

Submission to the Australian Government Productivity Commission's Inquiry into the Social and Economic Benefits of Improving Mental Health

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The Challenge: How do we ensure that mental health reforms and resources deliver best outcomes for individuals, communities and the 'mental wealth' of the nation?

Globally, the magnitude of the burden of mental illness and its associated adverse human, economic and social impacts has been well described.^{1,2} In Australia, mental illness is the largest single cause of disability, with as many as one in five people aged 16 to 85 years experiencing a mental illness in any one year.³ While mental illness across the lifecourse has implications for individuals and societies, mental illness that has its onset in early life has important implications for the social, family, educational and vocational trajectories of young people and for the 'mental wealth' of Australia.

It has been argued that mental health influences the degree to which an individual can participate in education, training, the labour market, social relationships, and positive physical health behaviours; which at a societal level influences earnings potential, productivity, innovation, economic growth, crime rates, social cohesion, civic engagement, and political stability.⁴⁻⁸ Productivity losses from those living and working with mental illness may be as high as \$14bn per annum, resulting from presenteeism and absenteeism.⁹ There is a non-linear relationship between the level of an individual's psychological distress and productivity. Low levels of distress have been estimated to result in productivity falls of 6.4%, and as distress increases to moderate, and then to high levels, the productivity falls are 9.4% and 20.9% respectively.¹⁰ Further, suicide results in \$1.7bn of lost lifetime productivity.¹¹ There is a clear social, economic (and moral) imperative to explore ways to more effectively improve mental health in this country.

Each year, around \$9.0 billion is spent nationally on mental health related services in Australia, with approximately 60% funded by state and territory governments, 35% by the Australian Government and about 5% by private health insurance funds.¹² This does not include broader mental health-related costs, such as the Disability Support Pension and Carer Payment and allowances, nor funding for services provided by non-government organisations or philanthropic investments.¹² In addition, over the last decade, hundreds of millions of dollars have been spent on mental health system reforms to make services and preventive interventions more effective, efficient, and culturally and contextually appropriate, and significant government and philanthropic investments are being made in research to evaluate the most effective strategies.¹³

Despite the potential benefits of improved mental health for individuals and the nation, and despite decades of reforms and increasing investments, rates of mental illness in Australia are

not decreasing.¹⁴ There is no clear consensus regarding the reasons for the inertia or the appropriate strategies to effectively address the complex, persistent problem of mental illness in this country. A range of perspectives have been offered in academic discourse and in the media, which include:

- That there is insufficient overall funding;
- That funding is inappropriately weighted across acute care in public hospitals, primary care, and community-managed mental health needs;
- That services are poorly distributed across geographic and socioeconomic strata;
- That there are insufficient investments in workforce, appropriate training and infrastructure / psychiatric beds;
- That interventions are poorly targeted across the lifespan;
- That investments are being made in the wrong types of interventions based on little evidence, with a push to focus only on those interventions where there is current evidence of effectiveness;
- The lack of impact has been attributed to the failing acute-focussed, increasingly specialised, ‘diagnosis-evidence-based-practice symptom-reduction’ paradigm that dominates mental health service delivery in this country and elsewhere.¹⁵ This paradigm is argued not only to be too expensive to be sufficiently scaled to meet the significant proportion of the population with mental health needs, but also questions the degree to which a focus on diagnosis and symptom reduction will achieve the outcomes relevant to patients; such as, improved educational, vocational and social participation.¹⁵ Therefore, it is argued that investments should be made in a variety of cross-sectoral models of supported education, employment and personalised care that are focussed on achieving functional improvements;¹⁵ and
- It has been suggested that promises about strong accountability in mental health which were an integral element of the first national mental health plan back in 1992, have failed to emerge.¹⁶

Calls for further reforms from influential experts and stakeholders holding this array of perspectives presents significant challenges for governments in determining what should be done and how best to allocate current and future mental health investments. System reform is further challenged by the division of roles and responsibilities between Federal, State and Territory governments, regional primary health networks, and private and non-government sectors, creating a level of system complexity that makes the provision of coordinated, client-centred services and interventions, and their evaluation difficult.¹² In the absence of appropriate tools to make sense of the complexity, mental health reform decisions to date have been taken using a trial and error approach.

