



## **Road to Recovery: Restoring Australia's Mental Wealth**

***Uncovering the road to recovery of our mental health  
and wellbeing using systems modelling and simulation***

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## Key messages:

- The ongoing and pervasive uncertainty regarding how the COVID-19 pandemic will continue to evolve, the extent and duration of the consequent economic downturn, the future course of social dislocation, and the security of social protection measures are all impacting negatively on Australia's mental health. Direct consequences are already evident in terms of increased generalised anxiety and depression and suicidal thoughts and behaviours, particularly in young people and other vulnerable populations.
- Public discourse around how best to address these mental health challenges has, to date, not placed sufficient emphasis on the centrality of assessing the effectiveness (nationally and regionally) of our economic, educational, and other social policies.
- Better delineation of the dynamic, iterative, and complex relationships between the economy, the education sector, physical health and social policy, and mental health outcomes, has the potential to facilitate coordinated actions to mitigate the scale of mental health impacts.
- A prototypic national system dynamics model (to complement our place-based models) was developed at the Brain and Mind Centre of the University of Sydney as a decision support tool to forecast the impacts of proposed economic, education, health, and social measures.
- Under the optimistic 'best case' scenario, over the period 2020-2025 the model forecasts 19,878 suicide deaths, an increase of at least 13.7%.
- The normal regional variation in suicide deaths, which we expect to increase in those communities previously affected by other recent natural disasters and industry-specific shutdowns (notably in tourism and hospitality), means that this 'national average' result is less adverse than our specific place-based estimates (see our previous May 2020 report: ['Sounding the alarm: a post-COVID-19 curve for suicide'](#)). Consequently, we might expect to see increases in suicides in regions of Australia up to 10 percentage points higher than the national average over the next 5 years.
- Over this same period, 173,123 self-harm hospitalisations (indicative of suicide attempts), and 1,613,837 mental health-related ED presentations are projected.
- Employment programs are the single most effective strategy for mitigating the adverse mental health impacts of the COVID-19 crisis; however, ceasing these programs too early in the trajectory of economic recovery decreases their impact (i.e. extending employment programs from May 2021 to May 2022 is projected to prevent an additional 9,272 ED presentations, 1,114 self-harm hospitalisations, and 123 lives lost to suicide over the period 2020-2025).
- Despite the principal effectiveness of employment programs, large additional investments in health system capacity are also required to flatten the mental health curve. This could be achieved by the novel approach of public purchasing of private system capacity to support acute care, ED diversions and aftercare.
- The most effective strategy modelled to bend the mental health curve is a combination of employment programs extended to March 2022, youth education programs aimed at achieving a 20% increase in enrolments, a doubling of the current growth rate in community-based specialist mental health services, coordinating multidisciplinary, measurement-based care enabled through technology, and post suicide attempt assertive aftercare. This combination is projected to prevent 97,030 mental health related ED presentations, 13,842 self-harm hospitalisations, and 1,590 suicide deaths over the period 2020-2025.
- For young people specifically (15-24 years) this combination of employment, education and enhanced health care is projected to prevent 17,660 mental health related ED presentations, 3,536 self-harm hospitalisations, and 172 suicide deaths over the period 2020-2025.

- Some policy initiatives that have been expanded in response to the COVID crisis are projected to have little impact and others are likely to have an adverse impact; for example, awareness programs are forecast to increase mental health related ED presentations by 5.2% over the period 2020-2025.
- Our modelling highlights the importance of coordinated economic, education, social and mental health actions to deliver the most effective strategies required to safeguard our country's most valuable resources, its people and their collective 'mental wealth', as we navigate the road to recovery.

## The Challenge:

The past 12 months have been an extraordinarily challenging time for Australia, with the devastating effects of a major drought, stressed ecosystems, extreme weather events, and catastrophic bushfires. Now the COVID-19 pandemic has precipitated twin public health and economic adversities that are undermining confidence in the security of health, housing, livelihoods, and futures in a generalized way and tearing at the social fabric of Australian society. Recessions are associated with increases in psychological distress and higher prevalence of mental disorders, substance misuse and suicidal behavior.<sup>1</sup> Economic downturns do not affect all groups equally, being particularly harsh for those reliant on casual work, those developing new skills and those without accumulated assets, experience or independent social networks. As demonstrated most markedly during the 2008-09 global financial crisis, the negative economic, social and psychological impacts of recession on families also have flow on effects on the mental health of young people through mechanisms including job loss, job instability, low wages, poor work quality, residential moves, increased parental stress and marital tension, diminished parental emotional investments, and increases in child abuse and neglect.<sup>2-5</sup> Such adverse experiences can have severe and long-term impacts on the vocational and educational potential of young people<sup>1,6</sup> and on the collective cognitive and emotional resources that underpin our productivity and current and future national prosperity.

Uncertainty regarding how the COVID-19 pandemic will evolve, with associated lockdowns, physical distancing, and quarantine measures, is driving uncertainty around the extent and duration of the resulting economic breakdown, further exacerbating psychological distress and mental health problems among previously healthy people and especially among those with pre-existing conditions.<sup>7</sup> As a result, attention is turning to appropriate public mental health responses to mitigate these adverse impacts, in parallel to broader social protection measures. However, the discourse around how best to address the mental health challenge has to date been constrained by a public mental health lens with prevention and management strategies focused on mental health education programs, improved access to virtual mental health services, and tinkering with existing service arrangements for mental health care. However, this framing can underestimate the impact of feedbacks between the economy, mental health and policy responses, and deters focus on higher order questions such as: what scale of deterioration in national mental health indicators are we likely to experience over the coming years; to what extent are current social protection measures mitigating the full impact of the COVID-19 pandemic and recession on mental health and what will happen when these measures are scaled back; how will social protection measures interact with population mental health measures to influence mental health outcomes; and what combination of strategies across social, economic, and mental health policy portfolios will work most effectively together to put us on the best road to recovery?

## What did we do?

The complex interplay of social determinants of mental health, service system factors, population demographics and behavioural dynamics requires an analytic method capable of accounting for complexity and facilitating scenario testing to help decision makers explore the interplay of economic, social protection, and mental health system strategies.

A prototype system dynamics model was developed as a decision support tool to test a range of social protection measures and health system strengthening strategies individually and in combination to better understand the trade-offs and implications of decision options before they are implemented in the real world. This model forecasts the likely short and longer term impacts of alternative scenarios on the prevalence of psychological distress, mental health-related ED presentations, self-harm hospitalisations, suicide deaths, and the proportion of young people (15-24 years) not in employment, education or training (NEET). A summary of the model structure, key assumptions, and validation of its performance against existing real-world data (2011-2018) is provided in Appendix A. The preliminary findings below report summary statistics for the impact of each scenario over the period 2020-2055, with figures showing the impacts over the longer time horizon (to 2031).

