

Mental Health Consequences from COVID-19 Pandemic and Strategies for Community Level Recovery

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Abstract

Background: The COVID-19 pandemic has spread across the globe from 2019 affecting millions of people physically, mentally, and socio-economically. The purpose of the study was to map out the mental health consequences of the COVID-19 pandemic and suggest recovery strategies.

Methods: A qualitative inquiry into the mental health aspects of the COVID-19 pandemic using observations from working in busy health clinics, general practices, primary and community care setting, and dedicated COVID acute care wards during the pandemic in Australia, United Kingdom and Sri Lanka; discussions with colleagues worldwide; analyzing social and news media comments; literature survey and experience of dealing with past disasters were used to map out mental health consequences and put forward recovery strategies.

Results: In covid sufferers, neuropsychiatric symptoms lasting months, unrelated to respiratory insufficiency suggested brain damage due to vascular endothelial injury and/or cerebral venous thrombosis (CVT). A third went onto develop or have a relapse of a psychological or neurological conditions. In the general population, common consequences included common mental health disorders; changing patterns of substance abuse including alcohol; increased domestic violence and child abuse. Family relationships, interactions and understanding improved in many but 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 (rapid vaccine production, contact tracing methods) and discoveries (mRNA Vaccines), health systems improvements (tele-health), online learning, gratitude toward health care workers, increased social/community/family cohesion, closer international networking, reduction in suicide rates and drop in interstate and civil conflicts, road accidents, crime and communicable diseases with their resultant morbidity, mortality and mental health consequences.

Conclusions: In view of the widespread mental health and psychosocial consequences from the COVID-19 pandemic, a community-based approach is suggested while treating more severe mental disorders at the primary care or specialist level.

Background

Similar to the various pandemics that have affected the world including the so called Spanish flu of the last century, Bubonic plagues of the past and the ongoing HIV/AIDS; 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 in humanity despite the deaths, isolation, physical distancing and travel and relationship

barriers. In addition to changes to individual, 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 WHO (World Health Organisation) in March 2020 [1,2]. The virus has caused millions of deaths globally and radically impacted on 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 [3]. 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 [4]. As such, human interactions and their behaviours are crucial in the spread and control of the disease. Even though two years have elapsed since the disease started, many parts of the world are still struggling to control the spread as well as consequences of infections. Measures adapted to control the spread such as lockdowns of cities or local geographical areas, restrictions of people movement; hotel, home and other quarantine; testing, contact tracing, vaccination and issues related to its roll out have also led to Psychosocial and Mental Health (PSMH) consequences. It was further complicated by rapid changes and innovations 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 enormous information released in a short period (infodemic) of time. Long term public health control measures and its socioeconomic repercussions are blamed for significant impact on PSMH at the individual and collective levels. However, the increase in PSMH consequences resulted not only from the control measures but also from effects of catching an infection [5] as well as general impacts. Researches clearly showed that continuation of non-pharmacological interventions [6] such as mask wearing, physical distancing and other 'social vaccine' measures [7-9] need to continue despite high coverage of vaccination to overcome this pandemic. It has been further emphasized with the arrival of the new variant omicron which is believed to be more transmissible and scientists are still learning of its virulence [10]. With the possibilities of the evolution of further dangerous strains and the challenges posed by the unfolding COVID Pandemic, this qualitative study aims to map out the psychosocial and mental health consequences of the COVID-19 pandemic and suggest strategies for recovery.

Methods

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

Study design and recruitment

This qualitative study was based on COVID-19 related literature search and Biblio-metric analysis, comments and/or posts on social / news media and participant (authors) observations. We searched for comments and articles that appeared in social media or news media related to covid pandemic. A systematic search of medical and reputed journals was done for relevant reports and articles on the current covid pandemic and comments from social or news media related to themes from participant observation. Relevant reports and articles that participants had read while working during the pandemic were also included. Participant observation data from actively working during the pandemic in various clinical settings including dedicated COVID-19 acute care wards from different parts of the globe were collected. Thematic analysis was carried to understand the collected data. 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 public health measures adopted to curtail the infection such as lockdowns, border closure and quarantine, isolation of contacts, COVID -19 testing and vaccination roll out.

This study was aimed to address the following objectives (O s):

O1: What are the psychosocial and mental health (PSMH) impact of COVID-19 pandemic on individual, family and community in published reports and studies, shared on social media, news media, and participant (authors') observations?

O2: Identify the positive aspects and responses with respect to COVID-19.

O3: Formulate strategies using insights from the positive responses and other literatures.

The study period: Since the start of pandemic December 2019- January 2022. Data extraction, collection and categorizing the key phrases were carried out from published reports and articles, comments from social media, news media, discussions and personal observations and crossed checked by all the investigators. Analysis of the collected data was carried out to uncover negative and positive themes, identify relevant study findings and those representing significant public perceptions and responses toward the COVID-19 pandemic was done.

The data (comments from news media and social media and participant observations) were grouped together to identify emerging themes. This thematic analysis frame work [11, 12] (**Figure 1**) grouped the data under the same themes summarized in Tables. All authors agreed on the grouping through discussion.

Participant observations and experience of working in busy mental health clinics, primary care setting, emergency departments and dedicated COVID-19 wards during the pandemic in major cities in Australia, UK and Sri Lanka; discussions with colleagues worldwide and experience of dealing with past disasters were used to map out mental health consequences and 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 so as to offer the best treatment to patients, their families and communities caught up in the COVID-19 crisis.

Results

In this study we analysed news and social media comments and participants observations to uncover people opinions or perceptions regarding COVID-19 pandemic mental health and psychosocial issues. Even though some of the participant observations were more relevant to health care workers, they indirectly applied to the general community as well. Our findings revealed negative and positive themes in PSMH consequences due to COVID-19 pandemic as summarised in tables. Further we searched the medical literatures for studies and reports related to mental health sequelae due to direct pathological changes caused by COVID-19 infection on brain, indirect PSMH consequences and to identify strategies to overcome them.

Mental Health consequences of COVID-19 can be usefully seen within a framework of bio psychosocial 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**) [13,14]. Common symptoms reported were “anosmia, cognitive and attention deficits (i.e. brain fog), new-onset anxiety, depression, psychosis, seizures, and even suicidal behaviour” [13, 14].

