Return on Investment: Prevention in mental health

e-Health interventions for the prevention of anxiety disorders in young people

Background

Anxiety disorders encompass several mental illnesses characterised by persistent feelings of anxiety, panic and/or fear. Anxiety disorders are the most common class of mental illnesses affecting Australians aged 4-17 years, with a 12 month prevalence of 6.9% (1). Mental health influences student engagement and learning outcomes. Young Australians with a diagnosis of anxiety disorder experience lower rates of school attendance and reduced academic performance at school (1). Poorer academic outcomes at school can result in lower potential career earnings for affected students as they transition into adulthood. In adulthood, a diagnosis of anxiety disorder can lead to substantive healthcare costs and productivity losses. For instance, anxiety disorders have been estimated to result in total healthcare costs amounting to $657 million and productivity losses of $8,060 million in Australia during 2013-14 (2). The high prevalence and widespread impacts of anxiety disorders highlight the need for intervention. Research shows that anxiety disorders are a chronic and persistent condition that often develop in adolescence and early adulthood (3). Intervening early in the life course of an individual could have follow on benefits in both preventing chronic anxiety disorders and reducing associated long term impacts. For example, experiencing anxiety disorder at younger ages is also a risk factor for developing a first ever episode of depression later in life (4).

Intervention modelled

Young people in Australia are frequent users of the internet, social media and electronic devices (5). In addition, young Australians often search for mental health information online (6). Digital e-Health platforms are increasingly being considered as a means through which psychological interventions for the prevention of anxiety disorder can be disseminated both widely and flexibly (7). MoodGYM is a locally developed e-Health intervention that has been extensively examined in the Australian context and has been shown to be effective in reducing symptoms of anxiety disorder (8). The MoodGYM intervention comprises five online modules based on cognitive behavioural therapy principles.

The intervention modelled in this analysis was based on the YouthMood project – a large scale trial examining the effectiveness of delivering MoodGYM to 30 schools across Australia (9,10). All classroom teachers were provided with a MoodGYM teacher manual, which contained detailed instructions on how to deliver the MoodGYM program in class. The intervention was delivered to students over 5 weeks with one module presented each week during a single class period. The role of the classroom teacher was to supervise students in their completion of the program and to answer any incidental questions that arose during its completion.

The effectiveness of the MoodGYM intervention was based on the findings of three studies evaluating different online interventions (including MoodGYM) to prevent anxiety disorder in young school aged persons (10-12). The MoodGYM intervention was subsequently found to reduce the risk of developing anxiety disorder by 21% immediately after receiving the intervention and 36% around 6 months after receiving the intervention. Intervention effectiveness was only modelled in the first year as no data was available to inform the modelling of intervention effects beyond one year. Additionally, intervention effects were assumed to apply equally across all ages in the model.

The primary outcome of this evaluation is the return on investment (ROI) ratio. This ratio includes the cost of the intervention in relation to any cost savings (i.e. healthcare cost savings and productivity gains). For an intervention to be considered cost effective, it would need to have a ROI ratio greater than 1. This means that the cost savings are greater than the costs of the intervention (e.g. a ROI ratio of 1.5 means that for every $1 invested, there will be a gain of $1.50).

Assumptions

The costs of the MoodGYM intervention include the following costs related to intervention delivery. All salary costs described below include 30% on costs, such as annual leave loading and superannuation.

Intervention delivery. Each school that participated in the intervention paid an average subscription cost of $950 per school (13). The rate of participation among schools was 46% or 1,217 schools (9,10). The MoodGYM teacher manual was distributed to five teachers at each school who were responsible for delivering the intervention. The cost of printing and distributing the manual was assumed to be $10 per teacher. Teachers supervised a total of five intervention sessions lasting 45 minutes each among classrooms with an average size of 23 students (9,10). The rate of participation among students was 59% or 560,625 students (9,10). The time spent by teachers supervising each intervention session was valued at $54 per hour (14).