## What did we find?

### *The impact of the COVID-19 pandemic and recession on mental health in Australia*

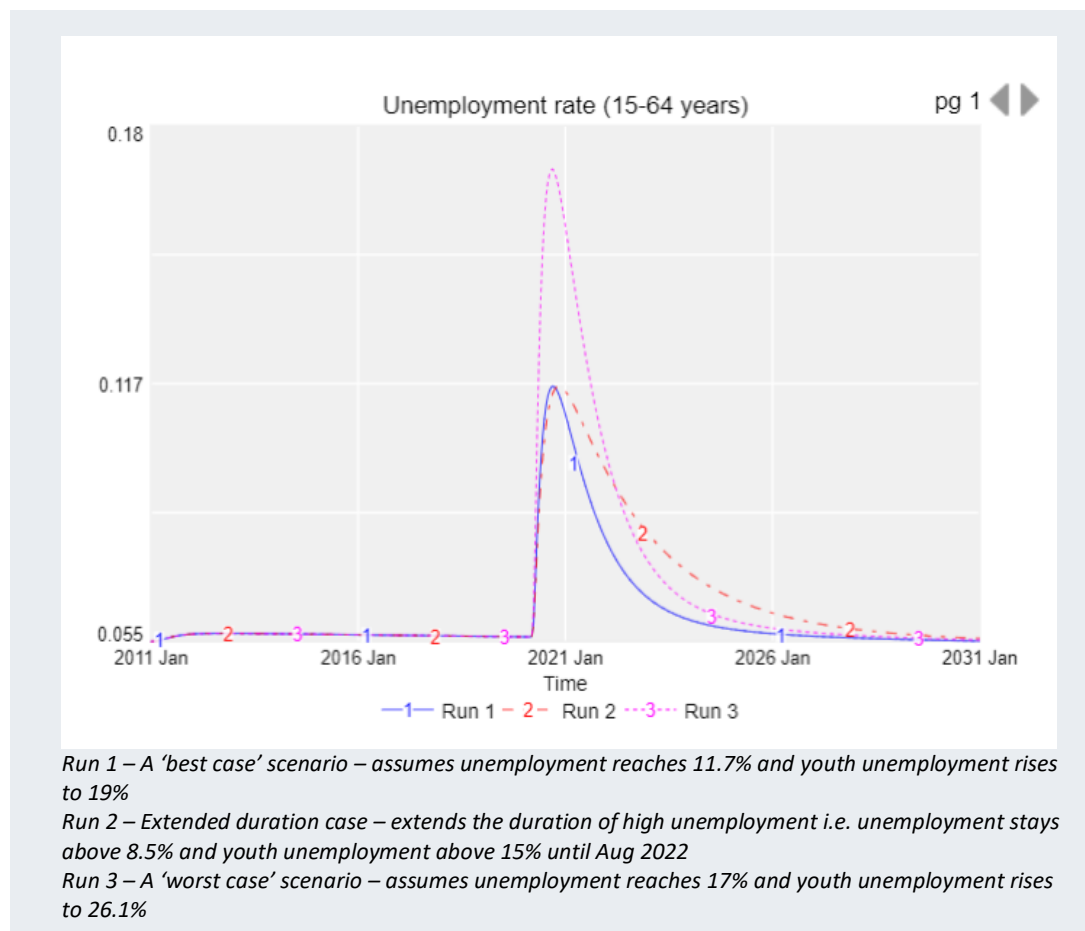
We ran multiple scenarios to estimate the scale of deterioration in national mental health indicators likely be seen over the coming years. Three scenarios were simulated (Figure 1):

- A best case – assumes unemployment reaches 11.7% and youth unemployment rises to 19%
- The extended duration case – which retains the peak unemployment rates of the best case scenario but extends the duration of high unemployment i.e. unemployment stays above 8.5% and youth unemployment above 15% until Aug 2022.
- The worst case – assumes unemployment reaches 17% and youth unemployment rises to 26.1%

Each of these scenarios assumes a 10% reduction in community connectedness resulting from social dislocation unrelated to job loss (e.g., working from home, not participating in sports, reduced social gatherings), that will persist for a period of 12 months.

Even under the most optimistic 'best case' scenario, **significant negative mental health impacts** are projected over the next 5 years (Table 1). The prevalence of **psychological distress** is estimated to peak at 39.6% by December 2021 (Figure 2) and among youth (15-24 years) at 48.3% by Sept 2021. The proportion of **youth not in education or training** (NEET) is projected to rise to a peak of 25.6% in major cities and 31.3% in regional areas by September 2020. **Mental health-related ED presentations** will increase by 11.4%, **self-harm hospitalisations** (indicative of suicide attempts) by 12.3%, and **suicide deaths** by 13.7% over the period 2020-2025.

**Figure 1:** Assumed pattern of unemployment underlying model outputs.

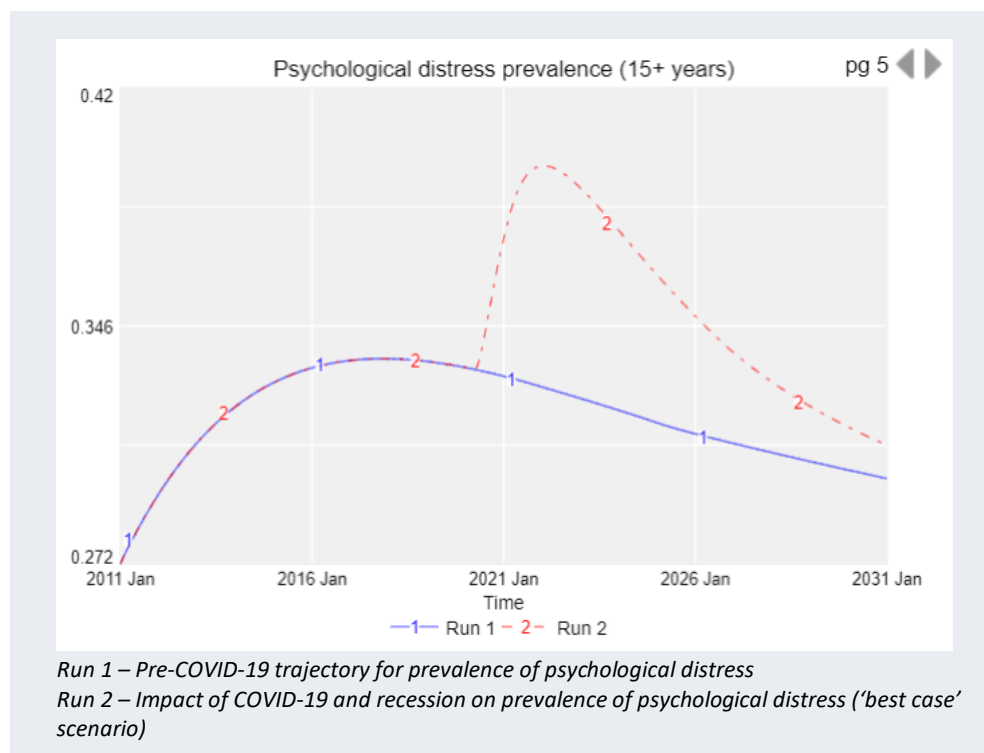


**Table 1:** Projected scale of impact of COVID-19 and economic downturn on mental health indicators across alternative baseline scenarios

Indicators	Best case		Extended duration		Worst case	
	n	% increase*	n	% increase*	n	% increase*
Mental health-related ED presentation (total)	1,613,837	11.4	1,639,154	13.2	1,728,525	19.3
Mental health-related ED presentation (15-24 years)	339,752	10.4	344,179	11.8	357,153	16.1
Self-harm hospitalisations (total)	173,123	12.3	176,178	14.3	186,183	20.8
Self-harm hospitalisations (15-24 years)	51,112	11.0	51,833	12.6	53,817	16.9
Suicide deaths (total)	19,878	13.7	20,220	15.7	21,375	22.3
Suicide deaths (15-24 years)	2,489	12.4	2,524	14.0	2,620	18.3

\*Projected increase against the baseline trajectory of mental health indicators had the COVID-19 pandemic not occurred.

**Figure 2:** Impact of COVID-19 and recession on prevalence of psychological distress compared to the pre-COVID forecast trajectory.



