COVID-19 and Substance Use Disorders: Syndemic Responses to a Global Pandemic

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Abstract

As this chapter is being written, the COVID-19 pandemic is having enormous impact upon the world. This is not only from direct mortality and morbidity due to the infection itself but also from its impact upon existing health services capacity which has been reoriented to cope. Worldwide infection control measures are causing socioeconomic upheaval. Deep emotional trauma and prolonged anxiety over facing the unseen and unknown are predicted to have lasting effects on individuals and communities. This includes an increase in drug and alcohol use, mental health conditions such as posttraumatic stress disorder, depression, somatisation and anxiety, lowered perceived health and reduced resilience to adversity.

Alongside this however are also huge advancements in medical science and unprecedented access to information and methods of communication through an ever-expanding digital infrastructure. Furthermore, there has been an increased understanding of the interrelatedness of various aspects of life, the so-
called determinants of health, and an explosion of multidisciplinary research approaches.

This chapter proffers to the reader a framework to understand the complexities of the COVID-19 pandemic in relation to the field of addiction medicine. The proposed syndemic response requires us to see addictions and substance use disorders as existing within multiple synergistic systems of social, economic, political and cultural contexts. It opens up opportunities for more effective and responsive multidisciplinary research, interventions and programmatic evaluations. Indeed, it is a good fit for current calls for research and programmes that enable society to prepare for the psychosocial and physiological challenges that lie ahead.

Keywords
Syndemic theory · COVID-19 pandemic · Complex systems · Substance use disorder · Addictions

88.1 Introduction

Few would argue that the COVID-19 pandemic is likely to be the worst public health emergency for a generation. COVID-19 has a high mortality rate (3–30 times that of seasonal influenza) and a high transmission rate (10 times more contagious than SARS). There is therefore a very real possibility of millions dying if the pandemic is not successfully contained [12]. The COVID-19 pandemic is also an economic crisis. The measures required to contain the spread of this disease, such as social distancing, lock-down measures and shielding, all involve a sharp reduction in economic activity. The direct impact of this unprecedented cessation of productivity is a predicted global recession, mass unemployment and debt crises [49].

Health and social services, already under strain from a decade or more of austerity following the last global financial crisis, have been overwhelmed in many countries. A redistribution of resources to manage the pandemic has resulted in the cessation of many services including those for the assessment and treatment or management of addictions [24]. Critically, in poorer, developing countries, or those without adequate investment in a social safety net, the COVID-19 pandemic will be a humanitarian crisis. The World Bank estimates that 49 million people will be pushed into extreme poverty, and the UN food agency has warned of multiple concurrent famines, with an additional 130 million pushed to the brink of starvation by the end of 2020 [67]. Basic social services such as education, health and policing will decline, with consequent increases in conflict, violence and crime.

The world is responding to the pandemic with relief measures to increase health services capacity, support those affected by public health measures and align incentives to comply with social distancing [23]. The duration of this crisis and containment phase is as yet unknown. It will however be followed by many countries undertaking recovery measures to transition out of significant socioeconomic upheaval.

What are the implications of these unprecedented events for people who use drugs and alcohol and people in need of addiction services? As with past global events resulting in socioeconomic upheaval, what are the opportunities and innovations that become possible? How do we understand, adapt, plan, design, implement and evaluate complex services and policies in the rapidly changing landscape the COVID-19 pandemic has brought to us? These are complex questions requiring us to factor in the pathogenic social contexts that people who use drugs and alcohol often experience which include socioeconomic disadvantages with low resilience and increased stigma, discrimination, homelessness and other inequalities in the upstream determinants of health [5, 6, 25, 58].

88.2 Syndemic Theory and Substance Use Disorders

The terms “syndemic”, a portmanteau of “synergy” and “epidemic”, “pandemic” and “endemic” have been used to explain the synergistic interaction of two or more conditions and
the social contexts in which these conditions develop [66] – synergistic in the sense that two or more agents or factors interact to produce a combined effect which is larger than the sum of their separate effects. A syndemics framework has been used most frequently in understanding human immunodeficiency virus (HIV) transmission, one of the leading causes of morbidity and mortality globally as a result of a communicable disease [7, 22, 54, 63]. Closely related with HIV transmission is injecting drug use, and so, unsurprisingly, a number of syndemics which include substance misuse disorder have been described in the literature (Table 88.1).