Cost savings. Healthcare cost savings were calculated by assuming that the cost of treating anxiety disorders in young people was equal to a previous estimate of the cost of treating anxiety disorders in adults (no comparable estimate was available for young people) (2). Productivity gains comprised two components: 1) productivity gains among parents

who take less time off work to care for their children (aged <18 years) due to school absence days attributable to anxiety disorders; and 2) productivity gains among former students (aged ≥18 years) who enter the adult workforce and experience reductions in lost work days due to fewer cases of anxiety disorders. The average wage foregone by parents (after adjustment for the average employment rate) was estimated to be $224 per school absence day (14), while the average wage foregone by students who enter the adult workforce was also estimated to be $224 per lost work day (14).

Alternative scenarios

Scenario 1) This scenario modelled the long term effectiveness of the intervention by assuming that the intervention effect lasted for five years and decreases by 50% in each successive year.

Scenario 2) This scenario only models the youngest or oldest age group – i.e. students in Year 6 or Year 12 respectively. This was done to compare the cost effectiveness of delivering the intervention to younger students who have a higher incidence of anxiety disorders (Year 6) and older students who have a lower incidence of anxiety disorders (Year 12). Data used in the model suggested that the incidence of anxiety disorders was highest at 11 years of age (i.e. around Year 6).

Scenario 3) This scenario tested what would happen if the intervention was made compulsory as part of the education curriculum, assuming that the rate of participation among students was 100%.

Results

Cost effectiveness findings

The MoodGYM intervention produced a favourable ROI ratio of 3.06 after ten years (see Table 1). This means that for every $1 invested in the intervention, there is a return of $3.06 within ten years of the intervention. The intervention cost a total of approximately $6.2 million or $11 per student. A time lag was observed between the application of the intervention in the first year and the occurrence of improved health outcomes and cost savings in later years.

When analysing health outcomes, the MoodGYM intervention resulted in **10,498 fewer cases of anxiety disorders** and a total of **3.4 million anxiety disorder free days** over ten years.

Table 1. Summary of results for the MoodGYM intervention

	Year 1	Year 2	Year 3	Year 4	Year 5-10	Total
Intervention costs	**$6.16M**	**-**	**-**	**-**	**-**	**$6.16M**
Government	$6.16M	-	-	-	-	$6.16M
Cost savings	**-$2.28M**	**-$3.91M**	**-$3.14M**	**-$2.50M**	**-$7.01M**	**-$18.84M**
Healthcare cost savings	-$0.53M	-$0.97M	-$0.84M	-$0.72M	-$2.71M	-$5.76M
Parental productivity gains	-$1.75M	-$2.95M	-$2.30M	-$1.78M	-$4.31M	-$13.08M
Net intervention costs (saving if negative)	**$3.88M**	**-$3.91M**	**-$3.14M**	**-$2.50M**	**-$7.01M**	**-$12.69M**
Cumulative ROI ratio	0.37	1.01	1.52	1.92	3.06	3.06
Anxiety disorder free days	313,529	574,753	496,227	428,949	1,607,636	3,421,093
Anxiety disorder cases averted	858	1,622	1,443	1,285	5,291	10,498
Cumulative cost per anxiety disorder case averted per year (cost saving if negative)	**$4,517**	**-$15**	**-$810**	**-$1,090**	**-$1,208**	**-$1,208**

Notes: ROI: return on investment per $1 invested

Results from alternative scenarios

Scenario 1 assumed that the intervention continued to be effective over the long term. This led to a much higher ROI ratio of 5.91 after ten years. Scenario 2 tested the impact of only modelling students in Year 6 and Year 12. Only modelling students in Year 6 led to a higher ROI ratio of 4.11, while only modelling students in Year 12 produced a lower ROI ratio of 1.98. These differences were primarily driven by the larger number of anxiety disorder cases averted among Year 6 students when compared to Year 12 students (1,649 and 1,361 respectively). Scenario 3 tested the impact of assuming that 100% of students participated in the intervention, this led to a slightly higher ROI ratio of 3.53.