### **The impact of current strategies**

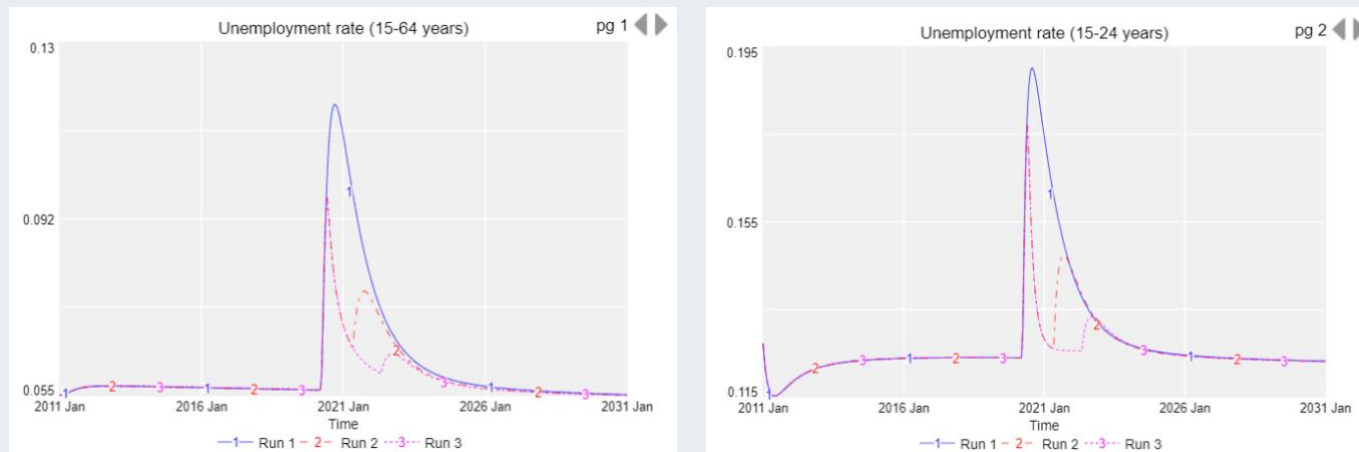
We simulated the broad strategies and directions for which there is national support or commitment; namely, employment programs (such as JobKeeper that endeavour to keep people in employment), mental health awareness programs (that encourage treatment seeking for mental health concerns) and potential expansion of the Better Access scheme (lifting the cap on the number of sessions with psychiatrists, psychologists and allied professionals that can be claimed on the MBS). Results demonstrate the significant benefits of employment programs across a range of national mental health indicators; however, the duration of maintenance of these programs is important. Figure 3 shows that ceasing these programs after one year (in May 2021) results in a greater rebound in unemployment (and youth unemployment) than if they were maintained for 2 years (until May 2022). Similar patterns are seen in the prevalence of youth NEET.

**Maintaining employment programs for 2 years** is estimated to reduce the peak prevalence of psychological distress by 2.4 percentage points, and prevent 53,195 mental health related ED presentations, 6,120 self-harm hospitalisations, and 700 suicide deaths across Australia over the period 2020-2025. Expansion of the Better Access scheme was forecast to deliver little benefit across national mental health indicators. Implementation of **mental health awareness programs** from 2021 was projected to **exacerbate adverse mental health outcomes** and acts to undermine the impact of employment programs when simulated in a combined scenario, with particularly negative impacts on mental health related ED presentations. Figure 4 shows the impact on the prevalence of psychological distress and ED presentations of scenarios a. to e. in table 2 below. The projected negative impacts of mental health awareness programs are explained primarily by the effect of driving increased demand to an already stretched mental health service system, increasing service disengagement rates due to increased waiting times and dissatisfaction with the quality of care. This would increase the



duration of high psychological distress, increase presentations to ED and increase suicidal thoughts and behaviours as people lose hope that the system can help them, or experience further trauma from receiving inadequate care from a stretched system.

**Figure 3:** Impact of duration of employment programs on rebound in unemployment and on mental health indicators.



Run 1 – The ‘best case’ baseline scenario  
 Run 2 – Employment programs for 1 year (until May 2021)  
 Run 3 – Employment programs for 2 years (until May 2022)

**Figure 4:** Simulated impacts of current strategies psychological distress and mental health-related ED presentations 2020-2031. Run numbers correspond with scenarios outlined in Table 2.



Run 1 – The ‘best case’ baseline scenario  
 Run 2 – Employment programs for 1 year (until May 2021)  
 Run 3 – Employment programs for 2 years (until May 2022)  
 Run 4 – Expanded Better Access scheme (commencing 2021)  
 Run 5 – Mental health awareness programs (commencing 2021)  
 Run 6 – Employment programs (1 year) + expanded Better Access + mental health awareness programs

**Table 2: Simulated impacts of current strategies on population mental health indicators 2020-2025.**

Scenarios*	ED presentations prevented n, (% ↓)	Youth ED presentations prevented n, (% ↓)	Self-harm hospitalisations prevented n, (% ↓)	Youth self-harm hospitalisations prevented n, (% ↓)	Suicide deaths prevented n, (% ↓)	Youth suicide deaths prevented n, (% ↓)
1. Best case COVID baseline	-	-	-	-	-	-
2. Employment programs – 1 year (May 2020-May 2021)	43,923 (2.7)	6,672 (2.0)	5,006 (2.9)	1,034 (2.0)	577 (2.9)	50 (2.0)
3. Extended employment programs - 2 years (May 2020- May 2022)	53,195 (3.3)	8,512 (2.5)	6,120 (3.5)	1,330 (2.6)	700 (3.5)	65 (2.6)
4. Expanded Better Access Scheme (commencing 2021)	-2,004 (-0.1)	911 (0.30)	-113 (-0.1)	100 (0.2)	-18.9 (-0.1)	5 (0.2)
5. Mental health awareness programs (commencing 2021)	-83,392 (-5.2)	-13,886 (-4.1)	-1,815 (-1.0)	-192 (-0.4)	-209 (-1.1)	-9 (-0.4)
6. Combined 2, 4 & 5	-18,842 (-1.2)	-3,034 (-0.9)	4,536 (2.6)	1,230 (2.4)	522 (2.6)	60 (2.4)

\*Results are for the period March 2020 to 2025. Youth refers to the cohort aged 15-24 years. Cases (n) and percent reduction from the 'Best case' COVID baseline are presented and a negative number indicates an adverse increase in cases as a result of the scenario. These estimates are conservative given the likely extended duration of high unemployment.

### ***Programs to support education and training***

Figure 5 highlights the significant impact of programs to support post-secondary education and vocational training on the prevalence of NEET across metropolitan and regional areas. Increasing enrolments by 10%, 20%, and 30% produces significant incremental impacts over the 5-year duration simulated, however prevalence rebounds to baseline levels when programs cease. Education programs were projected to reduce the prevalence of psychological distress in young people (15-24 years) by up to 0.8 percentage points by the end of 2025. While not delivering significant impacts on mental health indicators, investments in education and vocational training programs act to reduce the duration of the high prevalence of NEET, which is likely to mitigate broader negative effects of youth non-participation (not modelled here) as well as reduce future associated productivity losses (currently being investigated).