A key point about syndemics, and its relevance to populations suffering from addiction or substance misuse disorder, is that they include both disease and social epidemics. With reference to Table 88.1, we see that violence, unresolved family conflict, internalised oppression (referred to as homonegativity when in relation to the lesbian, gay, bisexual and transgender (LGBT) community), loss, trauma and homelessness are as much part of a defined syndemic as HIV, substance misuse disorder, and mental and physical ill health [43, 64, 66]. Epidemics within a syndemic framework is both psychosociological (social, structural and behavioural) and physiological [54, 66].

Ultimately, syndemics describe a heightened vulnerability to morbidity and mortality due to a variety of synergistically correlated systems. Syndemic theory is particularly useful at this time as we grapple with the challenges of the COVID-19 pandemic. For example, does the so-called “opioid epidemic” seen in Australia, North America and Scotland constitute an additional syndemic alongside the COVID-19 pandemic? Certainly, there are a number of ways in which this combination fits the syndemic definition. People with opioid dependence may have increased vulnerability to COVID-19 exposure due to the need to source their drug of choice or attend a pharmacy daily to access substitute treatment. They are vulnerable to disruptions in the drug markets which can result in experimentation with unfamiliar or more highly potent drugs. Social isolation, a necessary protective mechanism against COVID-19, increases the risk of a person who injects drugs as there is no one to help if the person experiences an overdose. The impact of COVID-19 in terms of the loss of social

| Components of syndemic                                                                 | Acronym | Country                          | Reference |
|---------------------------------------------------------------------------------------|---------|----------------------------------|-----------|
| Substance abuse including injecting drug use, violence including childhood sexual abuse, intimate partner violence, non-partner sexual assault and trafficking and HIV/AIDS. Special emphasis is placed on the challenges that sufferers have to negotiate condom use or to avoid needle sharing | SAVA    | USA, Malaysia, Kazakhstan, Sub-Saharan Africa | [26, 32, 39, 64] |
| Substance use which often co-occurs with mental illnesses such as depression, schizophrenia, manic depressive disorder mental illness, and overt familial conflicts which are acute or chronic all of which impact upon HIV outcomes | SUMIC   | USA                              | [60]      |
| Substance use during condomless intercourse, adolescent sexual abuse, violence, internalised homonegativity, and depression | SAVID   | Tanzania                         | [1]       |
| Physical health problems, abuse, mental illness, loss, instability, and substance use | PHAMILIS| USA                              | [42, 43]  |
| Syndemic of lifetime mental illness, substance use disorders, and trauma and adverse perinatal outcomes | –       | USA                              | [45]      |
| Depression, alcohol and violence                                                      | DAV     | India                            | [19]      |
| Depression, substance use, violence, sexual stigma and homelessness, unprotected anal intercourse and HIV infection | –       | 151 countries                    | [61]      |

SAVA substance abuse, violence and HIV/AIDS, SUMIC substance use, mental illness and familial conflict non-negotiation, PHAMILIS physical health problems, abuse, mental illness, loss, instability and substance use, DAV depression, alcohol and violence
networks, heightened stress from news stories, and bereavement from the loss of loved ones may result in increased drug consumption. Overall, there is a heightened risk of drug-related deaths as a consequence of the pandemic [3].

As mentioned earlier, there are a number of syndemics involving both substance use and HIV. COVID-19 here would add a further burden of disease and social disadvantage [63] exacerbating the challenges people living with HIV face which often include social and economic inequalities, stigma and homelessness [2, 11, 21]. A further consideration is the syndemic we are observing between communicable (e.g., COVID-19) and non-communicable diseases (NCDs). One strategy of many countries to protect from COVID-19-related mortality was to advise those with preexisting conditions to remain shielded or cocooned at home. Generally, this has meant remaining indoors in their own home for up to 3 months, with essential needs such as food or medication delivered to them. These preexisting conditions are primarily NCDs such as diabetes, chronic obstructive pulmonary disease (COPD) and cardiovascular conditions [47]. Unfortunately, as Volkow [70] identifies, people with addictions are over-represented in the numbers with NCDs. For example, long-term smokers and people who smoke crack cocaine or heroin have higher rates of both pulmonary and cardiovascular disease, both of which increase the mortality rate from coronavirus-related severe respiratory syndrome.