Table 2. Summary of results for alternative scenarios involving the MoodGYM intervention

Scenario	Intervention costs	Cost savings	ROI	Anxiety disorder cases averted	Cost per child
Base case	$6.16M	-$18.84M	3.06	10,498	$11
Scenario 1 – Long term intervention effectiveness over 5 years	$6.22M	-$36.77M	5.91	21,429	$11
Scenario 2a – Modelling Year 6 students only	$0.90M	-$3.69M	4.11	1,649	$11
Scenario 2b – Modelling Year 12 students only	$0.90M	-$1.79M	1.98	1,361	$11
Scenario 3 – 100% student participation rate	$9.38M	-$33.10M	3.53	17,334	$10

Notes: ROI: return on investment per $1 invested

Implementation considerations

While evidence on cost effectiveness is the focus of this project, there are other criteria apart from cost effectiveness that can influence whether and to what degree interventions are likely to be rolled out in routine practice. These criteria are not captured in the technical cost effectiveness results but are potentially very important from a decision making context. Some of these considerations are summarised in the Table below. The colour coding of each criterion is an attempt to visually summarise whether these secondary considerations impact on the results in a positive or negative way (red = negative, amber = uncertain, green = positive). A code of 'green' implies that the secondary consideration strengthens the case for investing in the intervention. A code of 'amber' means that the secondary consideration reduces certainty in the case for investing and a code of 'red' means that these considerations do not support investment in the intervention.

Implementation considerations		Overall Rating
Potential secondary effects	Other impacts such as improvements in academic achievement and their long term impact on career related opportunities in adulthood were not analysed. This represents a conservative modelling approach that is likely to underestimate the benefits resulting from the intervention.	**Positive**
Equity	Potential to reduce inequities of access to this type of intervention due to it being delivered universally to all students. However, the intervention is only available to schools with access to the internet. While most schools will have internet access, internet speeds are slower in rural and remote communities. It follows that while access may be increased via greater coverage of schools, there may be some schools (e.g. rural and remote locations) where access may be problematic.	**Uncertain**
Strength of evidence	Intervention effect sizes were derived from a meta-analysis of three intervention studies including a large scale intervention trial conducted in 30 schools across Australia. Longer term evidence of effectiveness is required as intervention effect sizes were only demonstrated up to one year following the intervention. Furthermore, previous intervention studies did not exclude participants who had previously experienced anxiety disorder. This may overstate intervention effect sizes due to the additional benefit of relapse prevention among those who have previously been diagnosed with anxiety disorder.	**Uncertain**
Acceptability	Reasonable likelihood of being acceptable to parents and students, especially if it is integrated as part of the broader school curriculum. The minimal training/supervision requirements will also increase the acceptability among teachers (when compared to comparable face to face psychological interventions). It is unclear whether a majority of schools would be willing to participate in the intervention if it were rolled out on a voluntary basis. Extensive uptake of intervention materials by schools and their students is vital if it is to produce the intended benefits.	**Uncertain**
Feasibility	The MoodGYM intervention can be feasibly implemented widely across Australia given its minimal requirements for training and initial set up. Even so, there may be issues in rolling out the intervention among schools with limited internet access. Any prospective roll out of MoodGYM should be undertaken as part of 'Be You' – a national initiative led by Beyond Blue to support young people's mental health in schools (15).	**Uncertain**
Sustainability	It is questionable as to whether schools/the government would be willing to support the program over the long term, particularly since there are overlapping programs currently implemented within schools.	**Uncertain**

Recommendations

The MoodGYM intervention is not currently implemented extensively across schools in Australia. This study provides good evidence for uptake of this intervention on the basis that it has the potential to result in net cost savings for every dollar invested. The online MoodGYM intervention has several advantages that make it a good choice for implementation across Australia compared to face to face preventive interventions. They include local development and testing, comparatively lower implementation costs than face to face interventions and easier dissemination to rural and remote regions. Any prospective roll out of MoodGYM should be undertaken with awareness of the 'Be You' initiative (www.beyou.edu.au) which currently provides mental health related advice and support to schools in Australia [15].

Take home messages

Implementation of the MoodGYM intervention has the potential to result in net cost savings when compared to its overall intervention cost. This intervention could be considered for implementation across schools in Australia, in line with the 'Be You' initiative (www.beyou.edu.au). Implementation of the MoodGYM intervention should be subject to ongoing evaluation. The advantages of the e-intervention includes its low cost and relative ease of implementation when compared to comparable face to face psychological interventions in schools.

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