All tip, no iceberg—a new way to think about mental illness

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Symptoms of mental disorders are inter-connected. Credit: Pixabay. , CC BY-SA

Mental disorders are traditionally seen as rather like flowering bulbs. Above the ground we see their symptoms, but we know their source lies

hidden beneath the surface. If we treat the symptoms without addressing the cause – cut off the flower without uprooting the bulb – they will just flower again later.

The idea that each mental disorder has an underlying cause is itself deeply rooted. We imagine that underneath the clinical symptoms of schizophrenia or depression there is an underlying disease entity. If treatment is to be effective and lasting rather than merely symptomatic it must target that concealed origin.

People have had many ideas about the form the unseen cause might take. Medieval physicians imagined a "stone of folly" that had to be surgically removed from a mad person's head before sanity could prevail. Funnily enough, the best known painting of such an operation, Hieronymus Bosch's The extraction of the stone of madness, shows the "stone" to be a flower bulb.

More recently, psychiatrists often suppose the hidden cause is neural, such as a brain disease or chemical imbalance. Psychologists sometimes prefer to invoke specific cognitive malfunctions or conflicts. What unifies them is the idea that a cluster of symptoms can be traced back to an underlying pathology.

This way of thinking makes perfect sense in some areas of medicine. A collection of bodily symptoms often points to an underlying disease process. Scarlet fever is revealed by a bright red rash, fever and a sore throat, all caused by an underlying bacterial infection. It would be folly to treat it symptomatically. Pacifying the rash with wet towels, taming the fever with aspirin and drinking tea with honey to soothe the throat would not attack the hidden, microbial cause.

Unfortunately mental disorder is not like infectious disease. Rarely is there a single, identifiable cause underlying a group of symptoms. Most

psychiatric symptoms spring from a tangled multiplicity of causes. In addition, many symptoms are not specific to a single condition.

Billions of research dollars have been spent trying to locate the unique hidden cause of each mental disorder. The results have been spectacularly disappointing, not because mental health researchers are inept but because the causes of mental disorder are extremely complex.

To extend the botanical metaphor, mental disorders are less like flowering bulbs than like bamboo. An interconnected network of underground roots (hidden causes) generates many visible stems (symptoms). No stem can be traced back to a single root, and no root feeds a single stem.

The network approach to mental disorder

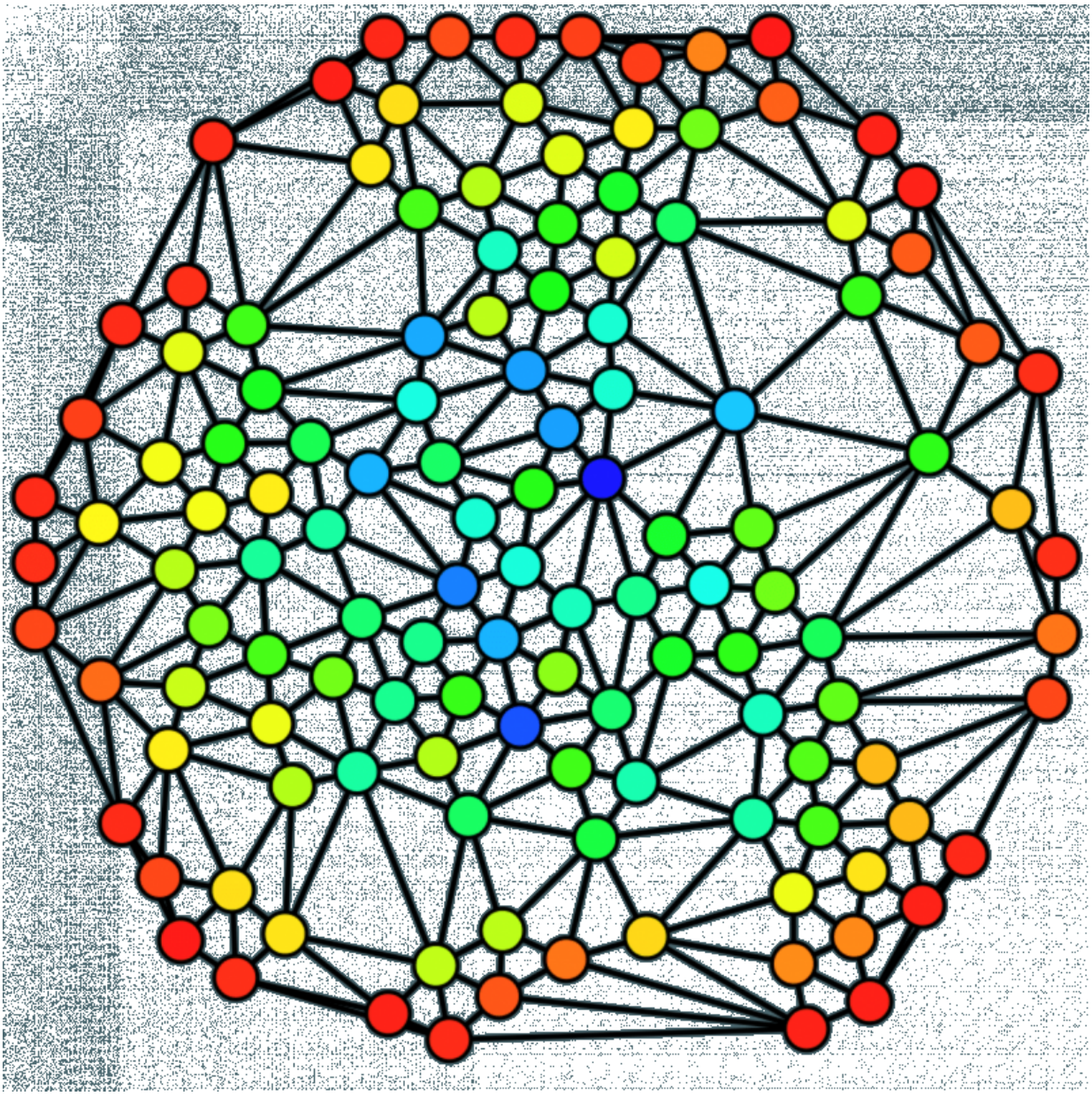
If there is no one-to-one link between symptoms and hidden causes, maybe we are better off putting aside the search for those causes. A new way of thinking about mental disorder argues just that, proposing that we focus full attention on symptoms instead.