Taking up the recommendations of the 2014 review by the National Mental Health Commission,¹⁷ the Federal Government committed new funds and called for appropriate focus on regional planning and implementation of mental health programs and suicide prevention, utilisation of new technologies, research, and systematic national evaluation. In addition to the challenges national decision makers face in selecting from multiple system reform options, decision makers at a regional level now face real challenges in making appropriate commissioning decisions to deliver effective mental health programs and services to meet local needs. These challenges include the complexity of mental illness and its multisectoral determinants, workforce capacity restrictions, numerous putative intervention options, geographical variation and changing population needs over time, competing views and agendas about what works locally and what should be done, and the timeliness of data. In mental health and across public health more broadly, these sorts of challenges have resulted in a move towards implementation of ‘comprehensive’ strategies (invest a little bit in everything deemed likely to be effective), based on the rationale that if more evidence-based interventions and services are

implemented, then the impact is likely to be greater.¹³ However, such ‘comprehensive’ strategies often lack focus, result in service systems that are crowded and difficult to navigate, or lack sufficient actual investment in time, resources and capacity to implement in specific geographic and socio-economic contexts. Consequently, ‘comprehensive’ approaches may undermine potential effectiveness by spreading scarce resources too broadly over a range of poorly targeted programs and services.¹³

Limitations of traditional analytic tools to support decision making: Traditional analytic tools for prioritising interventions and their targets have important limitations when applied to complex problems such as mental illness and suicidal behaviour. First, current methods determine the comparative burden each risk factor contributes in a given population, and the proportion of that condition that could be averted by targeting high-burden risk factors.¹⁸ The assumptions underpinning these estimates are that risk factors are independent, and relationships between risk factors and outcomes are unidirectional, linear, and constant through time. However, complex problems are characterised by interaction of risk factors, feedback loops (for example, unemployment contributes to depression and depression can prevent gainful employment), thresholds (or breaking points), and changing behaviour over time, all of which violate the rules for appropriate application of traditional analytic methods.¹⁹ Second, traditional decision analytic tools which seek to prioritise interventions on the basis of their comparative costs, benefits, or return on investment, also have significant limitations for informing policy and practice decisions for complex problems. These tools do not adequately account for population dynamics, behavioural dynamics, service or workforce dynamics, the variation in the intervention impacts over time and the non-additive effects of combining interventions.²⁰ These limitations make them ill-suited for informing decision making to address complex public health problems. As a result, application of traditional methods can lead to unrealistic expectations of the potential impact of evidence-based interventions in real-world settings.²¹ Therefore, we argue that the most notable deficits that account for a lack of impact of mental health system reform and investments over past decades on mental health outcomes are the lack of an appropriate predictive planning framework and infrastructure to guide and coordinate national and regional investments to ensure that mental health resources are put to best use.

An alternative approach: What can we learn from other sectors to guide mental health system reform, investment decisions and service planning?

Prior to making significant investments or reforms many sectors outside health make use of dynamic systems modelling and simulation (computer simulation) to forecast the likely impact of the investment and determine the viability of alternative strategies before implementing them in the real world. For example, dynamic systems models have long been successfully used in engineering, defence, economics, ecology and business to simulate and help solve complex problems, optimise system arrangements and resource management, to improve efficiency and public safety, and to optimise the use of limited resources.²² Additionally, dynamic modelling and simulation have been instrumental in other sectors in contributing to scientific and industrial advances. For example, complex technological exploits such as space and planetary exploration may not have been achieved without the use of computer simulation.²³ It is difficult to estimate how many lives have been saved globally by our ability to model, simulate and forecast the path, severity and duration of significant weather events.²⁴ Early applications of computer simulation in these key areas have evolved over many decades to achieve increasing levels of forecast accuracy and utility for decision makers. Successful evolution of these sectors despite complexity occurred as a result of a willingness to embrace a model-learn-adapt cycle and a commitment to achieving:²⁵

- (i) **Technological** advances in measurement (that improve the quality of data to parameterize models);

- (ii) **Investment** in the workforce and infrastructure required to improve the sophistication of the forecast models over time; and
- (iii) **Improved** multi-dimensional data assimilation (and automated data ingestion) into dynamic systems models to improve their predictive validity and facilitate rapid response capability.

