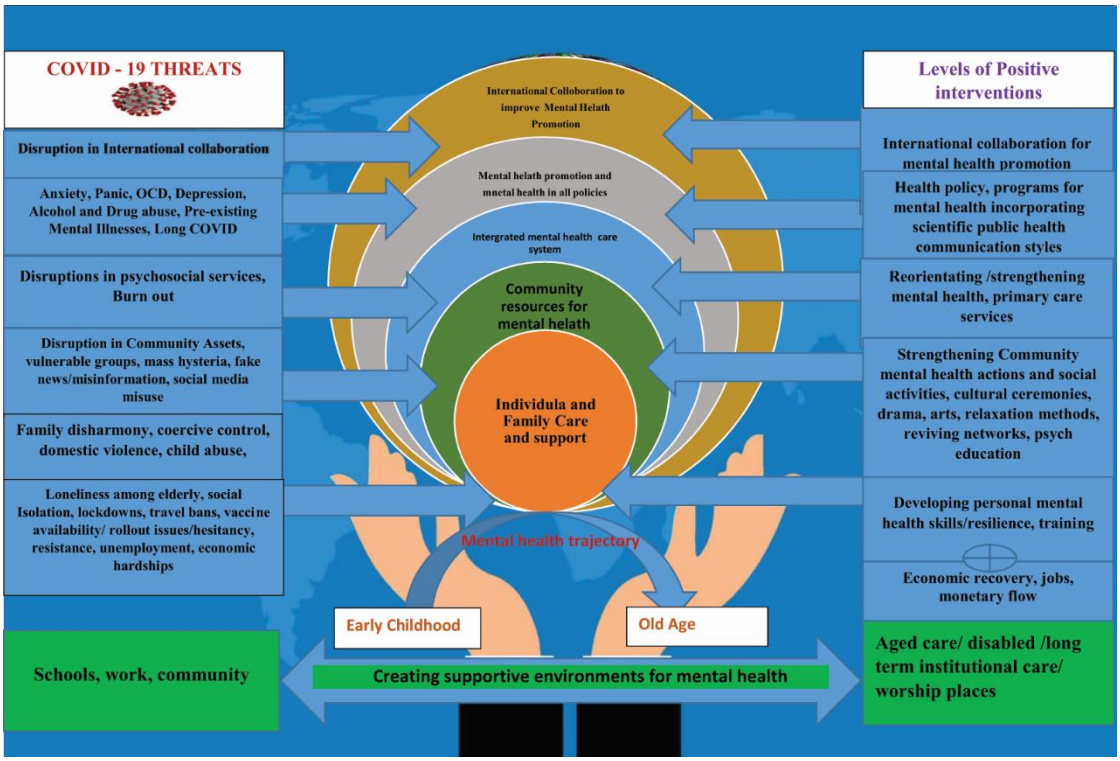

Figure 4 • Socio ecological model of mental health promotion intervention.

There were many positive aspects noted during the pandemic that can be used to promote mental health. For example, even though concerns regarding overdependence on social media and psychological effects were raised by many when their free time increased, it was used for positive self-motivation to do more gym and fitness exercises at home. Some indicated playing music as a tool while working out that it greatly helped them to overcome psychological issues [84].

During the COVID-19 lockdowns, there were different ways of showing appreciation even online in the social media with the theme "Gratitude": a shout-out at a Zoom meeting, a thumbs-up emoji, a retweet, regular email to the team highlighting achievements, awards for a colleague who showed great passion to ward patient care were observed by the authors. Messages coordinated by social media resulted in a simultaneous banging of pans as appreciation for health workers. Gratitude mindfulness exercises to enhance well-being are one of the intervention tools that can be used beyond the pandemic as well [85].

Despite the concern about the overuse of social media during the pandemic, evidence showed online learning during COVID-19 produced equivalent or better student course performance as compared with pre-pandemic performances [86]. Further telehealth services enormously helped to continue health provision with minimal interruptions. Enhanced telehealth services will probably continue well beyond the pandemic to become routine practice.