Rather than seeing symptoms as manifestations of hidden disease entities – as the tip of an iceberg – this "network approach" tells us to examine how symptoms relate to one another. It argues the symptoms of a disorder cluster together not because they share a hidden cause but because they interact with and potentially reinforce one another.

The network approach to mental disorder, developed by Dutch psychologists Denny Borsboom, Angelique Cramer and colleagues, represents each symptom as a node in network. It draws links between these nodes to reveal the symptoms that are most strongly related, such as which ones influence other symptoms most powerfully and extensively.

For example, loss of appetite and weight loss are both symptoms of major depression. If researchers found they were closely related, and appetite loss drives weight loss, then an arrow would be drawn from the former to the latter. By this means a group of dynamically related symptoms can be represented by a network diagram.

Several features of the resulting networks are particularly interesting. Certain symptoms can be shown to be *central*, related to many others, whereas others are more peripheral. Certain symptoms primarily *cause* others, whereas some symptoms are primarily caused by others.



A network diagram can show how symptoms are inter-related. Credit: Wikimedia Commons, CC BY

Because mental disorders are seen as mutually reinforcing symptoms, clinicians should target central symptoms that cause many others. Successfully treating these symptoms should have broadly beneficial

effects. It should reduce other existing symptoms and prevent the spread to new symptoms.

Certain symptoms may also be *bridges* from one disorder network to another. For example, sleep disturbance among people with post-traumatic stress disorder (PTSD) may cause fatigue, and fatigue may serve as a bridge to the depression network by activating concentration problems and guilt.

Examples

Researchers have carried out network analyses of several disorders, using similar computational tools as those used in social network analysis , an approach to mapping relations among people. One study of several substance use problems showed that using the substance more than planned was usually the most central symptom. It was strongly related to having worse withdrawal symptoms and needing more of the substance to get the same effect ("tolerance").

Several studies have explored anxiety disorders. A study of social anxiety showed that avoidance of potentially threatening social situations was a central symptom and thus a prime target for treatment. Research on PTSD following a catastrophic earthquake in China showed that sleep difficulty and hypervigilance for future threats had especially potent influences on other symptoms.

Turning to depression, a study of short term fluctuations in symptoms revealed the centrality of loss of pleasure in the symptom network. It activated an assortment of other symptoms including sadness, loss of energy and interest in activities and irritability. In contrast, sadness, crying and a loss of interest in sex were incidental.

Another study showed that depressed people whose symptoms were

more densely connected were more likely to have persistent depression two years later. This finding accords with the network view that symptoms of mental disorders can be self-reinforcing. People whose symptom networks form a tighter web may therefore have greater difficulty overcoming their problems.

Implications

The network approach has several important implications. For researchers, it suggests that the search for single causes of mental disorders is quixotic. Of course, symptoms have an assortment of social and neurobiological sources, but these sources are highly unlikely to be unique to one condition.

For practising psychiatrists and psychologists the network view implies that symptoms should be taken seriously in their own right and not seen merely as pale manifestations of underlying disease. Treatments should directly target particular symptoms, not a fictitious hidden cause.

Boorsboom and Cramer make this point amusingly in regard to major depression. "If [depression] does not exist as an entity that exists independently of its symptoms (like a tumour does), attempting to treat it analogous to the way medical conditions are treated (cutting away the tumour) is like trying to saddle a unicorn."

The network approach also has a strong message for all of us who care about mental health and illness. We should abandon the last vestiges of our belief that mental disorders are best seen as medical diseases. The symptoms of depression, PTSD, or social anxiety don't point to an underlying disorder. They *are* the disorder.

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