Emerging negative themes

We observed most of the news media and social media comments and participant observations indicated negative impact caused by the COVID-19 (**Table 1**). 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 were in the same ward opposite to each other. Sadly GP died within few days and patient witnessed the death. That gave him huge anxiety. But he later survived”-

P05

In addition surging admissions caused significant stress on health staffs 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 sheer volume of deaths within a short period of time"-P01

"One of my colleagues is currently off sick due to PTSD and getting treatment. Junior doctors needed support from Psychologists" P03

Many worried about children/adolescent 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

"There are many other families 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" P07

Substance use, particularly use of alcohol increased during lock down imposed to curtail the virus spread. One of our observation as below may explain a contribution to increase 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 outbreak" P010

Consequences at the community or collective level

Mental health issues among the health care workers due to overstretched health system noted was 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 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 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 really heartbreaking" C-41

Many comments in our analysis indicated the common negative theme as "Economical strain" especially in developing countries such as Sri Lanka which was a main reason for poor mental health during 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 observations attributed economic hardships and poverty to increasing suicide rates during 2021 in Jaffna. Comparatively, it was observed that in Australia and UK, there were generous economic support and packages that could have been one factor for the lower suicide rates there.

At the community level, 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 comment.

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

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

Main finding out of our analysis were of collective level, community reactions in several countries that appeared in the media during this COVID -19 pandemic, for example resulting in mass panic reactions. Further politically motivated division was observed in some developed nations such as US during 2020 election. Following are sample comments:

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

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

"Public opinion about coronavirus is more politically divided in U.S. than in other advanced economies" C-15

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

"It's your own 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**

Emerging Positive themes

Even though many media comments highlighted negative themes, our analysis showed positive themes which can be used as interventions summarized in **(Table 2)**. Some comments indicated they had more time to do exercise during lockdown than usual working period. Following comment is an example that some get more opportunity to do fitness activities during the pandemic:

*“It’s given me an opportunity 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 towards health care workers. Following comments were some examples observed in our study regarding positive gratitude towards health care workers:

*“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 out breaks COVID-19 for the first time in some developing countries such as Sri Lanka.

“Online learning and distant learning were at 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” **P012**

Further in 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**

In spite of 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 observed 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 completely”***C-65**

*“UK road deaths drop 16% during pandemic year”***C-70**

*“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”***C-69**

We also noted various community and religious organisations 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 campaign 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 I to prevent mutation of viruses all of which can directly or indirectly lower the risks of new variants emerging” **C93**

Discussion

Increased risk of mental health disorders including anxiety disorders (adjustment disorder, generalized anxiety disorder, and panic disorder), depression, post-traumatic stress disorder, substance abuse, and sleep disorders were observed among the COVID-19 survivors [13, 15, 16]. Depression, dementia, psychosis and stroke were commonly observed among patients who had COVID-19 infection [15]. One third of patients develop a psychiatric or neurologic condition within six months of COVID-19 infection [15]. Hospital or in intensive care admission increased the risk for mental illness due to the stress in hospital and effect of virus on the brain [17]; in particular, Post-traumatic stress disorder (PTSD) after ICU admission and severe COVID-19, dementia; myalgia encephalomyelitis/chronic fatigue syndrome (ME/CFS) or ‘Long COVID’, [18]. Patients with pre-existing psychiatric disorders have worsening of psychiatric symptoms [17, 19].

Fear of getting infection was common among many individuals and generally in the community which caused acute and prolonged stress. With difficulties in availability, changing patterns of substance abuse was reported [20]. 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 [21]. In a survey in China authors found out so called coping behaviours (online use, smoking and alcohol) related risks such as substance use and internet addiction was increased during COVID -19 pandemic. For example among 6416 respondents on this survey 46.8% reported internet use increased (dependence), and 16.6% said using it for longer hours [22]. 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; caused strains at the family level [17,23]. This may be one of the reason 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; ethnic groups and severely mentally ill [16,17].

Recent systemic reviews of studies among health care workers (HCW's) found that depression, anxiety, psychological distress, burnout and poor sleep quality were prevalent after the pandemic [24]. Further a study based on self-reports of "stress, resilience and coping" among HCW's 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[25].

During initial stage of the pandemic many countries adopted strict public health measures such as lockdown of local government area /cities or entire countries to curtail the spread which were blamed to be the cause of high mental health fall out. For example, in Assam province of India a survey revealed prevalence of "depression, anxiety and stress" among the population was quite high compared to national survey conducted in 2016 [26]. Further pandemic security measures and social distancing affected how people handled interpersonal relationships and empathy to others which were perceived as breaking relationships [27]. A recent study among 1005 participants found that the prevalence of symptoms of depression increased according to "relationship quality" from 13% up to 35% during COVID-19 [28]. 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 wellbeing [29].

Economical strain due to the pandemic was a key correlate of poorer mental health [30], especially in Sri Lanka 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 [31,32]. A recent study in US (United States) investigating school closure and children's mental health wellbeing pointed out that older children with "Black and Hispanic" background and from lower income families showed more impact on mental health than "white", younger and higher-income counterparts [33].

Community Level stigma related to catching 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 such as leprosy, cholera, TB and more recently HIV-AIDS which cause stigmatisation among patients and marginalized populations [34, 35]. Misconceptions and rumours that COVID-19 infections are more prevalent among certain marginalized socio-economic groups and religious minorities such as Muslims, lower-caste groups, rural-poor population and frontline workers (healthcare, police) [36] lead to community stereotyping, discrimination, unrest, and conflict.

Pandemic showed collective phenomena with fake news, misinformation, disinformation and exaggerations that spread through social media and online platforms manifesting as unfounded rumours [37,38], panic buying (for example in Australia of toilet paper and other 'essentials' [39], hoarding (including ventilators and oxygen cylinders in India), naming and shaming [40], conspiracy (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 (world is run by a global cabal of Satan-worshipping paedophiles who control American politics and the media) [41], doomsday predictions, and mass protests (anti-vaxers, far right against mask wearing, COVID -19 vaccination and lockdowns). These phenomena of group or herd behaviours 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 [42]. Groups become easy prey to influence where pent up emotions and anger are channelled or directed in pathological ways. A study in Germany revealed an association between "*High level perceived threat of COVID-19*" and less frequency of purchasing ($P < 0.001$) but increase of amount in one purchase ($p < 0.001$) which was associated with perception of high level uncertainty through media exposure ($P < 0.001$) [43]. It was compared to foraging behaviour in rodents under threat conditions. Toilet paper became a target of panic buying for people frightened of contracting COVID-19 [44]. The need for further research on impact of COVID-19 on diagnosis and management of panic disorders was highlighted by a recent review [45]. Many complained that their freedom was compromised but researchers pointed out elimination strategies such as lock down has been viewed as a civic solidarity approach to restore perceived civil liberties the soonest compared to catching infection and living with long term effects such as "Long COVID"[46]. However, inflammatory speeches like that from an Australian parliamentarian that likened "state and territory COVID-19 restrictions to the despotic regimes of Nazi Germany and Cambodia, calling for civil disobedience as a response" are a call to arms that can whip up mass protests, frenzy and hysteria. Some of his latest comments were featured on the Infowars web series hosted by far-right American conspiracy theorist, who has been largely banned from social media sites such as Facebook, Instagram and YouTube for violating hate speech policies [47]. Even doctor groups [48] and other reputable professionals [49] including powerful and influential world leaders [50] have been propagating conspiracy theories that have gone viral through social media during the pandemic.