**Figure 5:** Simulated impacts of progressive increases in youth enrolment in post-secondary education and vocational training on NEET prevalence in metropolitan and regional areas



Run 1 – The ‘best case’ baseline scenario

Run 2 – Education support programs – increasing enrolments in post-secondary education and vocational training by 10%

Run 3 – Education support programs – increasing enrolments in post-secondary education and vocational training by 20%

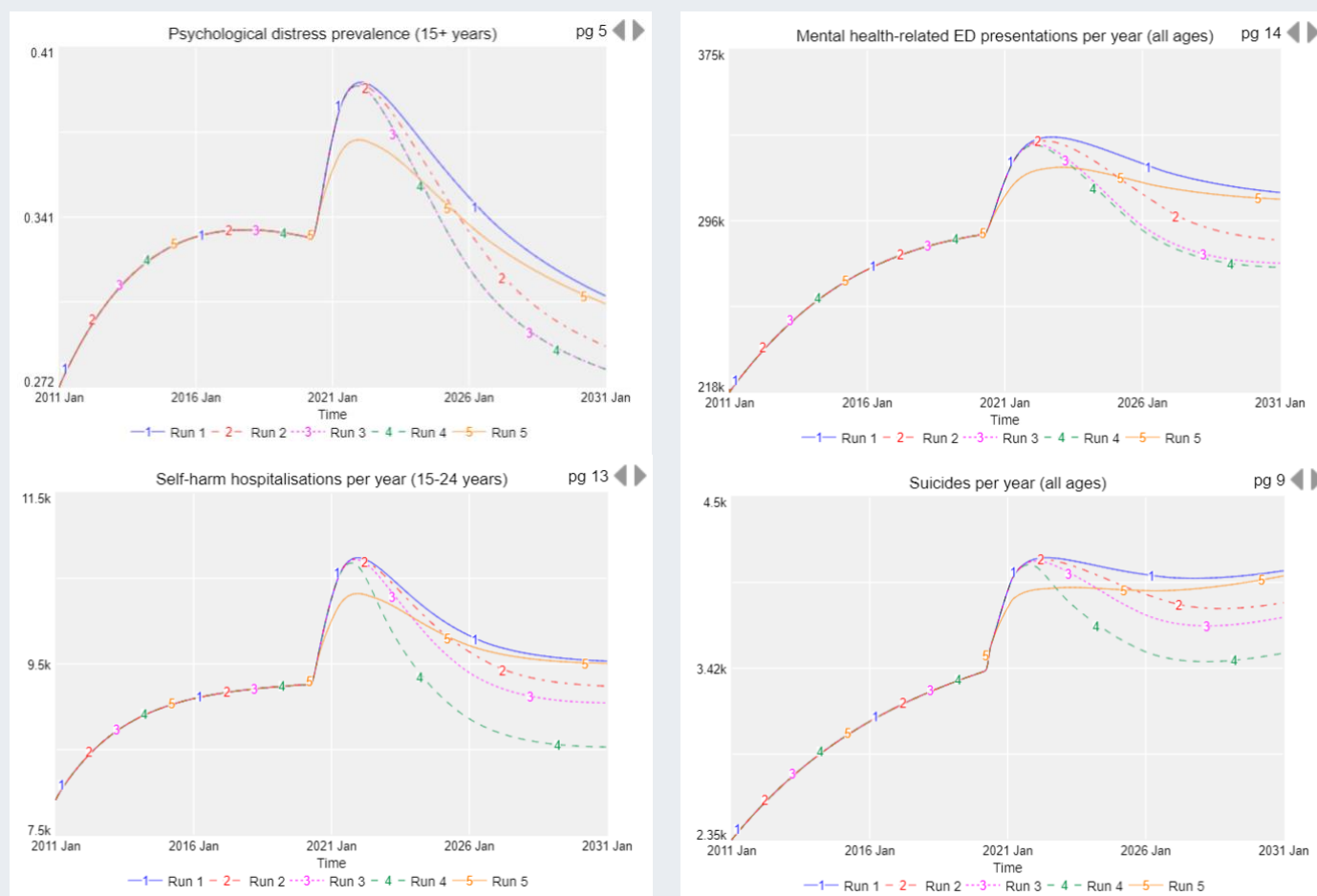
Run 4 – Education support programs – increasing enrolments in post-secondary education and vocational training by 30%

### Mental health services strengthening

A doubling of the current growth rate in mental health GP, psychiatrist and allied services, and community mental health services capacity from 2021 is forecast to prevent 15,955 mental health related ED presentations, 1,127 self-harm hospitalisations, and 136 suicide deaths over the period 2020-2025. Adding capacity increases in public and private hospital psychiatric care and private outpatient services to capacity increases in specialist community-based care (Table 3, Scenario 7) delivers little additional value over increasing specialist community-based care capacity alone (Table 3, Scenario 6). Figure 6 shows the amplifying effects over time (against the ‘Best case’ COVID baseline) of a doubling of the growth rate of specialist community-based care as well as the projected enhancing effect of introducing technology-enabled care coordination across population mental health indicators. Adding post-suicide attempt assertive aftercare to capacity increases and care coordination delivers further reductions in self-harm hospitalisations and suicide deaths. Despite these impacts, Figure 6 shows that investing in mental health services strengthening does not effectively mitigate the peak in adverse effects of the COVID-19 crisis on mental health in Australia and any impacts are unlikely to be seen until 2022. In comparison, employment programs mitigate the peak adverse mental health effects.

To understand this, Figure 7 provides the analogy of a bathtub representing the proportion of the population experiencing psychological distress; the taps contributing to psychological distress during the current COVID-19 pandemic and economic downturn include unemployment, anxiety about potential unemployment (including a partner or family member becoming unemployed), and social dislocation. Effective mental health services act to drain the bathtub. If the inflows are significantly greater than the outflow, levels of psychological distress in the community rises. Employment programs act to turn down the significant inflows so that the bathtub doesn’t overflow; and expanding specialist community-based services widens the drainpipe and acts to shorten the time it would take for levels of psychological distress across the community to go down to pre-COVID levels and below.

**Figure 6:** Simulated impacts of current strategies on prevalence of psychological distress, mental health-related ED presentations, self-harm hospitalisations (15-24 years) and suicide deaths (2020-2031).



Run 1 – The 'best case' baseline scenario

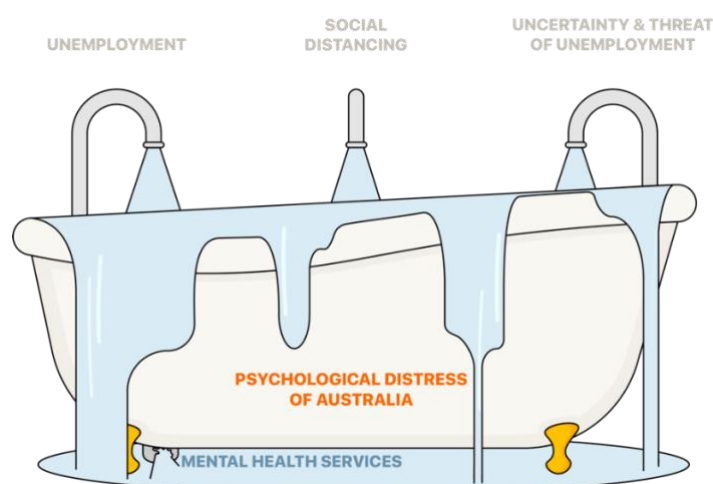
Run 2 – Doubling the current growth rate in specialist community-based mental health service capacity

Run 3 – Doubling the current growth rate in specialist community-based mental health service capacity + technology enabled care coordination

Run 4 – Doubling the current growth rate in specialist community-based mental health service capacity + technology enabled care coordination + post-suicide attempt assertive aftercare

Run 5 – Employment programs for 2 years (until May 2022)

**Figure 7:** Unemployment, anxiety about unemployment and social dislocation driving up psychological distress across the Australian population even with mental health service expansion



**Table 3:** Simulated impacts of education and mental health service initiatives on population mental health indicators 2020-2025.