Despite domestic violence and strained relationships due to COVID restrictions, many families reported positive aspects, better understanding, such as opportunities for improving relationships, interactions, clearing unresolved conflicts, adopting new hobbies, and developing appreciation, gratitude, and tolerance [87]. In another study, many parents indicated that their relationships had improved and had utilized strengths during the pandemic [59]. So future research is needed regarding utilizing family strengths to identify what is working in parent-child relationships. Further, a study suggested that neighborhood cohesion can help to navigate the depression caused by COVID-19 [88].

We also observed various community and religious organizations that offered various health promotion activities during the pandemic. However, religious or traditional festivals and mass gatherings such as political rallies or protests can become the source of super spreader events such as in some churches in South Korea [89], India [90], the United States [91], and Sri Lanka where unrestricted new year celebrations set off the second wave of infections [92]. In South African countries, some pastors preach against vaccination and promote conspiracy theories, leading to vaccine hesitancy and poor testing, which can result in the spread of infection and the emergence of deadlier mutations [93]. In Melbourne, Australia, the second wave of infection that spread among culturally and linguistically diverse people (CALD) led many states and organizations in Australia to use culturally adapted translations of key messages disseminated through their community leaders [94, 95]. Royal Australian College of General Practitioners (RACGP) highlighted the need for "Different communication styles and approaches for culturally and linguistically diverse people (CALD)" [96].

Encouraging and promoting family and social activities within appropriate precautions of social distancing, masks, and social vaccine measures, particularly for ethnic minority groups, economically disadvantaged, disabled, children and young people and/or older people, in the gradual community recovery process can reduce social isolation and loneliness, enhance psychosocial health, and re-establish positive community relationships and trust, and real-life networks. Improving access to nature through "green social prescribing" [21]; cultural practices, stress reduction/relaxation programs such as mindfulness and yoga; sports; artistic expressions, festivals, drama, and musical programs are examples that serve multiple healthy purposes of the cathartic release of pent up emotions [97], exercise creative impulses and socialization in COVID safe community re-activation strategies. Fractures created on the community organizational level can be rebuilt through positive community engagement. Empowering organizations and communities may be more successful when experts' advice is combined with local community knowledge [98]. This was further supported by the findings of social studies in the United Kingdom during the first 21 weeks of lockdown in which authors stated socially supportive coping strategies support speedy recovery in anxiety and depressive symptoms [99].

RACGP has highlighted the critical role of GPs in addressing disparities caused by pandemics such as low vaccine uptake among Aboriginal and Torres Strait Islander people [96]. They also stressed the need to support GPs through adequate funding and more integration with referring facilities to strengthen the Australian Health Care System [96, 100].

As communities across the world are now highly interconnected, greater international support and coordination are needed to strengthen further not only to curtail the spread of COVID-19 but also to overcome the effect of the COVID-19 pandemic on mental health. This collaboration can be further strengthened if countries politically join in a common agenda to combat the pandemic impact. Expanding global vaccine coverage, addressing inequitable distribution, and handling misinformation are essential to prevent the emergence of new variants. The novelty of the mRNA vaccine was a highlight of this pandemic especially COVID-19 identified in January 2020, and by December 2 of that year a vaccine developed by BioNTech and Pfizer was approved for emergency use in the United States [101]. International collaboration such as the WHO Covax initiative should continue beyond the pandemic to address disparities caused by the COVID-19 pandemic and peaceful co-existence, which are essential to creating an environment conducive for mental well-being. Due to significant misinformation spread through social media, the public must receive accurate information through effective, clear and timely public messaging, psycho-education, and culturally appropriate communication based on human behavioral sciences [102].

5. Conclusion

Mental health consequences due to the COVID-19 pandemic are enormous at the individual level, family level, and community level. Our analysis highlighted some of the key areas of concern such as fear of Long COVID syndrome, burnout among health staff, effects on children/adolescent's mental health, and increasing maladaptive behaviors such as online game addiction.