88.3 Syndemics and Complex Systems Thinking

A fundamental problem with a theory of disease, which emphasises social contexts as much as it does physiological pathology, is that it does not easily lend itself to compartmentalised approaches. Complex systems thinking is an approach which supports the understanding of syndemics by examining its elements (the physiological and contextual constituents), the interconnections between them (policies, legislation, social networks and norms and individual-level risk factors) and the true purpose or function of the examined system. To clarify this last point, one would hope that systems are not intentionally designed to perpetuate a syndemic. Yet, a complex systems analysis can uncover the dynamic of a social context and reveal that in fulfilling one function, for example, the lockdown strategy to minimise public exposure to COVID-19, the unintended consequence could be the creation of a system that may perpetuate or contribute to a syndemic (for example by increasing incidences of domestic abuse and violence) [53].

Systems approaches use tools and frameworks to develop a shared understanding of the interconnected and interdependent components of a problem or situation [17]. From this shared understanding, causal relationships and leverage points within them can be identified. Examples of this are provided in Fig. 88.1 through causal loop diagram. With systems-wide leadership and cross-sectoral cooperation, coordinated action can then be carried out, targeting these leverage points to manage the problem.

A complex system has several defining characteristics including emergence, feedback and adaptation. Emergence describes properties or phenomena that develop from a particular combination of systems elements that cannot be predicted simply by adding all these elements together [44]. Feedback is a situation whereby an intervention on an element within a system reinforces or balances a (usually) desired change within that system [44]. Adaptation refers to behavioural changes that come about as a result of an intervention [44]. These terms are explored in more detail in a later section.

88.4 Empirical Methods to Study Syndemics

A critique of the application of syndemic theory is that insufficient attention is paid to the actual mechanisms of interaction between epidemics to form a syndemic. The issue here is that some so-called social epidemics are simply a constellation of risk factors which are added up to create a composite variable which is then
entered into an equation to identify a statistically significant effect [69]. Unfortunately, such practices ultimately undermine the effectiveness of the syndemic theory in not only understanding the impact of pathogenic social contexts on the mortality and morbidity of vulnerable groups but also in designing and accurately evaluating complex interventions. Table 88.2 illustrates three proposed mechanisms of interaction between epidemics to create a syndemic and suggested empirical methods to investigate them.

**Table 88.2**

| Mechanism of Interaction | Empirical Method |
|--------------------------|------------------|
| Epidemic A and Epidemic B | Combined analysis |
| Epidemic C and Epidemic D | Comparative analysis |
| Epidemic E and Epidemic F | Correlational analysis |

**88.5 Applying Syndemic Theory and Complex Systems Thinking**

We use a causal loop diagram to visualise an application of syndemic theory through complex systems thinking. Causal loop diagrams are a visual aid to show how different variables within a system are interrelated. There are other methods of visualising complexity which include graph visualisation, network visualisation, and node–link diagrams [56, 74]. The challenge is to describe complexity in a way that allows us to grapple with the issues it raises while not simultaneously oversimplifying and forgetting the bigger picture.

**88.5.1 What Happens When a Syndemic Collides with a Pandemic? The Acute Phase**

Figure 88.1 describes some of the elements involved in efforts to control the syndemic of homelessness, violence, and blood-borne viruses and their interaction with interventions to manage the COVID-19 pandemic in this vulnerable population. In recognition of the particular difficulties the homeless population would have in following public health advice during the pandemic, the National Health Service (NHS) in the UK developed specific and detailed guidance [48]. This guidance required local authorities to...
coordinate their resources with health, third sector organisations, and addiction services and included the following:

- Arranging appropriate accommodation, which at a minimum needed to have en-suite washroom facilities to minimise unnecessary interaction
- Identifying individuals needing to be shielded due to comorbid health conditions which increase their risk of poor outcomes from a COVID-19 infection
- Providing the conditions to support the shielding process for this identified group, to keep them separate from their peers and community
- Case finding through testing of symptomatic individuals and keeping them isolated for the duration of their illness (2 weeks) or until a negative test is obtained

Table 88.2 How do epidemics interact to form a syndemic?

