The problem

Aotearoa New Zealand has one of the highest rates of childhood obesity in the world. Moreover, obesity disproportionately impacts Māori and Pacific children and those from poorer backgrounds. Left unchecked, obesity in childhood raises the risk of a number of adult health problems, including arthritis, diabetes, and cardiovascular disease. Once established, reversing obesity may require simultaneous changes in diet, activity and environment which are difficult to implement and maintain.

Better Start researchers at the University of Otago have investigated the possibility that helping children with their sleep may help prevent them becoming obese. Shorter sleep is associated with increased rates of obesity, possibly because of increased food intake in waking hours resulting in energy imbalance. In the 'Prevention of Overweight in Infancy' (POI.nz), study, Better Start researchers tested the effect of giving parents help to manage their children's sleep during the first two years of life. The study found that rates of obesity at age 5 were <u>halved</u> among children who received this help compared with children who did not.

What would this look like if the POI.nz Sleep intervention was rolled out widely, or to particular population subgroups? While it is time-consuming and costly to implement these rollouts in the real world, modelling can answer this type of question. For this reason, we developed the *Better Start Model*.

**Better Start Model
(https://compassnz.shinyapps.io/BetterStartModelShiny/)**

The Better Start Model uses simulation to model the long-term impact of interventions undertaken as part of the 'A Better Start' National Science Challenge (ABS). The model creates a virtual world of 10,000 individuals[1] – children with characteristics matching those of children born in New Zealand in 2013 – and uses results derived from interventions targeting literacy, early growth, and mental wellbeing, to simulate the effects of these interventions.
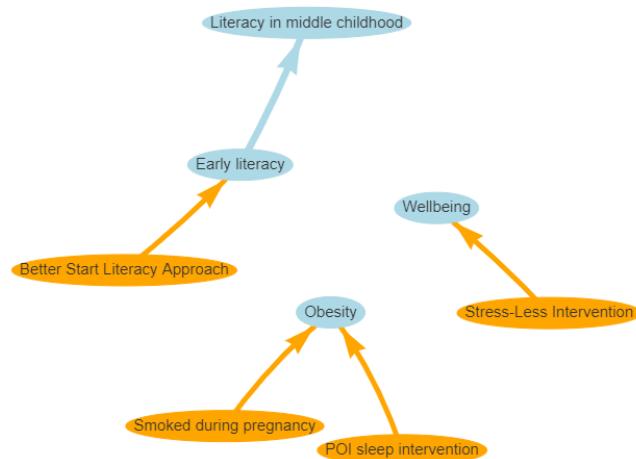
We model the impact of different levels of rollout of the POI.nz Sleep intervention on obesity at age five.

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[1] These are not real people, but 'synthetic' individuals created by analysing data from the Integrated Data Infrastructure (IDI).
Disclaimer: These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/.

Results

The model allows the impact of many different scenarios to be tested. The results of two models are presented here:
First, *What if the POI.nz Sleep intervention was rolled out to a randomly selected 50% of children*?

The panel to the right shows the results of this rollout. The red bar shows the 'base' scenario – if <u>no-one</u> had received the POI.nz Sleep intervention; the green bar shows the simulation we programmed – where POI.nz Sleep intervention was rolled out to a randomly selected 50% of children. The error bars represent the uncertainty from the simulation.
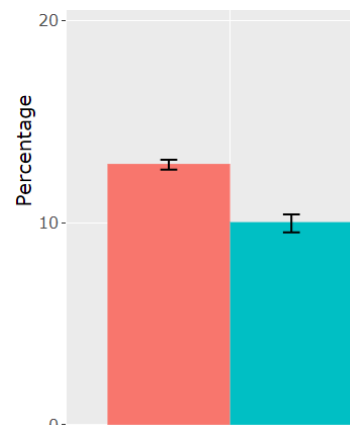

The simulation shows that a 50% rollout of the POI.nz Sleep intervention reduced the prevalence of obesity in five-year-old children from 13% to 10% - that's equivalent to 1800 <u>fewer</u> obese children each year. However, it is often the case that the real-world effect of an intervention is smaller than those found in trials. The Better Start Model allows effect sizes to be varied so it is possible to model the impact of a smaller effect.

This is shown in the second scenario tested:
What if the POI.nz Sleep intervention was rolled out to a randomly selected <u>50% of children</u>, but the effect is <u>smaller than</u> the POI study suggests??

POI.nz study effect   **Half POI.nz effect**

The panels to the right show the impact of the *POI.nz Sleep intervention* under two conditions. Results assuming the effect is as found in the POI.nz study is shown on the left, while results assuming the effect size is <u>half that size</u> is shown on the right. Even an intervention effect half as big as found in the POI.nz study would result in a substantial drop in child obesity at age five – from 13% to 11.5%. This demonstrates how *sensitive* the results are to the effect sizes programmed and show that the *POI.nz Sleep intervention* would be beneficial even if its effect was far smaller that the evidence suggests.
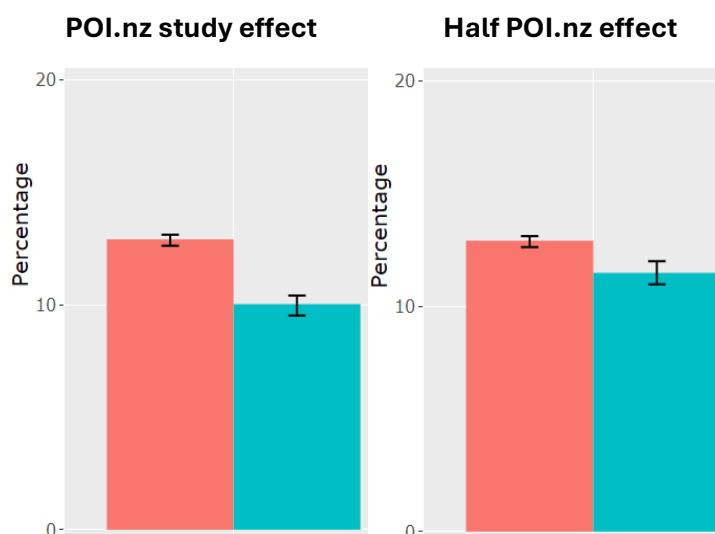
Take home message

A wide range of policy simulations can be run with the Better Start Model, including models targeting a greater or smaller number of people, models targeting different population groups, and models that vary assumptions - such as the varying the effect sizes as shown here. These models are useful for evaluating the impact of different policy options and providing solid evidence for future policy decisions.

Want to find out more?
Check out the model at https://compassnz.shinyapps.io/BetterStartModelShiny/, or contact
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