In US around 142 637 youths lost a parent or grandparent or care giver to COVID-19 from April 1, 2020, to June 30, 2021[51]. Seeing a parent grasping for breathe and continue to suffer for a month before death is very traumatic experience for a child. In US around one hundred and fifty thousand youths lost their caregiver (parent or grandparent) to COVID-19 since early 2020 to mid-2021[51]. This leads to “depression, PTSD suicidal ideation and attempts, and an increased risk of substance abuse, violence, risky sexual behaviours and sexual abuse, and shorter schooling” [51]. Further due to school closures and lack of community sports activities many worried about children and adolescent’s mental health [52]. It’s appeared as a common theme in our analysis: “Concerns about Children / Adolescent mental health”.

A national survey found out that approximately 20% Australian children showed “disruptive behaviours, disturbed sleep or symptoms of anxiety or depression” during 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 specialised mental health support [53]. 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 [54].

In spite of the negative impact on mental health we noticed some positive themes during analysis which can be considered when planning to counteract the negative PSMH consequences from COVID-19 pandemic. Positive proactive, prosocial behaviours were also in evidence; such as encouragement, help and support for others; gratitude towards health care workers; increased concern for cleaner environment and ecological causes; awareness of bio-knowledge (vectors, viruses, vaccines, immunity); charity and spiritual support, and innovative research observed during pandemic which can be used as social intervention tools in recovery strategies [55].

At the family level, improved understanding, support, family activities and cohesion during lockdowns were observed. 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, a good relationship quality was a protective factor for mental health and wellbeing [27]. Further the closure of licensed pubs and social distancing measures in Australia in response to the COVID-19 appeared to have reduced harmful alcohol consumption in younger drinkers, particularly young women [56]. The COVID-19 pandemic has generally reduced the numbers of road traffic accidents (RTA’s), and their deaths and injuries despite the relative increase of severity of injury and death [57]. 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 [58]. However, overall, total suicide rates appear to have declined. Drops in suicide rate were reported during the COVID-19 pandemic, for example, 7% decreased in suicide rates observed in Taiwan compared to pre-pandemic levels [59]. Similarly, data from the Australian Bureau of Statistics (ABS) show that the rate of suicide in 2020 dropped when compared with previous years [60]. Further reports from several countries mostly from high and middle income countries confirmed that suicide rates have not risen including England [61, 62]. Similarly in Sri Lanka,

where some of the authors are practicing, noticed a marginal reduction even though it was not statistically significant ($P>0.05$) [63] (**Table 3**).

Table 3: Impact of pandemic on suicides in author’s practicing area

Place	2019(Pre pandemic year)		2020(Immediate Post pandemic year)	
	Number of Suicides	Suicide rate (per 100000)	Number of Suicides	Suicide rate (per 100000)
Australia	3318	12.9	3139	12.1
England	5316	10.8	4912	10.0
Sri Lanka	3135	14.4	3074	14.1
Jaffna	124	20.1	108	17.5

Source: ABS [60], Samaritans [62], Sri Lanka Police [63], Authors monitored suicides in Jaffna

Further a recent systematic review that investigated suicidal rate in middle- and low-income countries also concluded that suicide rates were not changed from 2019 to 2020 with the limited studies available [64].

Non-covid respiratory infections in Sri Lanka decreased during pandemic [65]. Flu incidences were historically low in Australia during the pandemic years due to preventive measures adopted to combat the COVID -19 and the community’s adherence to public health messages [66]. The ABS also reported a decrease in overall death rates in 2020 [60]. 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 measures to control spread of COVID-19 before the biological vaccines became available [7-9]. It could well continue to be useful as an additional measure, particularly in the context of possible evolution of newer, more infectious, deadlier and/or vaccine resistant variants.

In times of distress, the first point of contact for many patients are family physician/GPs and primary health care workers. So they can be encouraged to manage mental health issues with additional support from government. They can prevent their own burnout by being reflective on their own vulnerabilities and seeking help when needed. There were calls for strengthening primary care system to navigate the mental health consequences during and after the pandemic [67]. Spirituality, considered as one dimension of health by WHO since 1995 [68], might be considered as a valuable coping mechanism for health care workers and the general public exposed to extreme stressful conditions during COVID -19 pandemic [69]. As COVID-19 pandemic and public health responses affected social domains such as networks, relationships, interaction and intimacy; for long term social recovery, rebuilding locally sustainable stronger communities should be one of the key aspects of public health policy [70]. As shown in **Figure 3**,

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 COVID -19 pandemic [71] would be beneficial.

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 raised by many when their free time increased, it was used for positive self-motivation to do more gym and fitness exercises at home. Participants indicated playing music as a tool while working out and greatly helped them to overcome psychological issues [72].

During the COVID-19 lockdowns there were different ways of showing appreciation: a banging of pans as appreciation for health workers, a shout out at a zoom meeting, a thumbs up emoji, a retweet, regular email to team highlighting achievements, awards for colleague who showed great passion to ward patient care were mentioned by some authors. Many consider selecting one of these gratitude mindfulness exercises to enhance well-being is one of the intervention tool that can be used beyond the pandemic as well [73].

In spite of concern of 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 [74]. 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, adapting new hobbies, and developing appreciation, gratitude, and tolerance [75]. In another study many parents indicated that their relationships had improved and had utilized strengths during the pandemic [52]. So future research is needed regarding utilizing family strengths to identify what is working in parent–child relationships.