Scenarios*	ED presentations n, (% ↓)	Youth ED presentations n, (% ↓)	Self-harm hospitalisations n, (% ↓)	Youth self-harm hospitalisations n, (% ↓)	Suicide deaths n, (% ↓)	Youth suicide deaths n, (% ↓)
1. Best case COVID baseline	-	-	-	-	-	-
2. Education programs (20% uptake in enrolments)	1,944 (0.1)	1,658 (0.5)	304 (0.2)	277 (0.5)	17 (0.1)	14 (0.5)
3. Doubling current growth rate in mental health GP service capacity (equates to a mean annual increase of 10.6% of 2020 capacity over the period 2020-2025)	4,012 (0.2)	504 (0.1)	284 (0.2)	48 (0.1)	33 (0.2)	2 (0.1)
4. Doubling current growth rate in psychiatrists and allied service capacity (equates to a mean annual increase of 7.9% of 2020 capacity over the period 2020-2025)	5481 (0.3)	662 (0.2)	386 (0.2)	63 (0.1)	49 (0.2)	3 (0.1)
5. Doubling current growth rate in community mental health services (equates to a mean annual increase of 9.4% of 2020 capacity over the period 2020-2025)	4,263 (0.3)	829 (0.2)	324 (0.2)	86 (0.2)	37 (0.2)	4 (0.2)
6. Combined 3, 4 & 5	15,955 (1.0)	2,332 (0.7)	1,148 (0.7)	228 (0.4)	136 (0.7)	11 (0.4)
7. Scenario 6 supplemented by doubling growth rates of public and private hospital psychiatric care and private outpatient services	16,820 (1.0)	2,429 (0.7)	1,206 (0.7)	238 (0.5)	144 (0.7)	12 (0.5)
8. Technology enabled, measurement-based care coordination	20,564 (1.3)	3,890 (1.1)	1,534 (0.9)	394 (0.8)	179 (0.9)	19 (0.8)
9. Post-suicide attempt assertive aftercare	5,310 (0.3)	1,620 (0.5)	5060 (2.9)	1,431 (2.8)	590 (3.0)	70 (2.8)
10. Expanding online mental health services	2,486 (0.2)	497 (0.1)	176 (0.1)	50 (0.1)	22 (0.1)	2 (0.1)
11. Combined 6 & 8	38,217 (2.4)	6,454 (1.9)	2,811 (1.6)	647 (1.3)	331 (1.7)	32 (1.3)
12. Combined 6, 8 & 9	43,440 (2.7)	8,073 (2.4)	7,771 (4.5)	2,057 (4.0)	909 (4.6)	100 (4.0)

\*Result are for the period March 2020 to 2025. Youth refers to the cohort aged 15-24 years. Cases (n) and percent reduction from the 'Best case' COVID baseline are presented. These estimates are conservative given the likely extended duration of high unemployment.

### ***What is recommended?***

Figure 8 demonstrates the combined impact of employment programs, education programs and health system initiatives in arresting the scale and duration of mental health impacts of COVID-19 and recession. Under this recommended scenario (Table 4), 97,030 mental health related ED presentations, 13,842 self-harm hospitalisations, and 1,590 suicide deaths will be prevented over the period 2020-2025.

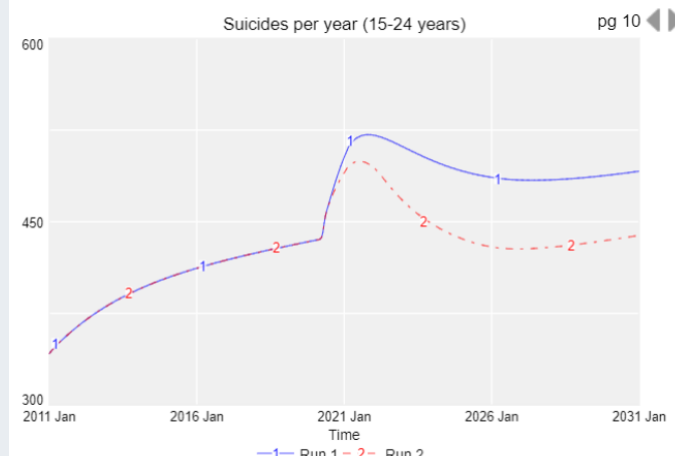
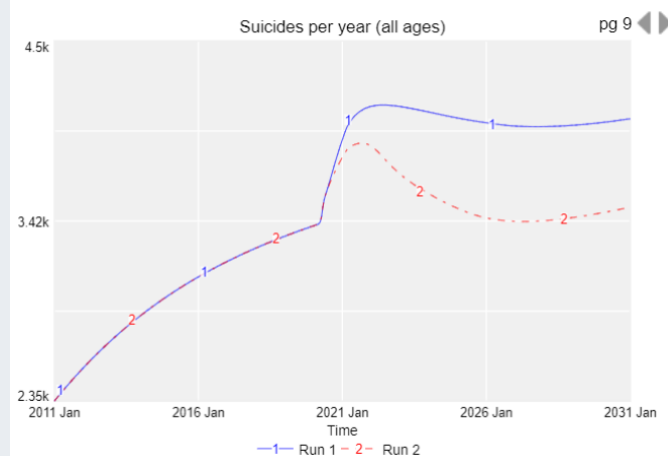
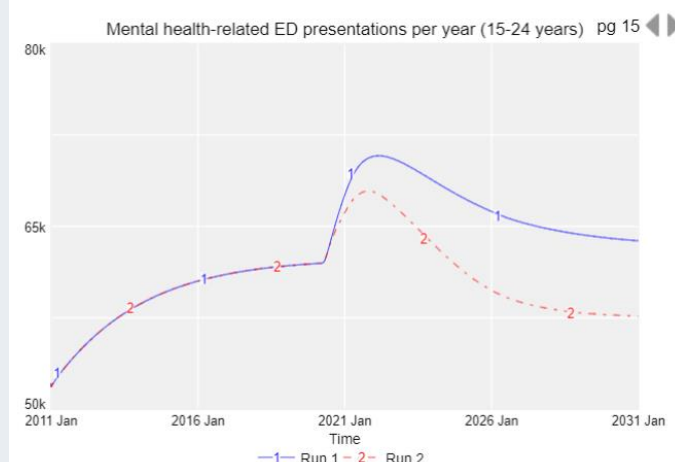
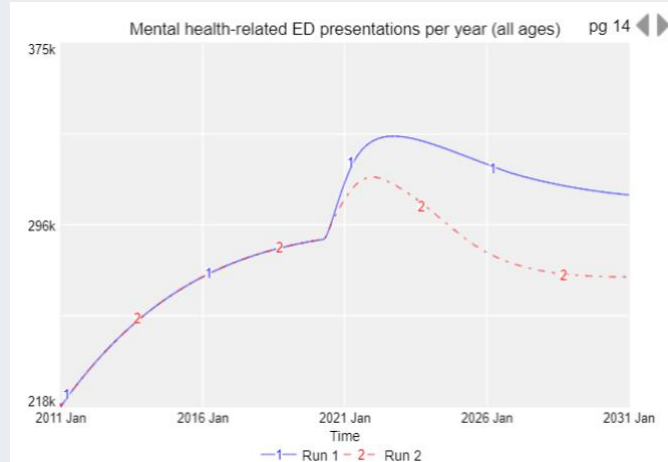
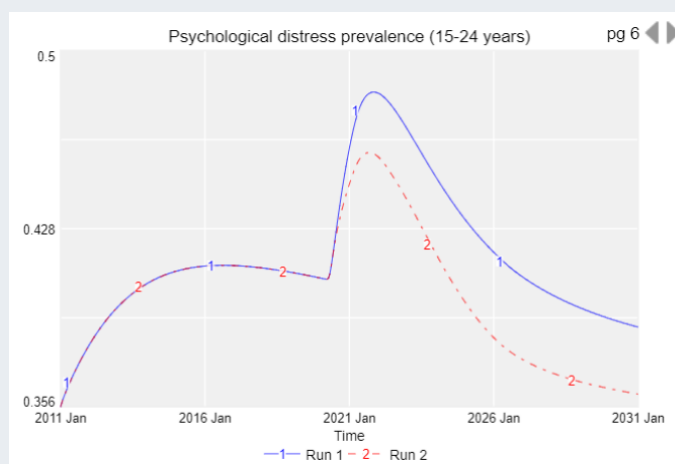
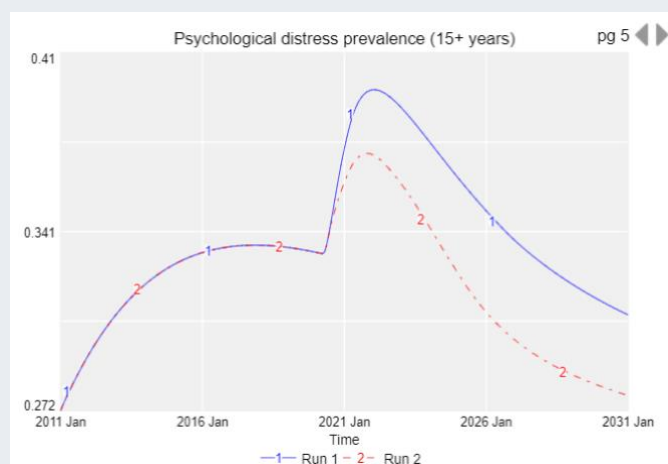
Our modelling highlights how the scale and duration of the adverse mental health outcomes of the COVID-19 crisis across the Australian population will depend on both social protection measures and investments in mental health system strengthening. It also highlights the dynamics between service demand and mental health system capacity and the need to be cognisant of the potential adverse impacts of implementing strategies that place additional pressure on an already stretched service system. Social, economic, and mental health strategies are usually developed in isolation. Our modelling highlights the importance of these sectors intersecting to deliver coordinated and effective strategies for safeguarding our country's most valuable resource – people – as we navigate the road to recovery.