We have also witnessed several community-level (mass hysteria) reactions during a pandemic such as panic buying, hoarding, spreading conspiracy theories, and protests such as anti-vaccination and anti-mask movements. Further, several myths, rumors, and misinformation spread through social media significantly contributed to community-level psychosocial consequences. Economic strain caused by the pandemic collectively on the community especially in developing countries such as Sri Lanka was one of the main findings reflected in the comments.

However, this report brings out, in general relationships improvements within families, reduction in non-COVID infection

and RTA-related morbidity and mortality and ecological improvements in addition to novel inventions such as mRNA vaccines within very short period of time from the start of the pandemic as a positive aspect.

Further we recommend community-level MHPS promotions through community organizations and/or religious/social organizations with the support of experts in relevant fields, strengthening primary health care to support individual and family level coping and appropriate use of social media by primary care physicians to counteract the misuse of social media by others are some of the ways forward to build community resilience during and after the pandemic. In addition, international collaborations are essential to support struggling nations to overcome the impact posed by COVID-19 in many aspects.

5.1. Limitations and recommendations

We acknowledge that our data inherently have many biases such as self-selection and representation [103] as we studied those who self-select to express on social media and social media platforms are under-representative of minorities and social media use where the population is skewed toward young adults. As study period of this study covered only the early years, some of the new developments in this field such as antivirals and a clear understanding of "Long COVID-19" were not clearly expressed in the comments [104].

Despite these limitations, our study also reinforces the potential utility of analyzing social media data to *reflect the temperature* of communities. But this may require a well-focused and robust collection of locally targeted information. As such we recommend further work to track mental health expressions to identify locally appropriate public health interventions to tackle the mental health challenges created by pandemics.

Abbreviations

ABS—Australian Bureau of Statistics

BBB—blood–brain barrier

CALD—culturally and linguistically diverse people

COVID—corona virus disease

GP—general practitioner

HCWs—health care workers

ICU—intensive care unit

ITU—intensive therapy unit

MD/NP/PA—medical doctor/nurse practitioners/physician assistant

ME/CFS—myalgia encephalomyelitis/chronic fatigue syndrome

MHPS—mental health and psychosocial

mRNA—messenger ribonucleic acid

PAR—Participant Action Research

PTSD—post-traumatic stress disorder

RACGP—Royal Australian College of General Practitioner

RTA—road traffic accidents

SARS-CoV-2—severe acute respiratory syndrome coronavirus-2

WHO—World Health Organization

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Author contributions

Conceptualization, D.S. and N.R.; methodology, N.R., B.K. and D.S.; software, not applicable; validation, D.S., T.K. and B.K.; formal analysis, N.R.; investigation, D.S., N.R., T.K., B.K., S.S., I.D.A., N.S. and N.J.; resources, all authors; data curation, N.R. and B.K.; writing—original draft preparation, N.R. and D.S.; writing—review and editing, D.S., N.R., B.K. and T.K.; visualization, N.R. and D.S.; supervision, D.S.; project administration, N.R.; funding acquisition, not applicable -self funded. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

Data availability statement

All data generated or analyzed during this study are included in Supplementary materials (**Tables S1** and **S2**); data and information collected during the study are available with the lead author. Data supporting these findings are available within the article, at https://doi.org/10.20935/AcadMed6172, or upon request.

Institutional review board statement

Ethical clearance does not apply to this study as it did not directly involve human subjects but was based on analysis of published articles, online comments from social, news media, authors' observation, and literature review. It was not felt necessary in keeping with the Declaration of Helsinki to obtain formal ethical clearance.

Informed consent statement

Not applicable.

Sample availability

The authors declare no physical samples were used in the study.

Supplementary materials

The supplementary materials are available at https://doi.org/10.20935/AcadMed6172.

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