

Integrating mental health with other non-communicable diseases

Mental disorders often coexist with other non-communicable diseases and they share many risk factors. **Dan Stein and colleagues** examine the evidence for an integrated approach

Mental health and wellbeing are central to reducing the global burden of non-communicable diseases (NCDs). The World Health Organization's mental health action plan for 2013-20 emphasises this, and last year UN member states expanded their focus on the big four NCDs and risk factors to a five-by-five approach that includes mental disorders and environmental contributors (box 1).^{1,2}

Cardiovascular diseases, diabetes, cancer, and respiratory diseases commonly co-occur with both common mental disorders (such as depression and anxiety disorders) and severe mental illnesses (such as schizophrenia and bipolar disorder). In addition, risk factors for NCDs such as tobacco use, unhealthy diet, physical inactivity, and harmful alcohol use commonly cluster in people with mental disorders.

We summarise evidence on these overlaps in order to support the call for including mental health in strategies for reducing NCDs. We also provide evidence for explicitly considering childhood adversity as an environmental risk factor. We emphasise findings from the World Mental Health Surveys, a unique international dataset comprising more

than 100 000 respondents in more than 20 countries.^{3,4}

Why consider mental health disorders with non-communicable diseases?

Epidemiological studies have found significant associations—within and across countries—between cardiovascular diseases and common mental disorders.^{5,6} In the World Mental Health Surveys, odds ratios for the association of heart disease with mental disorders were 2.1 for mood disorders, 2.2 for anxiety disorders, and 1.4 for alcohol misuse or dependence across countries. A dose-response association was seen between increasing number of mental disorders and heart disease, and there were strong associations between early onset common mental disorders and adult onset heart disease, as well as between early childhood adversities and adult onset heart disease.³

Meta-analyses have found links between diabetes and mental disorders, including schizophrenia, bipolar disorder, depression, and post-traumatic stress disorder as well as between diabetes and cognitive impairment.⁷ In the World Mental Health Surveys, after comorbidity was adjusted for, diabetes was significantly linked with depression, intermittent explosive disorder, binge eating disorder, and bulimia nervosa. Three or more

childhood adversities were independently associated with adult onset diabetes.³

Other NCDs, including cancer and respiratory diseases, are also linked with mental disorders. Depressive spectrum disorders are particularly prevalent in people with cancer.⁸ Systematic reviews have also shown links between particular cancers and both anxiety disorders and post-traumatic stress disorder.^{9,10} In the World Mental Health Surveys, mood, anxiety, and substance use disorders were associated with subsequent onset of asthma.⁴ Childhood adversities were also associated with adult onset asthma, a relation that strengthened with more childhood adversities.³

Although mental disorders are associated with greater disability than physical conditions, they are less likely to receive treatment across the globe.³ This may partly reflect higher levels of stigmatisation experienced by those with mental disorders compared with people with physical conditions.³ Multimorbidity of physical and mental disorders is the rule, with comorbidity ranging from two out of three cases of depression or anxiety to four out of five cases of heart disease in the World Mental Health Surveys.³ Furthermore, comorbidity of physical and mental disorders is associated with greater disability and more unemployment. This effect is not simply additive, but synergistic; the odds of severe disability in those with both physical and mental disorders are significantly greater than the sum of the odds of the single conditions.³ In other studies, multimorbidity has been associated with lower quality care, worse health outcomes, and increased medical expenditure.¹¹

Risk factors for NCDs tend to cluster together, perhaps particularly in people with common mental disorders, where they may have multiplicative effects.¹² Physical inactivity is linked to a range of mental disorders, including serious mental disorders. Unhealthy diets have been associated with several mental disorders, including common mental disorders.

KEY MESSAGES

- NCDs and mental disorders often coexist and their risk factors overlap
- The causal mechanisms underlying this comorbidity are increasingly understood and can therefore be targeted
- Evidence supports the effectiveness of collaborative care to integrate mental health treatment into general services
- The inclusion of mental health in the five-by-five framework for tackling NCDs is appropriate
- Adding childhood adversity as a sub-category of environmental risk factors would also be helpful

Box 1: Five-by-five approach to tackling NCDs

Disease types

- Cardiovascular diseases
- Diabetes
- Cancer
- Chronic respiratory diseases
- Mental disorders and other mental health conditions

Risk factors

- Tobacco use
- Unhealthy diet
- Physical inactivity
- Harmful use of alcohol
- Environmental risk factors

Tobacco and alcohol use are also linked with both common and serious mental disorders. The World Mental Health Surveys found an excess mortality of 8-12% among people with common mental disorders through smoking, diabetes, history of myocardial infarction, and hypertension.³

Taken together, these data suggest that addressing overlapping risk factors, and integrating the management of mental disorders and NCDs, would accelerate progress in tackling these conditions and reducing associated disability.