**Table 4:** *Simulated impacts of best combination across employment, education, and health system strengthening on population mental health indicators 2020-2025.*

<b>Scenarios*</b>	<b>ED presentations n, (% ↓)</b>	<b>Youth ED presentations n, (% ↓)</b>	<b>Self-harm hospitalisations n, (% ↓)</b>	<b>Youth self-harm hospitalisations n, (% ↓)</b>	<b>Suicide deaths n, (% ↓)</b>	<b>Youth suicide deaths n, (% ↓)</b>
1. Best case COVID baseline	-	-	-	-	-	-
2. Extended employment programs (May 2020- May 2022) + Education programs (20% uptake in enrolments) + Doubling current growth rate in community-based specialist mental health services + technology enabled, measurement based coordinated care + assertive aftercare	97,030 (6.0)	17,660 (5.2)	13,842 (8.0)	3,536 (6.9)	1,590 (8.0)	172 (6.9)

\*Results are for the period March 2020 to 2025. Youth refers to the cohort aged 15-24 years. Cases (n) and percent reduction from the 'Best case' COVID baseline are presented. These estimates are conservative given the likely extended duration of high unemployment.

**Figure 8:** Simulated impacts of current strategies on prevalence of psychological distress, mental health-related ED presentations, self-harm hospitalisations, and suicide deaths across all ages and among youth (2020-2031).



Run 1 – The ‘best case’ baseline scenario

Run 2 – Employment programs for 2 years (until May 2022) + Education support programs – increasing enrolments in post-secondary education and vocational training by 20% + doubling the current growth rate in specialist community-based mental health service capacity + technology enabled care coordination + post-suicide attempt assertive aftercare (commencing 2021)

## Next steps:

The model will be updated as revised estimates of unemployment, underemployment, participation, psychological distress and presentations to emergency care are released over the coming weeks and months. Furthermore, detailed elaborations of this model will be developed so that issues related to female gender, young people, detailed employment or education policy settings and specific health system options can be explored in much greater detail. Insights generated across such comprehensive national models and more specific place-based (regional) models will be further explored.

In addition, the costs associated with distress and mental health services, and the consequences for reduced productivity will be integrated into the model. This will help facilitate estimates of the true cost to the national economy and the need to mobilise an integrated social, economic, and mental health response of sufficient scale. A pragmatic approach to the economic analysis will be undertaken, which will include: a public finance perspective (return on investment), health sector perspective (cost effectiveness/cost utility), and a societal perspective (cost benefit analysis). The strategic purpose of this approach is to identify opportunities for multi-sector approaches to develop, fund and implement the most effective combination of strategies, and mitigate against short term and siloed approaches to responding to this crisis.

Finally, we recommend much more frequent and well-structured tracking of real-time psychological distress, suicidal thoughts and behaviours, self-harm presentations to Emergency Departments, deaths due to suicide and other related accidents and injuries – nationally and regionally. This would facilitate indicative monitoring of progress of the strategies implemented, permit comparisons against projected impacts of the model, and contribute to refinement of the model to strengthen forecasts over time.



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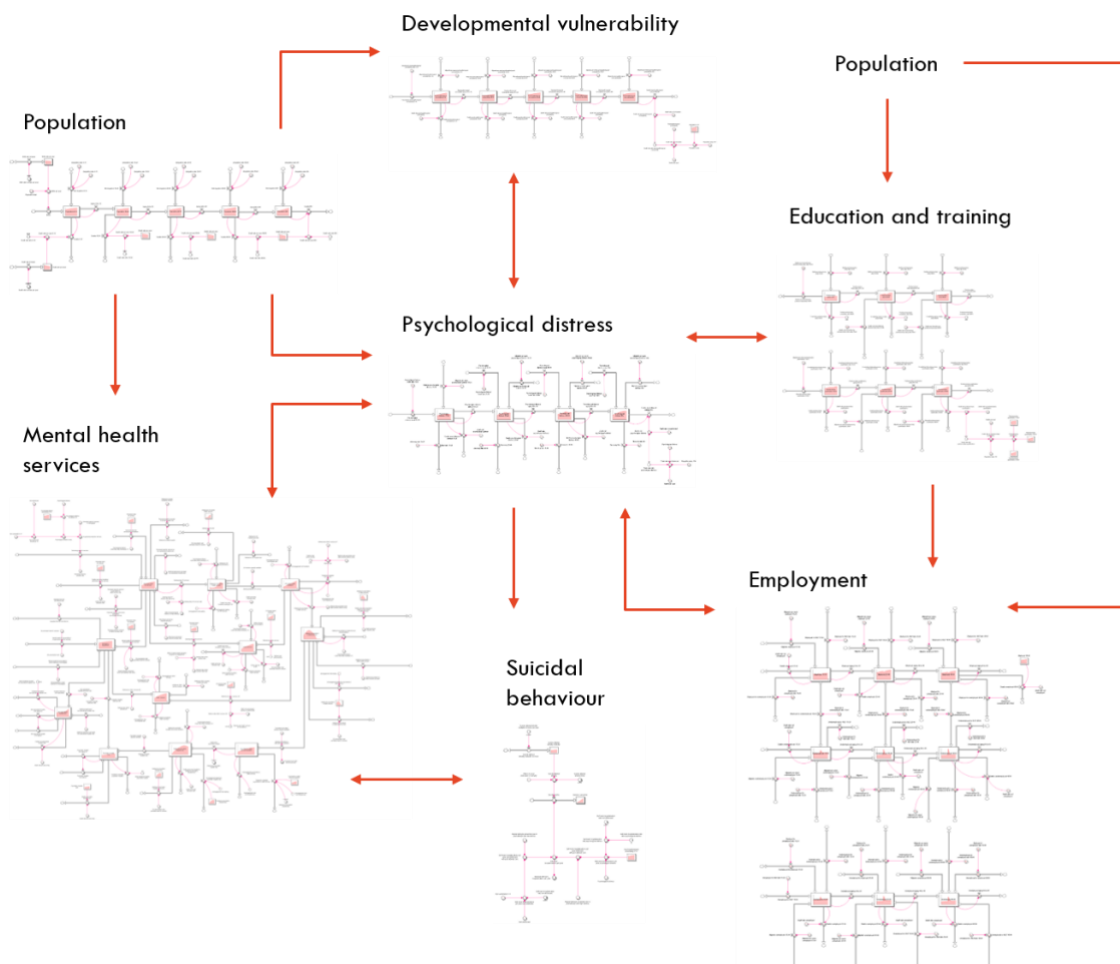
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## Appendix A

