

## COVID-19 health anxiety

Much has been written about the mental health consequences of the COVID-19 pandemic. The anticipated need to develop new services for post-traumatic stress disorder, for suicide prevention and for prolonged grief have filled many paragraphs of newspaper space, and these have been reinforced by weighty papers from experts across the medical disciplines<sup>e.g.1</sup>. But there is something missing from these accounts – health anxiety – and this cannot be ignored.

It is perhaps easy to explain why. Health anxiety is a relatively new concept. It derives from the much better known condition called hypochondriasis. The reason why health anxiety has been separately identified is that it is primarily an anxious disorder, whereas hypochondriasis covers a much larger range, including significant depression and even psychotic symptoms such as delusions.

People with pathological health anxiety have excessive fear of getting, or having, a disease<sup>2</sup>. But, as we all know in the health professions, anxiety itself leads to psychological and bodily symptoms that, all too frequently, are misinterpreted as evidence of organic illness. These are present across the wide range of disease and can simulate disorders in every medical speciality, which is why they were in the past included under the generic title of “medically unexplained symptoms”. So, in the case of people with health anxiety preoccupied with respiratory disease, somatic symptoms such as cough, dizziness, difficulty in getting one’s breath, and need to breathe more rapidly, are all present. But of course, most of us, in the present circumstances, would at least contemplate the possibility that, if we had these, they might be incipient coronavirus symptoms.

This is where COVID anxiety differs from ordinary health anxiety; at present it is probably justified and so cannot be regarded as pathological. But it is only a matter of degree. In the middle of the pandemic it is perfectly reasonable for people experiencing these symptoms to attribute them to coronavirus infection. But what happens later? COVID-19 is not going to disappear suddenly. There will be a long period, possibly extending over several years, in which there will still be the danger of infection, and this is when pathological COVID anxiety will occur.

Every symptom, no matter how small, will be given sinister significance. In classical health anxiety, sufferers become their own monitors of health, but, as they are never convinced that they are doing the job properly, they also need reassurance from relatives and friends, and often will present their symptoms to medical personnel. Because there is some doubt over the accuracy of tests, even a negative result for COVID-19 will not remove their fears. Once established, health anxiety leads to continued vigilance, often associated with checking of the body, repeated requests for reassurance, and browsing on social media, followed by the vicious cycle of increased anxiety, greater symptomatology and more misinterpretation.

It is difficult to predict what will happen with the COVID pandemic in the future, but all the evidence points towards a likely

second outbreak during this autumn. If so, this will be a peak period for pathological health anxiety. In the absence of a vaccine, there will continue to be fear of getting infected, even in those who may have already been tested, as even those who have tested positive will not know if they still have immunity.

Those with severe health anxiety are likely to become abnormally avoidant, continuing to isolate and practise repeated hand washing, checking their body temperatures, respiratory function, and even testing their ability to smell (as this is a recognized symptom of the infection) over and over again. There is considerable overlap between obsessional symptomatology and health anxiety<sup>3</sup>, and a relentless concern with safety seeking behaviours may come to dominate some people’s lives.

What can be done to prevent or reduce the impact of COVID health anxiety? We do not yet know, but there are worrying signs that handicap its prevention. One of the strong drivers of health anxiety is cyberchondria, the malign influence of the Internet and social media in promoting fears about illness. This may be behind the rise in pathological health anxiety in recent years<sup>4</sup>. As COVID-19 now dominates every news medium, it is going to be impossible to escape this particular reinforcement of health anxiety.

One of the positive signs is that now we have effective psychological treatments, after regarding hypochondriasis as untreatable for many years. Psychopharmacology is unlikely to help in this condition, unless depression becomes a marked symptom. The most effective established treatments are cognitive behaviour therapy adapted for the condition<sup>5</sup>, and acceptance and commitment therapy<sup>6</sup>. These can be given face to face and over the Internet very successfully<sup>6,7</sup>, and in most cases the response is rapid and encouraging. Nurses have also been shown to be highly effective in giving this treatment<sup>8</sup>, and it is likely that many other health professionals may be able to act as therapists for this condition.

What is not clear is how long COVID health anxiety is likely to persist. Other forms of health anxiety tend to last for many years and show little fluctuation. The symptoms often arise after a trigger event that threatens health and, paradoxically, COVID health anxiety might be even more prominent in those who have already experienced infection or have tested positive. Untreated, symptoms persist and can lead to a significant degree of depression<sup>9</sup>. Currently, we are carrying out a remotely given intervention for COVID health anxiety based on experience with previously successful short-term cognitive behaviour therapy for health anxiety (CBT-HA).