Causal mechanisms underlying comorbidity

The extensive literature documenting associations between NCDs and mental disorders, and between mental disorders and risk factors for NCDs, gives impetus to investigation of relevant causal mechanisms. Such causal mechanisms may operate at the individual level (eg, genetic factors controlling inflammation that act across disorders), at the neighbourhood level (eg, decreased social capital may be a risk factor across disorders), and at a societal level (eg, shared social determinants such as poverty contribute to both NCDs and mental disorders). Research on these causal mechanisms emphasises the complex and bidirectional relations between NCDs and mental disorders and further supports the potential of joint action.

Depression, anxiety disorders, and post-traumatic stress disorder are increasingly recognised as systemic illnesses with a range of mechanisms, including in immune and inflammatory pathways, that negatively affect physical health.^{6,12} Income inequality may contribute to mental disorders in various ways, including neighbourhood effects, that also affect physical disorders.¹³ Furthermore, societal mechanisms such as stigmatisation of people with mental disorders may contribute to delayed diagnosis or inappropriate treatment of physical conditions.¹⁴ Although pharmacotherapy is efficacious for many mental disorders, adverse effects include metabolic syndromes.

Conversely, NCDs, like other stressors, may trigger depression, post-traumatic stress disorder, and other common mental disorders. In addition, mechanisms involved in the onset of cardiovascular diseases, diabetes, cancer, and respiratory disease may also contribute to mental disorders. Again, these mechanisms operate from the individual level through to the societal level. Steroids used to treat cancer can affect neuroendocrine mechanisms and lead to depression, for

example, and the finding that comorbidity between NCDs and mental disorders is particularly strong in poorly resourced regions points to underlying societal mechanisms.¹¹

Mechanisms from individual through to the societal level also have a role in bidirectional relations between key risk factors and both NCDs and mental disorders. We consider in turn, tobacco and harmful alcohol use, physical inactivity and poor diet, childhood adversity, and non-adherence.

People with mental disorders may use nicotine and alcohol in an effort to self-medicate, which then leads to physical complications. Conversely, nicotine and alcohol use not only contribute to NCDs through peripheral somatic mechanisms but also adversely affect central reward systems, leading to depression and anxiety. From a societal perspective, tobacco use in serious mental disorders may be a particularly important contributor to premature mortality, and tobacco and alcohol use during pregnancy are associated with a range of mental and neurodevelopmental disorders in offspring.

Physical inactivity and poor diet are also risk factors for both NCDs and mental disorders, and NCDs and mental disorders may further exacerbate these issues. Depression, for example, may be associated with both lack of energy and carbohydrate craving, so contributing further to decreased activity and poor diet. Conversely, pharmacotherapy of serious mental disorders may be linked to weight gain and dyslipidaemia. Physical inactivity and metabolic symptoms in people with serious mental illnesses, whether pre-existing or iatrogenic, may contribute to the premature mortality seen with these conditions.¹⁵ Such multimorbidity may also negatively affect the family; uncompensated care giving is associated with a range of negative outcomes, and from a neighbourhood perspective clustering of NCDs and mental disorders may occur within particular households.¹¹

The World Mental Health Survey findings emphasise the importance of childhood adversity as a risk factor for both NCDs and mental disorders.¹⁶ Causal mechanisms range from the neurobiological through to the sociocultural. For example, childhood adversity leads to alterations in immune and endocrine systems, which may adversely affect both physical and mental health. In low and middle income countries, intersections between infection (eg, HIV), childhood adversity,

and subsequent ill health are particularly important.¹⁷ Survivors of childhood adversity may also be less likely to seek care when necessary and to adhere to treatment recommendations.

Non-adherence could help explain how mental disorders exacerbate NCDs. People with mental disorders may find it more difficult to access healthcare, treatments may require a range of behavioural shifts that are more difficult for those with such conditions, and stigma associated with mental disorders may affect support. Complex multicausal mechanisms mean that there is no single intervention that will work for everyone with multimorbidity, and that integrated and multipronged person centred and systems based approaches are needed.