### Model summary:

The core model structure included: 1) a population component, capturing changes over time in the size and composition of the population resulting from births, migration, ageing, and mortality; 2) a psychological distress component that models flows of people to and from states of moderate to very high psychological distress (Kessler 10 [K10] score 16-50); 3) a developmental vulnerability component modelling exposure to childhood adversity and its effect on the risk of developing mental disorders in adolescence and adulthood; 4) a post-secondary education sector that captures participation in education and vocational training; 5) an employment sector that captures workforce participation, unemployment and underemployment across the population; 6) a mental health services component that models the movement of psychologically distressed people through one of several possible service pathways involving (potentially) general practitioners, psychiatrists and allied mental health professionals (including psychologists and mental health nurses), emergency department and psychiatric inpatient care, community- and hospital-based outpatient care, and online services; and 7) a suicidal behaviour component that captures self-harm hospitalisations and suicide deaths. Figure 9 presents a high-level map of the core model showing the (causal) connections among sectors. The model is stratified by age-groups (15-24 years, 25-44 years, 45-64 years, 65+ years), and by major cities versus regional areas to enable exploration of differential effects of strategies on these populations.

**Figure 9:** A high-level overview of the causal structure and pathways of the system dynamics model



## Key assumptions related to the impact of COVID-19:

Below are the key assumptions related to the key parameters in the model that define the impact of the COVID-19 pandemic and recession on social connectedness, unemployment, and psychological distress. The values provided are the default estimates that can be revised as new information becomes available. The model interface (Figure 10) allows these default assumptions to be varied to explore the implications and guide decision making.

**Sense of Community Index decrease** – the maximum fractional decrease in the Sense of Community Index (SCI) resulting from social dislocation unrelated to job loss (e.g., working from home, not participating in sports, no social gatherings). The SCI ranges from 0 to 12, with 12 corresponding to the highest possible sense of community (see Chipuer and Pretty, 1999, *J. Community Psychol.* 27, 643-658). The default value (0.1) corresponds to a 10% decrease in the SCI relative to the baseline value (9.15; Handley et al., 2012, *Soc. Psychiatry Psychiatr. Epidemiol.* 47, 1281-1290).

**Social dislocation duration** – the duration in years of social dislocation unrelated to job loss. The default value (1) assumes that significant social dislocation will persist for a period of 1 year.

**Social dislocation decay rate** – the fractional rate per year at which the Sense of Community Index (SCI) returns to its baseline value (9.15) after social dislocation ends. The default value (1) implies that the SCI would return to its pre-COVID value in 1 year given the initial rate of increase (i.e., the rate of increase immediately after the pandemic ends); a value of 0.5 would imply a return to the baseline value in 2 years given the initial rate of increase. Note that the rate of increase in the SCI declines as the baseline value is approached, so the actual time required to reach the pre-COVID value will generally be greater than the inverse of the decay rate specified.

**Unemployment increase** – the initial (maximum) multiplicative increase in the per capita job loss rate for persons aged 25-64 years due to the pandemic. The default values (5 for the best-case scenario, 8 for the worst-case scenario) assume that the job loss rate increases by a factor of 5–8 when COVID-19 cases begin to increase rapidly (in March 2020).

**Youth unemployment increase ratio** – the COVID-related increase in the per capita job loss rate for persons aged 15-24 years divided by the corresponding rate for persons aged 25-64 years (equal to the value of the parameter Unemployment increase). The default value (1.1) implies that the increase in the job loss rate for persons aged 15-24 years is 10% higher than that for persons aged 25-64 years.

**Unemployment increase decay rate** – the rate per week at which the multiplicative increase in the per capita job loss rate declines to a value of 1 (corresponding to the no-COVID scenario). The default value (0.02) implies that the per capita job loss rate would return to its pre-COVID value in 50 weeks given the initial rate of decline (i.e., the rate of decline immediately after the abrupt increase in the per capita job loss rate in March 2020). Note that the rate of decline in the job loss rate decreases as the pre-COVID rate is approached, so the actual time required to reach the pre-COVID rate will generally be greater than the inverse of the decay rate specified.

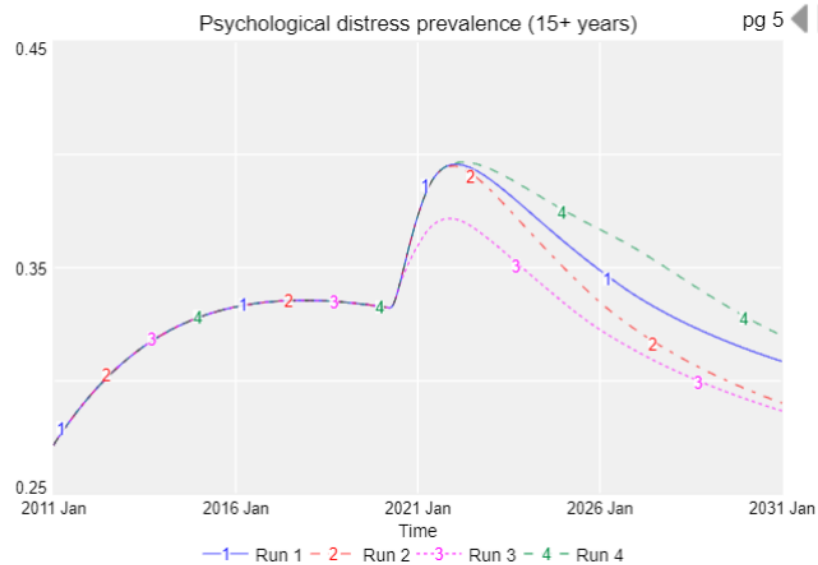
**Unemployment effect on distress** – the multiplicative effect of a doubling of the pre-COVID unemployment rate on the per capita rate of psychological distress onset resulting from anxiety about potential unemployment (including a partner or family member becoming unemployed). The default value (1.25) implies that a 100% increase in the unemployment rate above that applying immediately prior to the COVID-related increase in the per capita job loss rate results in a 25% increase in the incidence of psychological distress. Note that the increase in psychological distress onset affects the entire working-age population (15-64 years), including those who remain in employment and those not participating in the labour force.

**Effect on unemployment effect** – the multiplicative effect of doubling the pre-COVID unemployment rate on the mental health impact of being unemployed. The per capita psychological distress onset rate among people experiencing unemployment is assumed to increase as the unemployment rate increases above the pre-COVID rate due to decreased hope of re-employment (i.e., higher unemployment amplifies the negative mental health effects of being unemployed). The default value (2) implies that a 100% increase in the unemployment rate above that applying immediately prior to the COVID-related increase in the per capita job loss rate results in a doubling of the effect of being unemployed on the per capita rate of psychological distress onset.