| Types of interaction               | Description                                                                                                                                   | Proposed research methods                                                                 |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mutually causal epidemics         | This is the classic description of the syndemic, first described by Singer [64], i.e., the SAVA (substance abuse, violence, and AIDS) syndemic. Essentially epidemics A & B, B & C, and A & C are mutually causal. | Agent-based modelling. Theory-led assumptions as to how a syndemic forms from different epidemics are explicitly detailed. The theorised modelled syndemic may be based on anthropological data, with emergent descriptions, compares against epidemiological data. Agent-based modelling can be used to simulate population-wide effects of complex interventions, for example, how stigma and trust in authorities may interfere with uptake of public health advice to limit COVID-19 spread. Examples include work by Zhang et al. [75] in investigating the obesity epidemic. System dynamics is a mathematical modelling technique to frame, share understanding and unpick complex interactions [29]. Causal loop diagrams illustrated in Fig. 88.1 can be converted into stock and flow diagrams or can be used as they are to perform system dynamics via various computer programmes (Binder et al., [10]). |
| Synergistically interacting epidemics | In this syndemic, both A & B can cause C. When both co-occur, they have a synergistic effect which results in a much larger epidemic of C. This syndemic pattern is described by Singer & Clair [65]. Examples include the synergistic effects of alcohol abuse and HIV on the morbidity and mortality for patients with HCV coinfection [55]. | Social network analysis. In the social network perspective, individual risk factors as well as the interconnections between key risk factors are important across the lifetime to explain how epidemics become a syndemic. In this model, low-prevalence health risks can become critical if they are strongly and closely connected to other risks. These high-density nodes become good targets for intervention. Examples of this include work by Tomori et al., [68] and McNally et al., [46]. Structural equation modelling. Hypothesised associations between several different variables are tested statistically. Examples include work by Khan et al. [35] to understand the impact of poverty and unemployment on alcohol abuse. |
| Serially causal epidemics          | This proposed pathway to a syndemic runs parallel with theories of accumulated risk exemplified by life course epidemiology [55]. Most topical in many countries currently is the association of adverse childhood experiences [8] as a life course determinant of adult health [27]. | Adapted from Tsai [69]. |
The diagram is not intended to be a comprehensive illustration of every contingency but more to illustrate the implications of a syndemics perspective. The authors have some experience working through some of these pathways in the homeless and substance-using populations as the COVID-19 pandemic has unfolded [31]. The first reinforcing loop (1) is a visual representation of the synergistic effect of intravenous drug use, homelessness and violence upon HIV and hepatitis C (HCV) transmission. Opiate substitute therapy (OST), injecting equipment provision (IEP), condom supply, and HCV and HIV testing and treatment are important individual services. Collectively, as a complex public health intervention, these services have a greater impact than they do individually because of their impact on several elements of the syndemic. Furthermore, interrupting the provision of harm reduction services during the pandemic will potentially increase syndemic effects and contribute to drug-related deaths. In recognition of this, the Scottish government has specifically identified harm reduction and addictions services as essential through the pandemic [62].

Reinforcing loops (2) and (3) focus on the importance of trust as a driver for the success of public health interventions. Indeed, this has been highlighted as a key component in the acceptance of and compliance with public health advice [14, 15, 28, 52, 71]. Marginalised groups such as people who are homeless or people who use drugs have had a tendency to distrust institutions with authoritative powers, for example health or social services [50]. This mistrust is not the preserve of marginalised groups. The ability to retain the trust of the general public is increasingly seen as invaluable by many commercial, third sector and statutory institutions and organisations [30, 38].

There are a number of explanations for this which include media and government responses to actual and perceived failures within healthcare services [51], frustrations with healthcare rationing and unmet public expectations [20], and a cultural shift towards challenging the authority of experts, particularly if they are perceived to be detached from the realities of everyday life [72]. Indeed, and in line with Wilson et al., [73], syndemic theory can be useful here to understand the link between trust, structural violence (the suffering that comes from being stigmatised or oppressed due to socioeconomic status, homelessness or some other social factor), trauma and the motivation that individuals have to adopt health protective behaviours such as social distancing and self-isolating.

Carver et al. [18] unpick the service elements most valuable to the homeless population when seeking help for substance use disorders and identify the centrality of non-judgemental, compassionate and supportive relationships. Many frontline workers in the homeless sector have built these trusting supportive relationships with their clients over many years [9, 18, 40, 41]. Efforts to successfully remove barriers to homeless individuals complying with public health interventions to limit the spread of COVID-19 such as arranging suitable housing and welfare, nutritional, health and addiction support are contingent on building upon these invaluable, hard-won, human connections.

The restoration of public trust in healthcare requires an understanding of what is at the core of this concept [33], how it is lost and what strategies may return it [16]. Trust, relationships, social capital, reciprocity and similar concepts are difficult to measure or observe, yet are pivotal to the efficacy of public health interventions [73]. The application of syndemic theory necessitates that we understand psychosocial evidence in an equivalent way as physiological and biomedical evidence of the disease and offers a framework and the tools to do so.