We also observed various community and religious organisations that offered various health promotion activities during the pandemic. However, religious or traditional festivals and mass gatherings such as for political rallies or protests, can become the source of super spreader events such as in some churches in South Korea [76], India [77], US [78] and Sri Lanka where unrestricted new year celebrations set off the second wave of infections [79]. In South African countries where some pastors preach against vaccination and promote conspiracy theories, leading to vaccine hesitancy and poor testing, can possibly result in spread of infection and emergence of deadlier mutations [80]. Similarly in Melbourne, Australia, the second wave of infection spread among culturally and linguistically diverse people' (CALD) led many states and organizations in Australia to adopt culturally adopted translation of key messages disseminated through their own community leaders [81,82]. Royal Australian College of General Practitioner's (RACGP) highlighted the need for "Different communication styles and approaches for culturally and linguistically diverse people (CALD)" [83].

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, trust, structures, functioning institutions, real-life networks, dynamics and processes. Improving access to nature through “green social prescribing” [18]; cultural practices, rituals, ceremonies, celebrations; individual, family, group, community stress reduction/relaxation programs such as mindfulness, yoga, Tai Chi, meditation [84-86]; sports; artistic expressions, festivals; exhibitions; competitions; discussions, seminars, conferences, debates, drama, performances, and musical programs are examples that serve multiple healthy purposes of cathartic release of pent up emotions, exercise creative impulses and socialization in COVID safe community re-activation strategies. Fractures created on 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 [87].

Royal Australian College of General Practitioner (RACGP) have highlighted the importance of critical role of GPs to address disparities caused by pandemic such as low vaccine uptake among Aboriginal and Torres Strait Islander people [83]. They also stressed the need to support GPs through adequate funding and more integration with referring facilities to strengthen Australian Health Care System [83,88].

COVID-19 pandemic decreased inter/intrastate/civil conflicts and political violence in 2020, approximately 22% or 24,539 events decrease compared to 2019 reported by ACLED (Armed Conflict Location and Event Data Project) [89] with drops in resultant deaths, injuries and mental health consequences from such disasters [90].

As community 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 COVID -19 pandemic on mental health. This collaboration can be further strengthened if countries politically join in common agenda to combat the pandemic impact. Expanding global vaccine coverage and addressing inequitable distribution and handling the misinformation are essential to prevent emergence of new variant. So international collaboration such as the WHO Covax initiative should continue beyond the pandemic to address disparities caused by covid-19 pandemic and peace which are essential to create an environment conducive for mental well-being. ‘With the global community now highly interconnected, countries will struggle to keep their citizens safe in the face of pandemic threats without embracing a framework for greater international cooperation and coordination’ [90]. As there has been significant misinformation spread through social media, it is imperative that the public receives accurate information through effective, clear and timely public messaging, psychoeducation and culturally appropriate communication based on human behavioural sciences [91].

Conclusion

Mental health consequences due to COVID -19 pandemic and its affects are enormous at individual level, family level and community levels. We have witnessed several community level (mass hysteria) reactions during pandemic such as panic buying, hoarding, spreading conspiracy theories and protests such as anti-vaccination and anti-mask movements. Further, several myths, rumours and misinformation spread through the social media significantly contributed to community level psychosocial consequences. Community level PSMH 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 way forward to build community resilience during and after the pandemic. In addition, international collaborations are essential to support struggling nations in order to overcome the impact posed by COVID-19 in many aspects.

Abbreviations

CVT-Cerebral Venous Thrombosis

COVID-Corona Virus Disease

SARS CoV-2- Severe Acute Respiratory Syndrome Coronavirus -2

m RNA- messenger Ribo Nucleic Acid

WHO -World Health Organisation

HIV-Human Immunodeficiency Virus

AIDS- Acquired Immuno Deficiency Syndrome

PTSD-Post-Traumatic Stress Disorder

ICU-Intensive Care Unit

GP-General Practitioner

RACGP-Royal Australian College of General Practitioner's

ME/CFS-Myalgia encephalomyelitis/Chronic Fatigue Syndrome

HCWs-Health Care Workers

BBB-Blood Brain Barrier

MD/NP/PA- medical doctor/nurse practitioners /Physician assistant

RTA- Road Traffic Accidents

ABS-Australian Bureau of Statistics

US-United States

CALD-culturally and linguistically diverse people

RACGP-Royal Australian College of General Practitioner's

ITU-Intensive Therapy Unit

PSMH-Psychosocial and Mental Health

JMO- Judicial Medical officers

Declarations

Ethical clearance is not applicable 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.

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DS and NR conceived the study. DS, NR, BK, TK, ID, SS, NS and NJ involved in the data collection, literature review and development. DS and NR wrote the manuscript. NR prepared figures 1-3; NR prepared Tables 1 &2, BK prepared Table 3. All authors read and approved the manuscript.

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References

References are in the supplementary files section.

Tables

Table 1: Negative themes

Table 2: Positive themes

Theme (Common Stressors/Reactions)	Descriptions	Sample comments
1.Maladaptive attitudes	Blaming, shaming people who are not obeying guidelines, travel restrictions, lockdowns	<p><i>"Despite a growing cluster, residents in this coronavirus-plagued Sydney suburb are allowed access to public ... 'Appalling': Beach party idiots slammed" C1</i></p> <p><i>"Yesterday the 26-year-old man was fined almost \$10,000 for allegedly fleeing Sydney's lockdown to meet the 36-year-old Qantas flight attendant in northern NSW" C2</i></p> <p><i>"A search for villains': As Australia's outbreak grows, so does covid shaming"-C3</i></p> <p><i>"Novak Djokovic's visa cancelled because star seen as 'talisman' of anti-vaccine sentiment, lawyers say" C4</i></p>
2.Conspiracy theories	Blaming certain countries, religious society, religion, industries (Big Pharma) or certain technologies (G5) as cause/ origin/ spread of COVID -19	<p><i>"We are not the virus': Two-tier Delta lockdowns divide Sydney"-C5</i></p> <p><i>"It's like a shock for them as they believed they arrived in a free country and they say, 'we face same what we face in our (home) country"-C6</i></p> <p><i>"It's your own democratic right to choose [but] I just say that life and death is in the hands of God,"- C7</i></p> <p><i>"Omicron variant hits South Africa, as country encounters vaccine hesitancy, conspiracy theories" C8</i></p> <p><i>"GOP Medical Witnesses: Covid19 'Exactly what you'd expect if you'd Gone through Gain-of -Function'- C9</i></p> <p><i>"Defence is aware of social media posts claiming the Australian Defence Force is forcibly vaccinating or detaining members of the Australian community," C10</i></p>
3.Panic Buying or Hoarding	Fear and panic through social media could fuel psychological reactions in midst of crises.	<p><i>"People in NSW are panic-buying toilet paper again after Greater Sydney, the Blue Mountains, the Central Coast and Wollongong were placed into a two-week lockdown on Saturday"-C11</i></p> <p><i>"Once Again Australians Need Reminding That COVID-19 Does Not Give You Diarrhoea"-C12</i></p>