27 July 2020

**Figure 10:** Prototype model interface to facilitate scenario testing and variation in key assumptions

## National mental health and suicide prevention model



Best case settings pg 1	
	Value
Sense of Comm. Index decr.	0.1
Social dislocation duration	1
Soc. dislocation decay rate	1
Unemployment increase	5
Youth unempl. increase ratio	1.1
Unempl. increase decay rate	0.02
Unempl. effect on distress	1.25
Effect on unempl. effect	2

COVID-19 scenario

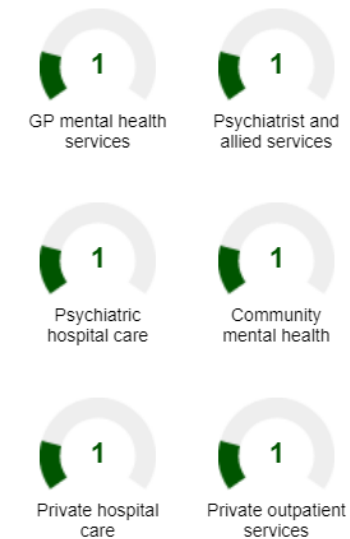
- ☐ No COVID  
☒ Best case  
☐ Worst case

Modify interventions

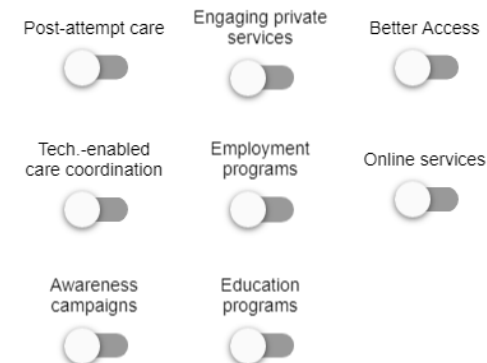
Export model results

Model validation

Services capacity growth



Interventions



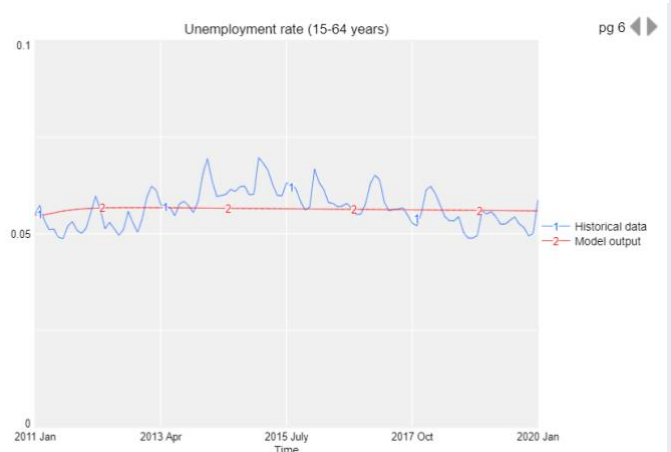
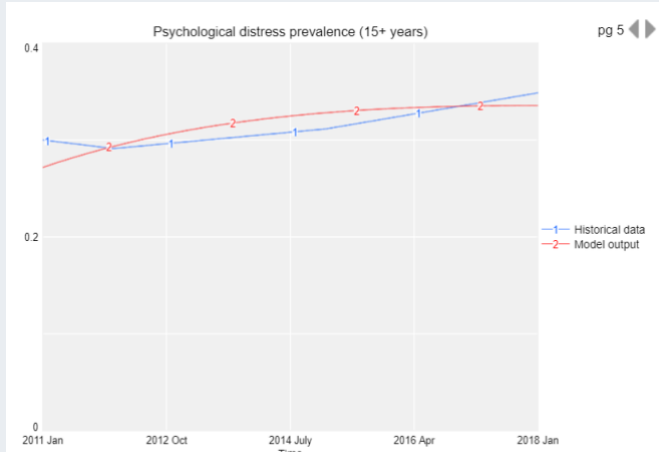
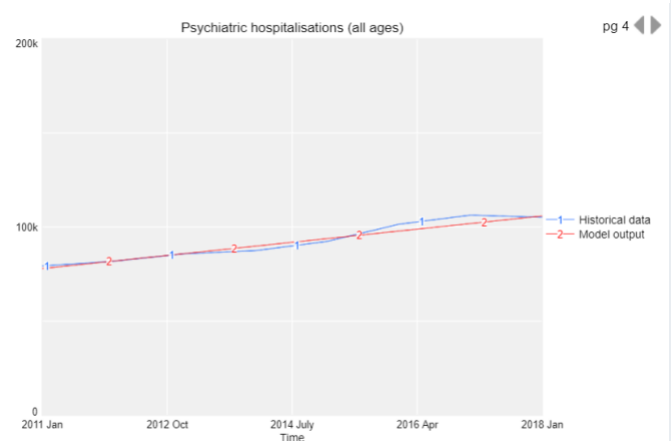
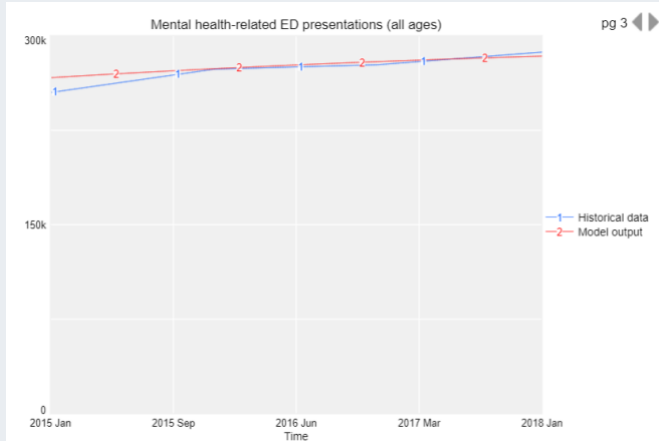
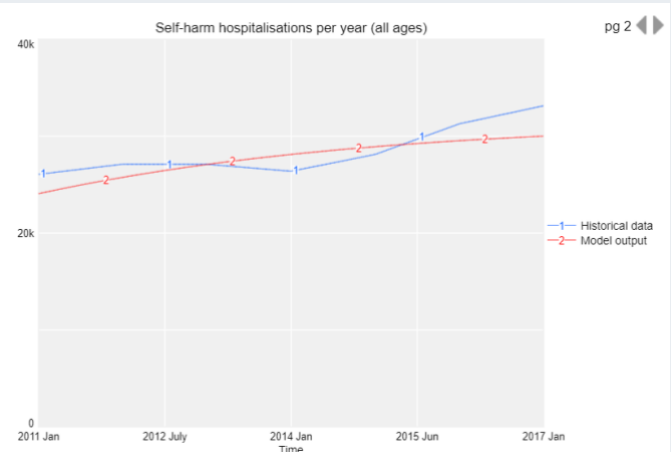
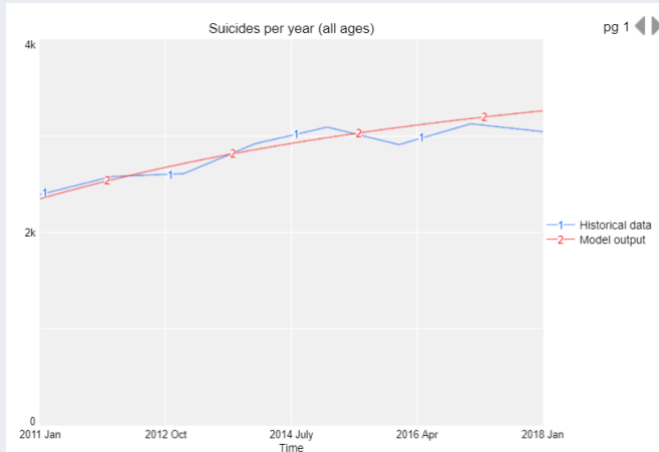
Run



Reset

## Model validation:

The model broadly reproduces historic trends across a range of indicators including suicide deaths, self-harm hospitalisations, mental health related ED presentations, psychiatric hospitalisations, psychological distress and unemployment rates from 2011.



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