Clinical practice and health policy

The strong associations and inter-related causal mechanisms of mental health disorders and other NCDs argue for a joint approach to care. Collaborative care has emerged as a key evidence based approach for integrating mental healthcare into primary care.¹⁸ In this framework, people with a chronic medical illness have a non-specialist case manager, who coordinates care by liaising with primary care practitioners and, if necessary, mental health specialists to tackle behavioural issues such as non-adherence or coexisting mental disorders. At an individual level, this framework emphasises person centred care, while at a systemic level it provides the potential for universal health coverage for both NCDs and common mental disorders.¹¹

Evidence, including randomised controlled trials of collaborative care, shows that integrated care for mental disorders can improve outcomes in cardiovascular disorder, diabetes, and other conditions.¹¹ Better integration of general medical care into the care of people with serious mental disorder is essential.^{19,20}

Liaison psychiatry and health psychology have a vital role in integrating mental health issues in healthcare settings. Given the burden of mental disorders and the under-resourcing of mental health clinicians, global mental health has emphasised shifting tasks to non-specialist health workers.²¹ However, investment in non-specialists with knowledge of mental disorders, cardiovascular diseases, diabetes, cancer, and respiratory diseases needs to be complemented by the development of liaison psychiatrists and health psychologists with skills in the integration of physical conditions with

mental disorders. Such specialists have an important role in a tiered system that is anchored by a primary care system; they provide training and supervision, research and implementation, and advocacy and leadership.

The 4C model of care (collaborative, coordinated, continuing, and centred on the person) highlights that integration of mental healthcare should be consistent with the management of any chronic condition.¹¹ The emphasis is on principles such as good communication, shared decision making, proactive monitoring, multidisciplinary guidelines, and integrated electronic health records.¹¹ For implementation of integrated care models, a broader framework that focuses on appropriate dissemination and translation into action is needed.^{12,22} Integrated care systems may help improve access to care, reduce fragmentation of services, and deliver care responsive to people's needs.¹¹ The efficiencies promised by integrated care are beneficial not only in high income countries, where the costs of NCDs and mental disorders are increasing, but also in low and middle income countries, where NCDs and mental disorders are particularly undertreated.¹¹

From a policy perspective, the evidence reviewed here supports the inclusion of mental health as one of the "big five" disease groups in strategies for NCDs as well as adding environmental risk factors.^{17,22} We suggest that the new five-by-five framework should include an explicit emphasis on childhood adversity within the environmental risk factors. Although further consensus is needed, a starting definition of childhood adversity emphasises exposure to "experiences that are likely to require significant adaptation by an average child and that represent a deviation from the expectable environment."²³ A vast literature documents that childhood adversity is a risk factor for both mental and physical conditions, relevant causal mechanisms are increasingly understood, and evidence based interventions exist at the individual level and at the level of healthcare policies and societal systems targeted by the sustainable development goals (SDGs).^{3,13,24} A focus on childhood adversity is also consistent with the dimensional and developmental approach required at the intersection of global mental health and sustainable development.²¹

Although existing evidence supports the integration of mental health and NCDs, additional research is warranted. Ongoing

surveillance of comorbidity of NCDs and mental disorders is required, particularly in low and middle income countries. Further investigation of the causal mechanisms is also needed; this may contribute to an integration of global mental health with neuroscience.²⁵ Most of the evidence on collaborative care has been garnered from high income countries in clinical settings, and studies are required in low and middle income regions, as well as in work settings to examine issues such as contextual adaptation, relevant training, and cost efficiency. Finally, more explicit links between such research and SDG indicators need to be developed and consolidated, in order to attain the goal of reducing NCDs by 2030.

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- 1 World Health Organization. *WHO Global NCD Action Plan 2013-2020*. WHO, 2013.
- 2 WHO. Heads of State commit to lead response to beat noncommunicable diseases, promote mental health. Press release 27 Sep 2018. <https://www.who.int/news-room/detail/27-09-2018-heads-of-state-commit-to-lead-response-to-beat-noncommunicable-diseases-promote-mental-health>
- 3 Von Korff MR, Scott KM, Gureje O, eds. *Global perspectives on mental-physical comorbidity in the WHO World Mental Health Surveys*. Cambridge University Press, 2009. doi:10.1017/CBO9780511770531
- 4 Scott KM, Lim C, Al-Hamzawi A, et al. Association of mental disorders with subsequent chronic physical conditions: world mental health surveys from 17 countries. *JAMA Psychiatry* 2016;73:150-8. doi:10.1001/jamapsychiatry.2015.2688
- 5 Cohen BE, Edmondson D, Kronish IM. State of the art review: depression, stress, anxiety, and cardiovascular disease. *Am J Hypertens* 2015;28:1295-302. doi:10.1093/ajh/hpv047
- 6 Batelaan NM, Seldenrijk A, Bot M, van Balkom AJ, Penninx BW. Anxiety and new onset of cardiovascular disease: critical review and meta-analysis. *Br J Psychiatry* 2016;208:223-31. doi:10.1192/bjp.bp.114.156554
- 7 Vancampfort D, Correll CU, Galling B, et al. Diabetes mellitus in people with schizophrenia, bipolar disorder and major depressive disorder: a systematic review and large scale meta-analysis. *World Psychiatry* 2016;15:166-74. doi:10.1002/wps.20309
- 8 Caruso R, GiuliaNanni M, Riba MB, Sabato S, Grassi L. Depressive spectrum disorders in cancer: diagnostic issues and intervention. a critical review. *Curr Psychiatry Rep* 2017;19:33. doi:10.1007/s11920-017-0785-7
- 9 Watts S, Leydon G, Birch B, et al. Depression and anxiety in prostate cancer: a systematic review and meta-analysis of prevalence rates. *BMJ Open* 2014;4:e003901. doi:10.1136/bmjopen-2013-003901
- 10 Arnaboldi P, Riva S, Crico C, Pravettoni G. A systematic literature review exploring the prevalence of post-traumatic stress disorder and the role played by stress and traumatic stress in breast cancer diagnosis and trajectory. *Breast Cancer (Dove Med Press)* 2017;9:473-85. doi:10.2147/BCTT.S111101
- 11 Patel V, Chatterji S. Integrating mental health in care for noncommunicable diseases: an imperative for person-centered care. *Health Aff (Millwood)* 2015;34:1498-505. doi:10.1377/hlthaff.2015.0791
- 12 O'Neil A, Jacka FN, Quirk SE, et al. A shared framework for the common mental disorders and non-communicable disease: key considerations