		<p><i>“Sri Lanka said-it would bring in new laws to deter hoarding and increase penalties on traders to tackle food shortages caused largely by the country's deteriorating forex reserves. Shortages of essential foods including rice, sugar and milk powder in recent months pushed the government to declare a food emergency, empowering authorities to seize stocks of staples and sell them at guaranteed prices”-C13</i></p>
4. Protests, violent outbreaks (Mass Hysteria)	Certain group come together over COVID, and capitalised on the unemployment, restrictions, frustrations, anger and uncertainty in sections of the community	<p><i>‘It’s almost like grooming’: how anti-vexers, conspiracy theorists, and the far-right came together over COVID-19”-C14</i></p> <p><i>“Public opinion about coronavirus is more politically divided in U.S. than in other advanced economies”C-15</i></p> <p><i>“They're motivated by a fear of societal collapse or a specific social or economic grievance or conspiracy, the ASIO boss prophetically explained in March 2021” - C16</i></p>
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 effect on family dynamics	<i>“Pandemic Lockdown; Autism: A Parent’s Concern from Sri Lanka - Colombo Telegraph”-C17</i>
6.Health System Strain/Health Staff Burn out	a. Hospital settings (Emergency/ICU)	<p><i>“ I have witnessed doctors and Nurses(mainly working in ITU and Respiratory wards) struggled to cope with sheer volume of deaths within a short period of time”-PO1</i></p> <p><i>“As Respiratory Physicians we have been inundated with acute COVID management , post COVID follow ups , rising number of new lung cancer /pleural /TB cases (delay in diagnosis due to COVID) and of course long COVID” PO2</i></p> <p><i>“One of my colleagues is currently off sick due to PTSD and getting treatment. Junior doctors needed support from Psychologists”-PO3</i></p> <p><i>“One of my Patient was very ill and needed elective intubation. But he refused to consent for intubation and mechanical ventilation. During that time ITU beds were like gold dust. When I asked him the reason he told me that he was very anxious thinking about being</i></p>

in a coma stage with huge uncertainty about the recovery. We persuaded him to accept the treatment eventually. He survived at the end”-PO4

“I had a GP and his patient were in the same day opposite to each other. Sadly GP died within few days and patient witnessed the death. That gave him huge anxiety. But he later survived”-PO5

“Surge in doctors seeking help for own mental and physical health concerns- What we see on the doctors' helpline is only the tip of the iceberg, there are many more doctors who are impacted by burnout who don't call us,”-C18

“I currently have another patient who got admitted to our hospital in late December. I inserted his first chest drain for pneumothorax secondary to Pneumomediastinum. He spent 4 months in ITU. Currently on Respiratory ward getting rehabilitation. He went through a lot. He had 16 chest drains in total during this admission. He is one of the longest surviving in patients in England” PO6

“Sydney hospitals erect emergency tents as COVID-19 cases hit record -The Australian Paramedic Association said 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 patient”-C19

“We did a bit of informal research a few years ago and it was really disheartening; the vast majority of people who've been burnt out have not told anybody -C20

b. Primary Care setting

1.COVID -19 posed several situations where primary care physicians has to refuse several request from patient which are against the public health advice”

“Are there still a lot of COVID exemptions Handed over? Faced abuse and anger from a mother whom I refused to give COVID-19 Vaccine exemptions for herself and her 16 year old kid (they are healthy individuals),now I am the one responsible for them losing their jobs .

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

and apparently their friends' doctor does exemption (did not believe this bit). This is draining, they are not willing to listen" - C21

"The pandemic has tipped us over" - C22

"Adjusting to new numbers, adjusting to new ways of practising, adjusting to everybody's distress, spending hours and hours reading the new COVID-19 rules and having them change again and again to get to the stage where we are now, where we feel like we're fighting people to get vaccinated. It's affecting us at a very personal level"- C23

"We work too much, we work too hard, we see too many people, we see too many people too quickly - and why do we do that? The way the Medicare system is structured with fee for service and with predominance of bulk billing" - C24

"NSW is struggling to keep up with vaccination demand in the hotspot areas of south-west Sydney due to insufficient Pfizer doses and a reluctance of older residents to take AstraZeneca" - C25

"The great concern about having a blood clot after the AstraZeneca vaccine is not logical because there is a much greater chance of being severely affected, and possibly dying, by being infected but people worries around this causing significant mental health issues among patients and treating physicians"-C26

"Depleted and exhausted': British GPs demand fee-for-service payments" C27

c. Mental Health Facilities

Disruptions to mental health services for vulnerable people, to counselling 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

"Mental health services struggle under surge of demand" C28

"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

		<p><i>"There has been a shortage of psychiatrists in Australia for many years, but increased demand due to the pandemic has exacerbated the issue"-</i> C30</p> <p><i>"People are fatigued': Mental health services still in high demand" C31</i></p>
7.COVID-19 Stigma	Stigma related to COVID -19 testing and isolation	<p><i>"Public not reporting Covid symptoms or going for testing due to fear of Government/Army quarantine camps/ isolation" -C32</i></p> <p><i>"Shame, stigma barriers to COVID-19 testing for young and culturally diverse"-C33</i></p> <p><i>"Those returning to their homes after COVID-19 are socially shunned and ostracized in Sri Lankan villages"-C34</i></p> <p><i>"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</i></p>
7.Preventing culturally appropriate rituals for COVID-19 deaths	Govt. mandated forced cremation causing unresolved and extended grief, guilt affecting targeted community in Sri Lanka for Political victimization, reprisal	<p><i>"Preventing the next of Kins performing the last rights and not allowing them to express the grief. Moreover, keeping the remains in the mortuary for weeks!! All have led to an extended grief!" -PO8</i></p> <p><i>"Sri Lanka: COVID-19 forced cremation of Muslims Discriminatory baseless public Health claims smokescreen for Persecuting Minority"-</i> C35</p>
8.Misinformation, Fake News spread in social media	Large volume of message causing confusion among public (Infodemic) which further complicated by inappropriate messages	<p><i>"Being a physician involving care in both covid wards and ICU I have observed very important issue that had a great negative psychosocial impact is Circulation of video clips captured during a chaotic busy covid ward with terminally ill patients with respiratory distress particularly from Indian subcontinent that created a fear psychosis related to the care of a covid patient"-PO9</i></p> <p><i>"Chief Health Officer Chant was "really horrified" to learn people could be deliberately trying to get infected"-C36</i></p>

