National Institute for Health and Care Excellence

Draft for consultation

Social, Emotional and Mental Wellbeing in Primary and Secondary Education

Evidence Review J: A cost-consequence and cost-benefit analysis of interventions to improve social, emotional and mental wellbeing in schools

NICE guideline <number>

Economic modelling underpinning recommendations in the NICE guideline

January 2022

Draft for Consultation

This report was developed by York Health Economics Consortium

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Warning for model users: Due to substantial variability in the interventions available and heterogeneity across schools it is neither possible, nor judicious, for this model to provide 'generalised' results. It is recommended that the model is used as a guide to explore the potential economic and wellbeing implications so that each school or wider decision maker can evaluate its own most likely scenario.

An explanatory video has been developed to support users and can be found here: SEMW Model 09 12 V1 0 LEC Excel 2021 12 15 10 28 34 crop - YouTube

Abstract

Educational institutions are designed to provide learning spaces and learning environments for children and young people. As such, these institutions play a key part in children's development through both the taught and wider curriculum (such as activities outside the classroom). These institutions, such as schools, are key settings in which to identify and provide early intervention for children and young people at increased risk of mental ill health. Increases in recognition of the effect of mental health problems on academic attainment, and the unique platform that schools can offer in access to and support for children has led to an expansion of school-based mental health interventions in high-income countries. However, a key challenge is knowing what approaches improve student outcomes in a specific setting. Schools and other educational institutions may not have the time or resources to assess the effectiveness of programmes they use or provide quality assurance of interventions. Therefore, with the economic model on social, emotional and mental wellbeing (SEMW) in primary and secondary education we aim to quantify the costs and effectiveness, and hence the impact, of introducing certain mental health and wellbeing interventions.

It is recommended that the model is used to explore the *potential* economic and wellbeing implications so that each institution or wider decision maker can evaluate its own most likely scenario. The model can be used to as a support tool for relevant recommendations.

Executive Summary

1. INTRODUCTION

The National Institute for Health and Care Excellence (NICE) commissioned York Health Economics Consortium (YHEC) to produce an economic evaluation for the social, emotional and mental wellbeing (SEMW) in primary and secondary education public health guideline.

2. OBJECTIVES

The objective of the economic evaluation, as identified in the NICE guideline scope, was to identify whether an intervention, or combination of interventions, that promote social, emotional and mental wellbeing in children and young people in primary and secondary education, are effective and cost-effective. Interventions were grouped by approach type and a range of student outcomes were studied.

3. METHODS

To approach the research questions and cater for the model user, the model developed was both a cost-consequence and cost-benefit model. Evidence from the NICE social, emotional and mental wellbeing in primary and secondary education guideline review was used in the model. It is intended that the model will be used as an interactive cost-calculator for those who are considering implementing mental health and wellbeing interventions at school, or other interested parties. The model allows users to input values and generate bespoke results, specific to the educational environment of interest.

4. RESULTS AND DISCUSSION

The review of evidence indicates that interventions that promote SEMW in primary and secondary education are likely to influence a range of outcomes. Because of substantial variability in the interventions available and heterogeneity across schools it is neither possible, nor judicious, to provide ‘generalised’ results. It is recommended that the model is used to explore the *potential* economic and wellbeing implications so that each school or wider decision maker can evaluate its own most likely scenario. The model can be used to as a support tool for relevant recommendations.

Acknowledgements

The authors would like to thank the Public Health Advisory Committee (PHAC) for their comments and suggestions.