It is worth at this point identifying examples of emergence, feedback and adaptation defined earlier in this chapter. Referring to (5) and (6) in Fig. 88.1, a transient rise in non-fatal drug overdose (NFO) rates among people who have a long history of homelessness may be an emergent property following interventions to enable them to self-isolate and practice social distancing. These interventions include rapid access to housing and the provision of opiate substitute therapy where required.

While protective against COVID-19 transmission, there are some issues which may increase
NFO rates at least in the early stages. This includes concentrating a large number of individuals with substance use issues in close proximity to each other, increasing their exposure to negative peer influences. During the initial phase of opiate substitute therapy, prescribers often do not provide take-home doses until the patient has a degree of social stability. In the context of the COVID-19 pandemic, this may not be possible due to reduced pharmacy capacity to supervise the daily consumption of medication or due to a need to shield the patient from unnecessary social contact. Individuals who have not been used to take-home doses may not take their medication as prescribed or be victimised by others because of their possession of valuable medication. In other words, in the short term at least, interventions widely seen as positive and supportive may increase substance-related harms.

The importance of adaptation is illustrated in (4). Bearing in mind that most countries have not the experience of managing a pandemic of this nature before, a region’s COVID-19 response is more likely to be effective if authorities are able to coordinate their efforts rapidly and flexibly. To use the analogy of a plant growing around obstructions to reach the sunshine and thrive, agile and accountable governance and management structures, strong partnership working and culturally informed practices can contribute to the implementation of an effective COVID-19 containment strategy.

An example of feedback is observed here at (7). Marginalised groups such as people who are homeless or who use substance have often been through complex trauma. Fundamental to trauma-informed interventions are principles such as providing choice, collaboration and opportunities for empowerment, all of which are essentially about respecting the autonomy of the individual [4, 34]. While outreach interventions often closely fit with trauma-informed principles, public health messages which appear restrictive of civil liberties, freedom of movement or contingent on the tolerance of social isolation are likely to challenge this sense of autonomy. Getting the balance right here is essential to avoid situations of treatment refusal and to preserve the efficacy of interventions to reduce COVID-19 transmission events.

### 88.6 Multilevel Analysis

Based on theoretical models such as the risk environment framework [57, 58], the socioecological model [13] and the eco-social model [37], multilevel analysis looks at data nested within hierarchies. An individual is part of an interpersonal network within a community which accesses a health system which in turn is influenced by the political economy of the country. Failing to recognise these hierarchies and not accounting for them in mathematical modelling produce incorrect inferences. An example is how large-scale social forces such as economic upheaval or war can impact upon the individual’s choices and risks leading to increased exposure to HIV (Tim [59]). Critically Bradley et al. [12] point out that the complexity involved in researching priority areas around COVID-19 necessitates the use of multidimensional and multilevel perspectives. Table 88.3 goes through some of the issues that will need to be considered both during the acute and recovery phases of the pandemic.

The micro-level here refers to the smallest level of interaction. This could be at the level of interpersonal relationships or communication and could also include the internalisation of perceived public opinion to form their self-identity. This term also indicates individual characteristics, capacities or abilities which influences behaviour.

The meso-level refers to organisational-level behaviour. This can range from individuals developing a sense of solidarity with each other and forming a community group, organisational behaviour in the face of a changing environment or social norms with a group.

The macro-level refers to large-scale patterns or influences, for example the impact of laws, the economy or widespread public opinion.
| Level of analysis | Acute phase(s) of uncertain duration | Public health interventions and supportive relief measures | COVID-19 recovery phase | Transitioning out of socioeconomic upheaval |
|-------------------|-------------------------------------|-------------------------------------------------|---------------------|----------------------------------------------|
| **Micro** Individual-level interactions personal decisions and agency Individual values, strengths, capabilities, life experiences | **Problems** Distrust of authority Re-traumatisation Fear of isolation Alternate rationalities influenced by substance use Stigma | **Problems** Coping with disaster Loss and bereavement Trauma Chronic fear and anxiety Helplessness Increased substance use |
| Micro | **Opportunities** Shared decision-making Co-producing services Build or attach to peer and frontline worker relationships Psychologically informed environments and interventions | **Opportunities** Maintaining capacity to provide mental health care Removing barriers to treatment Building upon collaboration across sectors, disciplines and service-users |
| **Meso** Organisational service delivery Third sector Community groups Community engagement Community level norms and practices | **Problems** Deprioritising of addictions services Re-deployment Staff illness Unresponsive management structures | **Problems** Re-orienting services towards future pandemic preparedness Catch up with urgent care delayed by the current pandemic Increased demand on services due to trauma and chronic anxiety and stress Unrecognised value of addiction and mental health services |
| Meso | **Opportunities** Sharing experience and knowledge Digital platforms Advocacy Build upon networks, for example public health | **Opportunities** Developing novel technological solutions Targeting digital inequality Developing peer support, co-production and collaboration with service-users The definition of essential workers and their importance in society have changed for the better Collecting data and research to show the value of psychological and psychosocial factors in physical health responses |
| **Macro** Policy level (macro-economic, public health, social, legal) Public discourses Media | **Problems** Economic or public health crisis? Tensions between the needs of economic security and public health Relief measures have had a direct effect on the public purse through increased spending, for example, increased expenditure on health care, while at the same time there is a reduction in tax income due to reduced economic productivity | **Problems** Avoiding collapse through relief measures Austerity Reduced spending on health and social services Benefits cuts Shrinking of the state |