- for disease prevention and control. *BMC Psychiatry* 2015;15:15. doi:10.1186/s12888-015-0394-0
- 13 Patel V, Burns JK, Dhingra M, Tarver L, Kohrt BA, Lund C. Income inequality and depression: a systematic review and meta-analysis of the association and a scoping review of mechanisms. *World Psychiatry* 2018;17:76-89. doi:10.1002/wps.20492
 - 14 Henderson C, Noblett J, Parke H, et al. Mental health-related stigma in health care and mental health-care settings. *Lancet Psychiatry* 2014;1:467-82. doi:10.1016/S2215-0366(14)00023-6
 - 15 Walker ER, McGee RE, Druss BG. Mortality in mental disorders and global disease burden implications: a systematic review and meta-analysis. *JAMA Psychiatry* 2015;72:334-41. doi:10.1001/jamapsychiatry.2014.2502
 - 16 Scott KM, Von Korff M, Angermeyer MC, et al. Association of childhood adversities and early-onset mental disorders with adult-onset chronic physical conditions. *Arch Gen Psychiatry* 2011;68:838-44. doi:10.1001/archgenpsychiatry.2011.77
 - 17 Mensah GA, Mayosi BM. The 2011 United Nations high-level meeting on non-communicable diseases: the Africa agenda calls for a 5-by-5 approach. *S Afr Med J* 2012;103:77-9. doi:10.7196/SAMJ.6347
 - 18 Ngo VK, Rubinstein A, Ganju V, et al. Grand challenges: Integrating mental health care into the non-communicable disease agenda. *PLoS Med* 2013;10:e1001443. doi:10.1371/journal.pmed.1001443
 - 19 Gierisch JM, Nieuwsma JA, Bradford DW, et al. Pharmacologic and behavioral interventions to improve cardiovascular risk factors in adults with serious mental illness: a systematic review and meta-analysis. *J Clin Psychiatry* 2014;75:e424-40. doi:10.4088/JCP.13r08558
 - 20 WHO. *Guidelines for the management of physical health conditions in adults with severe mental disorders*. WHO, 2018.
 - 21 Patel V, Saxena S, Lund C, et al. The Lancet Commission on global mental health and sustainable development. *Lancet* 2018;392:1553-98. doi:10.1016/S0140-6736(18)31612-X
 - 22 Centers for Disease Control and Prevention. *Public health action plan to integrate mental health promotion and mental illness prevention with chronic disease prevention, 2011-2015*. Dept of Health and Human Services, 2011.
 - 23 McLaughlin KA. Future directions in childhood adversity and youth psychopathology. *J Clin Child Adolesc Psychol* 2016;45:361-82. doi:10.1080/15374416.2015.1110823
 - 24 Ehring T, Welboren R, Morina N, Wicherts JM, Freitag J, Emmelkamp PM. Meta-analysis of psychological treatments for posttraumatic stress disorder in adult survivors of childhood abuse. *Clin Psychol Rev* 2014;34:645-57. doi:10.1016/j.cpr.2014.10.004
 - 25 Stein DJ, He Y, Phillips A, Sahakian BJ, Williams J, Patel V. Global mental health and neuroscience: potential synergies. *Lancet Psychiatry* 2015;2:178-85. doi:10.1016/S2215-0366(15)00014-0

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