<p>9.Reduced social connection and support</p>	<p>Mainly due to lockdowns and restriction of movement</p> <ol style="list-style-type: none"> 1. People get anxious at the start of lockdowns, then their coping resources get eroded over time. Prolong lockdowns also posing strain on relationships and increases the domestic violence, child abuse 2. Social isolation particularly a problem for elderly living alone who are not able to have visitors or family to on them 3.Boarder closure related issues 	<p><i>"COVID-19 lockdown will leave lasting impact on Sydney hotspots, new report says, "Not being able to see her and not being able to meet my newborn niece has been particularly difficult."- C37</i></p> <p><i>"There is a fissure between the western suburbs and the rest of the city, it won't just heal with restrictions ending, it will grow, and distrust grows,"-C38</i></p> <p><i>"Affected mental health", as restrictions "separated me completely from my family and friends who live in Sydney."-C39</i></p> <p><i>"British far-right figure accused of 'making a mockery' of Australian quarantine after posting video calling Covid lockdowns a 'hoax' " C-40</i></p> <p><i>"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 really heartbreaking," she says C-41</i></p>
<p>10.Economical strain</p>	<p>People fear about losing their income from catching infection and prolong admission to hospital, or self-isolation for 14 days by catching infection according to public health, further many small business specially hospitality section forced to close their business, and many lost their employment</p> <p>Prolonged lockdowns causing economic stagnation; lack of movement of goods; transport restrictions, overseas trade etc.</p> <p>Lots of high street starter business were ruined as online platforms took over everything. This caused uncertainty and anger/anxiety for those people working in those sectors. Also uncertainty of future job losses exacerbated mental health issues.</p>	<p><i>"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</i></p> <p><i>"The government does not see that mental impact of being unemployed and getting the distinct feeling you are seen as scum."-C43</i></p> <p><i>"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 outbreak" PO10</i></p>
<p>11. Concerns Children /</p>	<p>They lost the social interaction with their peers and teachers in general. They are</p>	<p><i>'It breaks my heart': Australian parents say mental health strain on their children is worsening" C44</i></p>

Adolescent mental health	<p>affected by “zoom fatigue” due to prolong online education.</p> <p>Many children spent long hours in 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</p>	<p><i>“Her world contracted. She began living on social media, seeing her peers’ interstate and overseas living their best lives.” C45</i></p> <p><i>“There are many other families doing it much worse with their kids who already had difficult circumstances to deal with before the pandemic,” -C46</i></p>
12.Fitness issues	<p>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.</p>	<p><i>“I used to run. After the last lockdown 18 months ago, I found it really hard to get back into running, but I had just started to, and this lockdown just killed that.”- C47</i></p> <p><i>“I do know people going through having COVID, and that just hardens my anxiety, like I don't want to be outside.”- C-48</i></p>
13. Long COVID syndrome	<p>Various studies over the past 18 months estimate long COVID can affect anywhere from 2.3 per cent to 76 per cent of COVID-19 cases.</p> <p>Symptoms lasting for months; fatigue, mind fog, depression, body pain....</p>	<p><i>“No-one can tell you anything about it or when it might end. You’re just existing in the unknown.”- C-49</i></p> <p><i>“F... found herself on a vicious merry-go-round of symptoms — fever, sore throat, dizziness, muscle spasms, numbness, chest pains and fatigue. The symptoms kept coming around and around and around” C-50</i></p> <p><i>“My doctors and people [who are] trying [to] look after me are saying, ‘I don't know, I don't know what's wrong with you, I don't know how to help you.’”- C51</i></p>
14. Nostalgia-Retrospection and frustrations due to life disruptions	<p>People recall life before COVID and get frustrated and due to disruption on daily activities such as household chores, sporting events suspension, high food prices and closure of restaurants also causing frustration</p>	<p><i>“I took this picture of my friends on March 13, on what ended up being our very last day of high school together. We were sitting outside on the soccer field during our lunch period having what would be our last in-person conversation together” C-52</i></p> <p><i>“I gonna Missing the hangout” C-53</i></p> <p><i>“ effect of children education outcome as many children missed out on exam and then university places”-PO11</i></p>
15.Problems related	Disturbance from other members from	<i>“The coronavirus pandemic has forced</i>

<p>to working from home</p>	<p>kids causing psychological stress ,pain and sleep disturbances</p>	<p><i>millions to work from home — and the office will never be the same” C-56</i></p> <p><i>“Initially it was quite a challenge to ask that small question. It would usually take a couple of minutes by just walking over to someone face to face in the office,” C-57</i></p> <p><i>“Even though many people found it blessing at working from home, but many also struggled particularly when children also at home as having to look after and work at the same time” C-58</i></p>
<p>16. Anxiety about life after lockdown.</p>	<p>Mental health issues (fear, anxiety) of going back to work; socializing after long lockdowns</p>	<p><i>“After you've been inside for a long time, it can feel very strange to go outside” C-59</i></p> <p><i>“People are trying to cope by loving being in lockdown, by creating a cocoon of safety, a haven, to make the whole experience more tolerable. C-60</i></p> <p><i>“Ironically that can create problems later on because people can love their lockdown too much and become anxious about going outside.”-C-61</i></p> <p><i>“Furlough from work has been a problem for some as they found it difficult to go back to work, workplace anxiety increased and led to many frictions within work teams” -C62</i></p>
<p>* C-Comments from social media or news media, PO-Participant observation</p>		