(continued)
Syndemic theory differs from conventional health models by incorporating the upstream social determinants of health into explanations of disease clustering from the outset. This means that complex population-based interventions can be designed which address macro-level social elements, for example societal and institutional stigma. Complex public health interventions offer a number of benefits, not least, the avoidance of duplication through multiple independent initiatives or competing smaller projects [69].

There is however the issue of local areas often having different priorities, resources and demographics. Awaiting consensus across several administrative regions on one comprehensive intervention may result in an unresponsive local health service with consequent risks of increased mortality and morbidity. Similarly, different communities may have different vulnerabilities. Worldwide, large communities of displaced people and international migrant workers may live in conditions that increase their vulnerability to COVID-19. They are also at risk of income loss, healthcare insecurity, postponement of decisions on their legal status and an inability to protect themselves or their families from violence [36]. Population-level initiatives to reduce viral transmission must address these needs in order to be successful.

### 88.7 Conclusions

Single health issue interventions or quality improvement activities by services have an important role in meeting the needs of individuals suffering from syndemic conditions. Conceptualising these interventions within a complex systems approach allows us to understand its contribution to the functioning of the overall system. For example, removing barriers to medication-assisted therapy during the pandemic has the obvious outcome of stabilising drug use and removing the suffering of withdrawals. It may also rebuild trust between people who use drugs and authorities, and through this, improve compliance with social distancing.

The provision of good-quality housing to enable homeless individuals to self-isolate during the pandemic will reduce their immediate risk of COVID-19 infection. It may also signal to these individuals that they are cared for by society. Supported and stable housing may provide opportunities for people who use drugs to remove themselves from destructive social networks and experience sobriety for the first time. This in turn could have benefits or disadvantages such as a deterioration in mental health due to the recollection of past trauma. Using network science, agent-based models or other syndemic and systems analytical tools allow us to develop, design and better evaluate interventions [69].

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**Table 88.3** (continued)

| Level of analysis                              | Acute phase(s) of uncertain duration | COVID-19 recovery phase  |
|------------------------------------------------|--------------------------------------|--------------------------|
|                                                | Public health interventions and supportive relief measures | Transitioning out of socio-economic upheaval |
| **Opportunities**                              |                                      |                          |
| 1. Recognition of the importance of the social network and publicly well resourced publicly funded healthcare |                                      |                          |
| 2. Recognition of the importance of civil liberties may lead to increased public participation |                                      |                          |
| 3. A number of long-debated initiatives such as universal basic income and housing first may become relevant again |                                      |                          |
| 4. Improved environmental health and reduction in the carbon footprint |                                      |                          |
| **Opportunities**                              |                                      |                          |
| 1. Critical times require well-designed government action and effective public service delivery |                                      |                          |
| 2. A monetary and fiscal policy, which avoids desperate measures, ensuring continuity of public services provision for vulnerable people, contributes to macroeconomic stability |                                      |                          |
able to look at individual strands, while also keeping an eye on the overall complex tapestry.

Syndemic and complex systems approaches support a recent position paper by Holmes et al. [28] regarding mental health science research priorities during and following the COVID-19 pandemic. The paper recommends a research strategy that is global, collaborative, multidisciplinary, cross-sectoral and incorporating people with lived experience which addresses the psychological, social and neuroscientific underpinnings of the mental health impacts of the pandemic. The essential role that the social sciences, humanities and technology have in terms of understanding the uptake and acceptance of evidence and public health measures and in reducing fear and stigma has been highlighted and should be capitalised upon to develop future comprehensive and complex interventions.

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