Much will depend on the arrival of a vaccine and further evidence about the degree and length of immunity after recovered infection. Once the current uncertainty is resolved, the situation will be clearer and we can then expect the prevalence to fall. In the meantime, the following advice might be given to those with an abnormal degree of health anxiety linked to COVID, and indeed all those who already have health anxiety: limit unnec-

essary contact with health professionals of all types, only listen to the news for a short time each day, do not wash your hands repeatedly if you have had no possible contact with another person, and keep yourself occupied as much as possible.

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## Smartphone relapse prediction in serious mental illness: a pathway towards personalized preventive care

Imagine a smartphone app that knows when a patient is at risk of relapsing on alcohol use based on geolocation data indicating proximity to a liquor store and real-time surveys suggesting elevated craving. The smartphone detects this imminent risk, alerts a clinician, and the patient receives a personal check-in within minutes. Such a system does not sound futuristic in 2020, neither was it a decade ago, when the Alcohol - Comprehensive Health Enhancement Support System (A-CHESS) study, described above, was conducted<sup>1</sup>. Ten years later, smartphone relapse prediction systems are catalyzing a paradigm shift in mental health care that is now further accelerated by the COVID-19 pandemic. As these approaches continue to enable dynamic and longitudinal modeling of risk, personalized preventive care is within reach.

The evidence for smartphone relapse prediction across major mental disorders is impressive. Today it is possible to build dynamic digital proxies for symptoms, functioning, cognition and physiology using smartphones and wearables – often referred to as digital phenotyping<sup>2</sup>. For example: passive smartphone data from sensors like global positioning system (GPS) can inform about location; accelerometer about sleep; active data from surveys (often referred to as ecological momentary assessment) can capture real time symptoms; metadata from phone interactions can characterize cognition; and data from wearables can inform on physiological measures.

Capturing these diverse data streams is highly feasible. Open-source and free platforms such as mindLAMP have permitted teams across the world to engage in this work<sup>2</sup>. Using varying combinations of these digital data streams, studies have shown clinically actionable assessment of relapse risk in schizophrenia<sup>3</sup>, depression<sup>4</sup>, bipolar disorder<sup>5</sup> and substance abuse<sup>1</sup>. Furthermore, data around spoken and written language as well as social media use (often accessed via smartphones) is also augmenting relapse prediction. Since at least 2018, an effort has been made to predict suicide attempts in the US through real time natural language processing<sup>6</sup>.

The success in accurate assessment of relapse risk is encouraging and highlights the need for the field to advance towards studies of predictive validity and reproducibility. In the suicide prevention field, a recent review highlighted that even the good global classification accuracy of current suicide risk models still

yields a predictive validity of less than 1%<sup>7</sup>. The predictive validity of smartphone relapse models remains untested, but targets for ensuring reproducibility have already emerged, including data accessibility, standards and methods.

Data accessibility from smartphones is constantly in flux, as Apple and Google (which control over 99% of the world's smartphone operating systems) change accessible data sources each year in response to both technical and privacy considerations. For example, in June 2020, both Apple and Google announced that access to Bluetooth data (which can be used to infer social context – a key element in many relapse models) would become limited given growing privacy concerns. Balancing ethical data uses and surveillance risks from this work requires renewed attention. For available data streams, differences in sensors and phone models and brands often yield divergent metrics for the same behaviors, generating a need to control for device characteristics in a standardized way.

Furthermore, assuming a case where all smartphone sensors are sampling at 10Hz, theoretically up to 65GB of data can be generated for one patient in one month. Appropriate use of statistical methods is critical, as spurious findings should be considered the norm with this amount of digital data. Sharing data – a challenge in this work given the personal and identifiable nature of digital phenotyping data – will be critical to success, and new efforts in the spirit of the openfMRI project (see <https://openfmri.org>) are necessary. Ensuring that these new dynamic models of relapse are not biased, as is being realized today for some medical treatment algorithms that misuse race<sup>8</sup>, will require diverse and representative research.

Careful assessment of the prospective validity, reproducibility and clinical applicability of these new smartphone relapse prediction models is a clear next step. Many current models are not utilized in routine care because they are based on static risk factors (e.g., age and gender) and explain a low percentage of relapse variance. While there are some sophisticated models that allow for time varying factors, they often assume that mental health processes are ergodic, i.e. that group level data are generalizable to an individual<sup>9</sup>. In the past, when data collection was limited at the individual level, this assumption has been necessary, but now it is recognized to be incorrect<sup>9</sup>.