Themes	Descriptions	Participant Observation/Sample comments from media
1. Gratitude towards Health Care	Increase in Positive attitude towards health care workers	<p><i>"Healthcare workers have taken their already high resilience to the next level, they have also shown the lengths to which they will go to protect the community and in doing so a deeply human side that won't be forgotten, earning them even more respect than previously" C-63</i></p> <p><i>"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" C-64</i></p> <p><i>"India's COVID-19 health workers showered in flower petals as military thanks 'warriors" C 65</i></p> <p><i>"Google Doodle shows its appreciation for all healthcare workers for their service" C-66</i></p> <p><i>"We bow down to the nurses, doctors, researchers that are working to provide us with the best healthcare they can" C-67</i></p>
2.Reduce morbidities and mortalities	<p>Respiratory illness such as Flu reduced significantly due to public health measures and death due to that.</p> <p>Also suicide rate reduced during pandemics (increased social cohesion) reduced numbers of RTA, and their deaths and injuries (due to decreased mobility, lockdowns)</p> <p>Reduced Covid morbidity and mortality in some countries by strict public health measures- 'social vaccine' (International entry bans, lockdowns etc. - Australia), aggressive vaccination,</p> <p>Reduced Inter and intra-state, civil wars and conflict</p>	<p><i>"COVID-19 pandemic drove flu to historic lows, and may have eliminated one virus type completely" C-68</i></p> <p><i>"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" C-69</i></p> <p><i>"UK road deaths drop 16% during pandemic year" C-70</i></p> <p><i>"Australia has avoided 30,000 Covid deaths due to strict measures: PM Pledging that he will not risk Australian lives, Prime Minister Scott Morrison on Tuesday said the strict measures adopted by his government have avoided 30,000 deaths in the country" C-71</i></p>
3. Gratitude, increased	People expressed gratitude	<i>"A Daily Gratitude Practice Improves Mood</i>

social/community/family cohesion	towards frontline workers	<p><i>And Builds Resilience”C-72</i></p> <p><i>“It’s clear that Australians have turned to their communities, keeping connections going and making new ones. Many people are clearly showing strong signs of resilience” C-73</i></p> <p><i>“The pandemic has absolutely tested us. And it’s shown that acts of kindness matter, it’s the social glue that keeps us together,” C-74</i></p> <p><i>“A journey through expressions of gratitude during the pandemic reveals how we’re helping each other through it” C-75</i></p>
4. Increased Family cohesion	Increased relationships, understanding, family activities (lockdowns made more time to reflect on family needs)	<p><i>“Spending More Time Together Has Strengthened Bonds”C-76</i></p> <p><i>“I’ve seen people begin to re-establish lost connections, not only with other people, but also with themselves,” C-77</i></p> <p><i>“The pandemic has allowed my husband, daughter and I to spend much more time together,” adds G. “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.”C-78</i></p> <p><i>“I have become a lot more creative in things [during pandemic restrictions]. I find myself concentrating on teaching [my children] more academic things”C-79</i></p> <p><i>“we have a lot more time to cook nice meals and play Legos together” C-80</i></p> <p><i>“It Has Stopped Our Lives” to “Spending More Time Together Has Strengthened Bonds” C-81</i></p>
5. Discovery of health interventions	Discovery of the mRNA vaccines in short time changed pandemic management; vaccines developed at faster time, more motivation within research teams Innovative contact tracing including online ‘check in	<p><i>“I received my first dose of the Covid-19 vaccine. It filled me with relief and immense gratitude. I am deeply grateful for the thousands of scientists” C-82</i></p>

	(QR code)" ; mobile phone app	
6.Health System Lessons-Improvements	Contact tracing innovations, more allocation for mental health and tele health services	<p><i>"Provision of substantial funding to support the mental health of Australians, including boosting digital supports, establishing pop-up clinics and providing dedicated services to the most vulnerable" C-83</i></p> <p><i>"Tele health should become another plank of the healthcare system" C-84</i></p> <p><i>"Hospitals are not the only place where care can be provided. From chronic medical conditions to aged care to rehab, there are a variety of patient health scenarios that can be undertaken at home, offering more flexibility for both patients and healthcare providers" C-85</i></p>
7.Online learning/ webinars/ seminars/conferences/meetings	Online learning during COVID-19 produced equivalent or better student course performance as compared with pre-pandemic	<p><i>"Students Want Online Learning Options Post-Pandemic. The experience of learning remotely during the pandemic left students with a positive attitude toward online and hybrid courses, a new survey suggests" C-86</i></p> <p><i>"Online learning and distant learning were at 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" PO 12</i></p>
8.Online health promotion activities	Various online health promotion activities during pandemic with new dimensions on it	<p><i>"Songs developed by local physician about Covid and uploaded could be considered positive collective level intervention" PO-13</i></p> <p><i>"Webinars organized by several community organisation through ZOOM platforms can be considered as positive collective level intervention" PO-14</i></p> <p><i>"YouTube channel and educates public on various controversies related to Covid" PO-15</i></p>
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	<p><i>"Sydney locals band together to support needy and vulnerable during COVID lockdown" C-87</i></p> <p><i>"This community has always looked after each other and I have been a beneficiary in</i></p>

	infected by the coronavirus, are more likely to give to a charity to support pandemic relief.	<i>the past and now I'm helping other people who are in need. It's as simple as that."</i> C-88
10. Various community level creative activities including spiritual	We observed various community level activities keep community connected created better environment for recover	<i>"Chatterbox" Dr Sam talks to Nighat Arif about 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"-C-89</i> <i>"An Important Step To Take During COVID Pandemic Sadhguru</i> <i>https://www.youtube.com/watch?v=hGxRl0h4jgE"C-90</i>
11. International Collaborations	Several international collaboration established sharing scientific finding and such sharing viral sequencing and ensure the vaccine equitable access such as COVAX facility	<i>"75,000 scientific papers on the virus published by November, over three quarters of which are open access. The scale of publications is another major achievement underwritten by the openness of COVID-19 research. The rapid response was built on the fact that the genome of the virus was sequenced and the results were instantly made public"</i> C-91 <i>"COVAX- With a fast-moving pandemic, no one is safe, unless everyone is safe"</i> C-92 <i>'Expanding global vaccine coverage with ensuring equitable distribution, and combating hesitancy and misinformation remains critical to limit overall viral evolution, protect vulnerable people and I to prevent mutation of viruses all of which can directly or indirectly lower the risks of new variants emerging"</i> C93
12. Economic opportunities	Homemade protective equipment Online shopping and markets	<i>"Shares in some pharmaceutical companies involved in vaccine development have shot up"</i> C-94 <i>"How companies pivoted from making dresses, snowboards and whisky to face masks, gloves and sanitizer"</i> C-95
13. Opportunity to involve in physical activity		<i>"It's given me an opportunity 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"</i> C-96

