The Australian Prevention Partnership Centre
Systems and solutions for better health

FINDINGS BRIEF

A what-if tool to address alcohol harms

Dynamic simulation modelling is a 'what if' tool to test **approaches to complex issues**

We worked with stakeholders to develop a **model of alcohol use** in NSW

This robust tool forecasts

the effectiveness of approaches to **prevent alcohol-related harm**

Key messages

- Excessive alcohol consumption causes a range of harms across society, from violence and accidents to chronic health problems including heart disease, cancer and stroke.
- Alcohol-related harm is a complex problem, with many inter-related causes. It can be difficult for decision-makers to know which interventions, or combinations of interventions, is likely to produce maximum community-wide impact.
- Dynamic simulation modelling is a useful 'what if' tool that enables policy makers to test the likely impact of a range of possible policy solutions before implementing them in the real world. It has been widely used in other sectors.
- This project developed a dynamic simulation model of alcohol use in NSW to forecast the effectiveness of a variety of approaches and explore what combination of interventions is likely to achieve the best outcomes.
- The project found that combining different interventions can have undesirable effects; some combinations have synergistic effects; and some produce impacts that are not visible within a policy cycle.

The project: Simulation modelling of alcohol consumption and the effectiveness of harm-reduction policies
Project lead: Dr Jo-An Atkinson, The Australian Prevention Partnership Centre
Project start: January 2015 **Project end:** June 2016

Why is this issue important?

Alcohol misuse is a complex, 'wicked' problem. Globally, alcohol is estimated to result in 3.3 million deaths each year, with the associated health and social costs accounting for more than 1% of the gross national product of high and middle-income countries.[1,2] In Australia, alcohol is widely used and accounts for an estimated 5.1% of the total burden of disease and injury.[3] The harms from alcohol, including ill health, chronic disease, crime, road traffic accidents and lost productivity, have been conservatively estimated to cost Australia $15.3 billion a year.[4]

Implementing policies and programs to tackle alcohol-related harm is very difficult. A range of individual, social, cultural, economic and environmental factors influence individuals' drinking patterns and behaviour. There are many opportunities to try to reduce harms using different interventions[5], but it is often unclear which combinations are most likley to work best.[6] In addition, health decision-makers must take into account cost, politics, community views and industry lobbying.[6–9]

Dynamic simulation modelling has been widely used to solve complex problems in other sectors. It can answer important questions such as which risk factors are the most important, when in people's lives we should target interventions, and which combinations of interventions work best, are most equitable and most cost effective.

Recent advances in modelling software capability and more user-friendly interfaces have meant that simulation modelling is now more accessible. This has allowed the Prevention Centre to embed stakeholder engagement, consultation and consensus-building processes in the development of sophisticated dynamic simulation modelling tools.

> "The benefit of the approach taken by the Prevention Centre is that the process of developing the model is open and transparent. It's a glass box rather than a black box, which is important in terms of believing the model."
>
> **Dr Jo Mitchell**
> NSW Health

What did we do?

The aim of this work was to bring together researchers, policy makers and practitioners to co-develop a dynamic simulation model – to provide NSW decision-makers with a robust decision-support tool to test the likely impacts of different policy scenarios to reduce alcohol-related harm.

A consortium of Australia's leading academics, policy experts, program planners, clinicians and health economists were engaged to collaboratively develop a model of alcohol consumption behaviour and related harms in NSW. The model was built based on the best available evidence from psychology, sociology and addiction literature as well as expert experience and administrative and survey data.

The resulting dynamic simulation model is a virtual representation of NSW, in which the behaviours and routines of individuals and communities mimic real life. It can follow individuals throughout life, identifying how their influences and behaviours change, and how their health is impacted over time. It can also calculate the cumulative effects of millions of people operating in a complex system, following their interactions and responses to different policies and interventions.

What did we find?

The model simulated a large range of possible combinations of interventions. Several findings are of particular interest:

Combining different interventions has unanticipated, synergistic effects. For example, combining a policy of 3am licensed venue closing time plus 1am lockout with an expansion of treatment service coverage to 20% of heavy drinkers suggested a 33% reduction in acute alcohol-related harms. This population impact was greater than the sum of each policy modelled individually. This understanding will help policy makers to develop suites of interventions within the constraints of limited government resources.

Some interventions can have unintended consequences. For example, when we tested the impact of raising drink prices in licensed venues, the model unexpectedly showed an increase in consumption and violence. This is because individuals in the model shifted their behaviour to drinking more at home parties or 'preloading' due to the higher prices in pubs and clubs.

With sustained investment, the effect of interventions can grow stronger over time – though the full impacts may not be seen within a policy cycle.

What did we produce?

Tools

A decision support tool that allows policy makers and other stakeholders to explore the impact of a broad range of potential intervention scenarios over time.

Published papers

Atkinson J, O'Donnell E, Wiggers J et al. Dynamic simulation modelling of policy responses to reduce alcohol-related harms: rationale and procedure for a participatory approach. Public Health Res Pract. 2017;27(1).

Why does it matter?

This project highlighted the benefits of working collaboratively to produce an evidence synthesis tool that is transparent, accessible, robust and low risk.

It demonstrated that dynamic simulation modelling is a useful tool that can be used to test different interventions, to quantify the trade-offs between different combinations of interventions, and to predict the unanticipated, synergistic effects of combinations of interventions. These insights can promote more effective use of limited resources.

Complex problems often require multi-strategic, cross-agency responses. This project has shown that combining different interventions delivered by different agencies such as health, police, justice, welfare departments and other government, academic and community organisations can have a synergistic benefit. This may assist with making a compelling case for cross-agency cooperation to deliver coordinated and effective responses to address alcohol misuse and related harms.

Next steps

The team is continuing to work on integrating costs and benefits into the modelling. This will result in Australia's first economic evaluation of different responses to alcohol-related harm that accounts for population and behavioural dynamics and the potential non-additive effects of combinations of interventions.

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Findings brief: A what-if tool to address alcohol harms

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