Abbreviations

CBA	Cost-Benefit Analysis
NICE	National Institute for Health and Care Excellence
OR	Odds ratio
PHAC	Public Health Advisory Committee
QALY	Quality-adjusted life year
RR	Relative risk
SEMW	Social, emotional and mental wellbeing
SMD	Standardised mean difference
YHEC	York Health Economics Consortium

Glossary

Cost consequence model	A cost consequence model assesses a wide range of costs and consequences (effects) of comparator interventions and reports them separately, so each decision maker can choose which costs and effects are most relevant to their local context and viewpoint.
Cost benefit model	A cost-benefit model is a comparison of interventions and their consequences in which both costs and resulting benefits (health outcomes and others) are expressed in monetary terms.
Net benefit	The value of the benefit from an intervention, minus its total costs. It can be expressed in health (for example, using quality-adjusted life years) or monetary terms. Net benefit is a model outcome which considers the effect of an intervention all sectors in society not solely an educational setting, when a societal perspective is used.
QALY	A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One quality-adjusted life year (QALY) is equal to 1 year of life in perfect health. QALYs are calculated by estimating the time (years) of expected intervention effect and weighting by a quality-of-life (utility) score.
Relative risk	The probability of an event occurring in the study group compared with the probability of the same event occurring in the control group, described as a ratio. If both groups face the same level of risk, the relative risk is 1. If the first group had a relative risk of 2, subjects in that group would be twice as likely to have the event happen (e.g. a change in student outcome). A relative risk of less than 1 means the outcome is less likely in the first group. Relative risk is sometimes referred to as risk ratio. It will be very similar to an odds ratio when events are rare.

1 Introduction

1.1 Background

The National Institute for Health and Care Excellence (NICE) worked with Public Health England to develop a guideline scope for social and emotional wellbeing in primary and secondary education. The guideline will update and replace the NICE guidelines on social and emotional wellbeing in primary education (PH12) and social and emotional wellbeing in secondary education (PH20). The guidelines were combined so that commonalities and differences between interventions for children and young people at different ages and life stages can be addressed. Full details are set out in the surveillance review decision [1]. This guideline will also complement legislation such as the Department for Education's:

- Keeping children safe in education [2],
- Supporting pupils with medical conditions at school [3],
- Preventing and tackling bullying [4],
- Mental health and behaviour in schools [5],
- Relationship's education, relationships, and sex education (RSE) and health education [6].

Primary and secondary schools help children and young people learn social and emotional skills through both the taught and wider curriculum (such as activities outside the classroom). Schools can provide the nurturing environment that supports positive social, emotional and mental wellbeing. Schools are also key settings in which to identify and provide early intervention for children and young people at increased risk of mental ill health. However, a key challenge for schools is knowing what approaches improve student outcomes in a specific school setting. Schools may not have the time or resources to assess the effectiveness of programmes they use or provide quality assurance of interventions.

NICE has commissioned York Health Economics Consortium (YHEC) to carry out a systematic cost-effectiveness review and conduct an economic evaluation. This document outlines the objectives, methods, and results of the economic evaluation.

1.2 Objectives

The Public Health Advisory Committee (PHAC) prioritised questions in the NICE scope for further economic analysis. Key issues and draft questions were to identify whether an intervention, or combination of interventions, that promote social, emotional and wellbeing in children and young people in primary and secondary education, and young people with SEND in further education, are effective and cost-effective.

The key intervention approaches identified were:

- Universal
  - Curriculum content and classroom-based interventions focused on social, emotional and mental wellbeing. This includes lessons on resilience, self-esteem, coping skills (such as dealing with bereavement or adverse childhood events), mental health awareness, managing social relationships (to avoid bullying, including online bullying) and the appropriate and safe use of the internet and social media.
- Whole school
  - The whole-school approach is an integrated approach that includes and goes beyond teaching and learning in the classroom to all aspects of the life of a school including culture, ethos and environment, as well as partnerships with parents or carers and families, outside agencies, and the wider community.
- Targeted
  - Targeted social or emotional support such as individual or small group interventions for areas such as self-esteem, resilience or coping skills for children and young people who need extra support in developing social and emotional skills.
- Support during periods of student transition
  - Support during periods of transition (for example developmental transitions such as puberty, life transitions such as family break-ups or bereavement, and educational transitions such as moving from primary to secondary school).

The student outcomes identified were:

- Emotional distress
- Behavioural skills
- Social and emotional skills
- Self-esteem
- Bullying perpetration

The aim of the analysis was to conduct economic modelling and provide costs and benefits to those who are considering implementing an intervention at school to

prevent poor wellbeing and improve mental wellbeing, measured in terms of student outcome variables.