		<i>"It's actually benefited me in that I've been able to increase my activity" C-97</i>
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 crisis and other health issues, such as mental health,	<i>"The pandemic shows us that the goals must always be the same: contributing to the fulfillment of human needs and purposes. This requires us to cooperate locally when we face local challenges, nationally when we face national challenges, and globally when we face global challenge" C-98</i> <i>"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</i>
15. Benefits related to working from home	Some suggested working from home provided flexibility to work as well as improve productivity and it may go beyond pandemic in some sectors	<i>"It was very easy to just check that extra email and quickly go log on and reply back at any time of day, even early morning, rather than switching off completely, which you'd usually do you if you had a commute home"- C100</i> <i>"Not having to wake up so early, being able to exercise on my lunch break or after work, and being able to even cook a home-cooked meal for lunch was just really, really nice" C-101</i> <i>"It's the caregivers, it's people with disabilities, it's the people that can't physically make it into an office. They're as intelligent, if not smarter, than the next best person but we've kind of prevented them from coming into the workplace." C-102</i>
16. Solidarity is Coming Together With Social Common good	Public International / regional / national solidarity in many ways	<i>"You're not alone in this, and if you can have the resources to reach out when you need help, and there are people there to respond and help you out in those times, I think we can make it through," C-103</i> <i>"If I'm going to the grocery store, if I'm going to the pharmacy, why not extend my services to these people -- let me bring back what you need," C-104</i> <i>"We've pivoted to feel like we are an essential service and our teams are having to go to work so others can stay home" C-105</i>
17. Increased Bio knowledge;	People quickly came to	<i>"When I get body aches and sneezing I know</i>

<p>Awareness of disease and evidenced of disease recovery; ecology</p>	<p>know the symptoms, disease process and ways of avoid it and so on. People were well informed</p>	<p><i>that I got COVID, I was aware the symptoms as my sister in UK got it last year and she told the symptoms and I was quite ok and managed in home as I had one dose of Pfizer I didn't end up in hospital I know it saved and none of roommates did not catch as all vaccinated I wanted to complete my second dose as I am recovered completely"</i> C-106</p>
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Figures

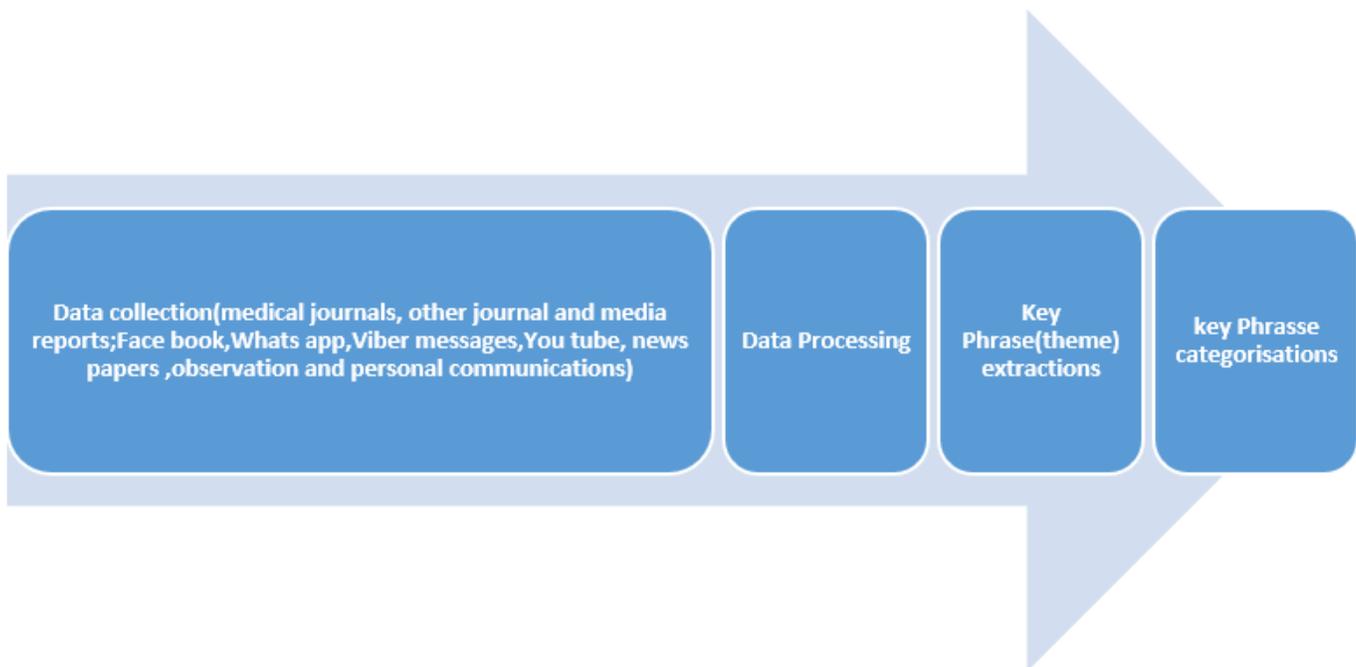


Figure 1

Outline of method adapted

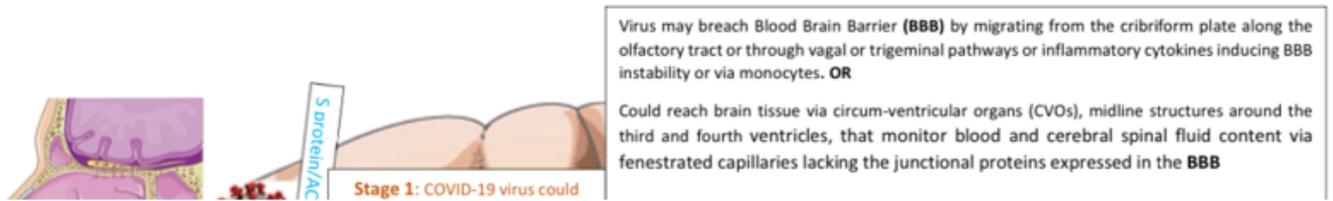


Figure 2

Pathological changes in brain due to COVID-19 infection, adapted from [13, 14]



Figure 3

Socio ecological model of mental health promotion intervention

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [References.docx](#)