While dynamic systems modelling and simulation has supported the control and elimination of global infectious diseases, and contributed to epidemic and bioterrorism preparedness,²⁶⁻²⁹ for the most part, health and social sectors rely on comparatively rudimentary decision analysis tools and program evaluation approaches when seeking to understand complex problems and to inform policy and planning. Such rudimentary tools wielded at complex problems can lead to unrealistic expectations of the potential impact of interventions at a population level and are inadequate for informing strategic decisions regarding the optimal combination, reach, timing and intensity of interventions.²¹ The health sector lags behind in the routine use of dynamic systems modelling and simulation.³⁰ However, the authors of this submission have a track record of working at the intersection of systems science, data science, population health sciences and citizen science and in partnering with policy agencies and program planners to deliver dynamic systems models to inform decisions at national, state & territory, and regional levels. Our most recent applications have included models that are informing:^{13,30-37}

- suicide prevention nationally and for several Primary Health Networks in NSW that are showing leadership in engaging with advanced decision intelligence;
- the reduction of alcohol related harms in NSW and Tasmania;
- strategies to reduce smoking prevalence and related harms in Queensland;
- how best to achieve the Premier’s target of reducing childhood overweight and obesity in NSW;
- strategies to reduce diabetes in pregnancy in ACT;
- strategies to reduce osteoporosis and cardiovascular disease nationally;
- state-wide health system service planning to improve hospital performance in Queensland; and
- strategic planning for improved system performance to better support vulnerable children and families in NSW.

These applications have generated new knowledge and insights that are only possible when we use systems modelling methods to bring together the different pieces of the puzzle (for example, the determinants of mental health, local needs assessments, service barriers & facilitators, effectiveness of particular interventions) with disparate, multi-agency data sources, best available research evidence, expert and local knowledge, and deep understanding and unique perspectives of those with lived experience. Insights from systems modelling applications have included leverage points (areas in the system where interventions will deliver greater than anticipated effects); an understanding of potential unintended consequences of programs and services; sources of system inertia and delay that can limit the population impact of ‘effective’ evidence-based interventions; the synergistic or non-additive effect of intervention combinations; and the optimal targeting, timing, scale, frequency and intensity of screening, treatment, and/or population health strategies.

Once developed, dynamic systems models can be used as an interactive ‘what-if’ tool to test the likely impacts of alternative reform options or intervention strategies over the short and long term - *before* they are implemented in the real world.²⁰ Consequently, these tools can help local and national decision makers determine where, when, and how to best target and allocate investments, and with what intensity. After deployment, systematic monitoring and evaluation can then be employed to iteratively determine the extent to which the modelling corresponds with real-world outcomes and how intervention strategies are tracking against forecast outcome targets. Information from monitoring and evaluation is used to refine model parameters (*data*

assimilation) to improve its predictive capabilities and guide subsequent decision-making in a timely and responsive way (providing a continuous improvement framework). Systems modelling and simulation embedded in monitoring and evaluation cycles provide the necessary decision analytic infrastructure that would guide sustained investments, reduce the fragmentation of mental health programs and services, strengthen local mental health systems, help realise the full potential of the Government's most recent mental health system reforms, and underpin the continuous deployment, evaluation and realignment of regionally-based mental health programs and services and suicide prevention strategies.

The importance of a participatory approach: Participatory co-development of these sophisticated decision support tools has been a unique and important component of our collaborative work. Bringing together multidisciplinary, multisectoral stakeholders (from academia, policy planning, clinical practice, economics, the private and NGO sectors and people with lived experience) in the development of these tools has delivered significant benefits in facilitating communication and intellectual exchange, advancing contentious debates, building consensus among stakeholders, aiding transparency and translation of model outcomes to broader audiences, and garnering broader support for collaborative action for implementation. Recent advances in simulation modelling software and more user-friendly interfaces have made participation and the achievement of such outcomes feasible. These interactive interfaces allow stakeholders to run forecasts and collectively weigh up the trade-offs of alternative strategies or intervention combinations by exploring their relative impact on a range of population-level mental health, educational and vocational outcomes, disparities between population subgroups (such as on the basis of indigenous status, socioeconomic status, or age groups), service use and health system burden, cost-benefit estimates, and productivity gains. Figure 1 provides an example primary interface page for a suicide prevention decision support tool.

The participatory modelling approach delivers better transparency of models and their assumptions, delivering greater robustness and utility of our decision support tools as well as greater credibility and confidence in model insights and outputs. In bringing together researchers with the end users, and deeply engaging them in the process of developing these sophisticated decision support tools, our approach has knowledge mobilisation at its heart^{34,38,39} with direct policy and planning impacts. Feedback regarding these tools and approaches have included:

“It’s a glass box rather than a black box, which is important in terms of believing the model...the thing that is important for me is that it’s robust, that it involves clinicians, prevention practitioners and academics in building the model, and locates the evidence to support the model – it’s credible,”

A representative of the Centre for Population Health at NSW Health

“The model is proving to be a useful decision-support tool. It is providing robust, substantive information that we can use to guide and select the most effective approach for smoking reduction,”

A representative of Department of Health, Queensland

“It is an understatement to say that this is truly excellent. Over the years I have watched so many health-related projects unfold in our region that seem to have little or no basis in evidence, and that have instead been founded on somebody’s ‘good idea at the time’. It is refreshing to see that the evidence around suicide prevention interventions has been pulled together to help direct service delivery that maximises outcomes.”

A representative of a NSW PHN (*contact first author for verification*)

Preventing suicide in Australia

A national decision support tool for reducing suicidal behaviour

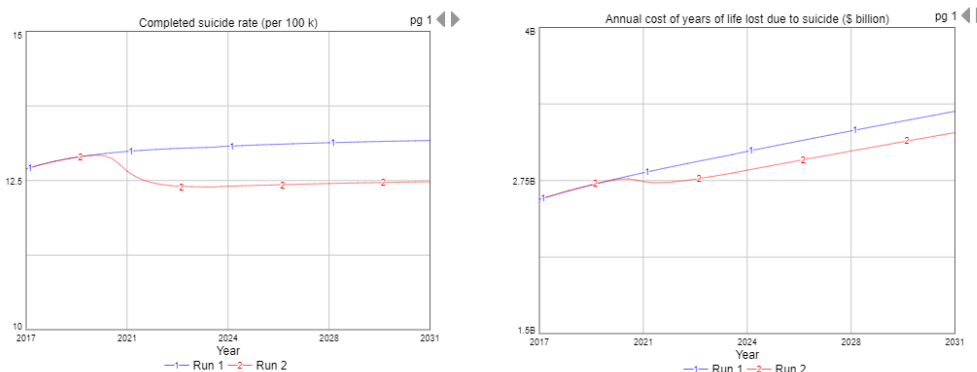
Simulation results

Model structure

- Population
- Psychological distress
- Suicide
- Services capacity
- Mental health care
- Loss to treatment
- Intervention mechanisms
- Modify interventions

Release notes

National suicide model
v1.01, March 2019



Run Reset Export data from graphs

Specific suicide prevention interventions

- Assertive aftercare
- GP training
- Community support
- Suicide helplines

Mental health interventions

- Community management
- Mental health education
- Online services
- Services re-engagement

Mental health service planning interventions

Hospital staff training

Assessment fraction increase per year: 0

Additional psychiatric beds per year: 4.1

Additional service providers per year: 3.3

Figure 1: An example interactive interface of a dynamic systems model of suicidal behaviour forecasting the impact over time of an intervention (red line) compared to a baseline of business-as-usual (blue line). Sub-interfaces allowing scenario testing of alternative targeting, timing, scale, frequency and intensity of interventions is not shown.

In conclusion:

Tools to support and sustain genuine regional mental health reform are few. Local planners and commissioners urgently need better decision support tools and new skills if they are to drive positive change in local mental health services. Currently, much mental health research that informs decision making emphasises single elements of care, individual treatment programs and active linking of local or sentinel data to regional or national program logic-based evaluation approaches. This approach, which assumes a simple additive effect of interventions, is used to derive estimates of likely impacts of both regional and national programs. In our view, due to the spurious estimates of impact at a population level that such simplified approaches can lead to, this is an inadequate method for supporting sustained resource investment and management, regionally-led deployment of real-time or responsive population-based mental health interventions, or the development of longer-term national policy or mental health system reform. This view is consistent with that expressed by the 2014 US National Action Alliance for Suicide Prevention Research Prioritization Taskforce,⁴⁰ which concluded that a genuine evidence-based research agenda needs to utilise *prior* modelling to demonstrate how specific activities will contribute impact *at scale*. This authoritative review underpins our emphasis on the deployment of scalable dynamic systems models that will bring a necessary discipline to national and regional investments to deliver better outcomes for individuals, carers and communities, and deliver a blue print for next generation investments in mental health system strengthening to unlock the ‘mental wealth’ of Australia.

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