As outlined in the final scope, the updated guideline and economic model are for:

- Teachers, school support staff and others working in schools with – or responsible for – children and young people
- School leadership teams, including governors and leadership teams of multi-academy trusts
- Practitioners with a health or social care remit (including public health, mental health, and social workers) working in the NHS or local authorities
- Commissioners and providers of interventions and services for child social, emotional and mental wellbeing
- The wider public, private, voluntary and community sectors working with children and young people

The economic model outputs were used to inform the committee's guidance decisions for questions prioritised in the NICE scope and provide an interactive online calculator to help inform the implementation of mental wellbeing interventions in school. The economic model can be used in addition to tools already available regarding student interventions for mental health and wellbeing. The Education Endowment Foundation's *Early Years Toolkit* show the estimated impact and cost of an intervention and the strength of evidence base used to inform this [7]. The economic model outlined in this report also focuses on the cost and impact of student interventions but allows a model user to change inputs to reflect the setting of interest.

2 Methods

The following section summarises methods applied during the analysis of interventions relating to social, emotional and mental wellbeing at school.

2.1 Model Overview

In the model a choice of model perspective is to be made. This should be the perspective which best aligns with the model user. The two choices are 'educational' or 'societal'. The educational perspective is for those who want to look at the intervention impact within an education setting i.e. school, college, young offender institutions etc. The societal perspective considers not only costs associated within the educational setting but wider societal ramifications of an educational intervention on other sectors. This could include the impact on local hospitalisation or crime rates of students associated with the intervention. The societal perspective also encompasses student quality-adjusted life years (QALYs). QALYs are used predominantly in the health sector as a measure of health. A QALY is a measure designed to combine the impact of gains in *quality* of life and in *quantity* of life (i.e. life expectancy). The quality element of this metric is determined by utility values associated with a given student outcome. This utility value usually varies between 0 (dead) and 1 (full health). Teachers, school support staff, school leadership teams and others working in schools may not be familiar with the use of attributing a utility value to a given student outcome. However, practitioners with a health or social care remit, commissioners and providers of interventions and services for child social, emotional and mental wellbeing may be more likely to be familiar with utility values and, thus, the model adapts for each perspective.

With an educational perspective a simple cost-consequence model estimates the impact of student mental health and wellbeing interventions over a one-year time horizon. Cost-consequence analysis is a form of economic evaluation where disaggregated costs and a range of outcomes are presented to allow readers to form their own opinion on relevance and relative importance to their decision-making context. A descriptive table is then used to present the effectiveness results (student outcomes) in a disaggregated format, together with the estimates of the mean costs. The model extends to a cost benefit analysis, using the monetisation of QALYs, when a societal perspective is taken within the model. A cost benefit analysis (CBA) is a form of economic evaluation used to compare the costs and effects of alternative interventions. CBA measures both costs and effects of interventions in monetary terms. This involves placing a monetary value on health benefits. In line with current NICE recommendations a monetary value of £20,000 is assigned to each QALY gain. This value can be changed by the model user.

Costs in the model were separated into intervention costs and additional monetary values. Intervention costs are the costs associated with implementing the intervention in the given student setting (e.g. staff, resources). Additional monetary values are costs or savings which are estimated following the implementation of the intervention (e.g. savings of no longer needing the intervention currently in place or avoiding future student exclusion).

The NICE evidence review identified several studies to determine how effective interventions were on various student outcomes. Please refer to Appendix G of the evidence review for social, emotional and mental wellbeing in primary and secondary education for a full breakdown of the studies found in the evidence review. The measure of intervention effectiveness used in the economic evaluation model was the relative risk (RR). The RR value gives the probability of a student having an outcome after undergoing the intervention compared to a student not undergoing the intervention. In the model the RR value was used to determine the change in the number of students with an outcome after undergoing the intervention. That is, if the outcome studied was student behavioural skills, an RR value greater than 1 means that more students will have behavioural skills than if they did not undergo the intervention.

Economic modelling was undertaken to create a simplified representation of the impact of interventions on student social, emotional and mental wellbeing. Key inputs in the model include:

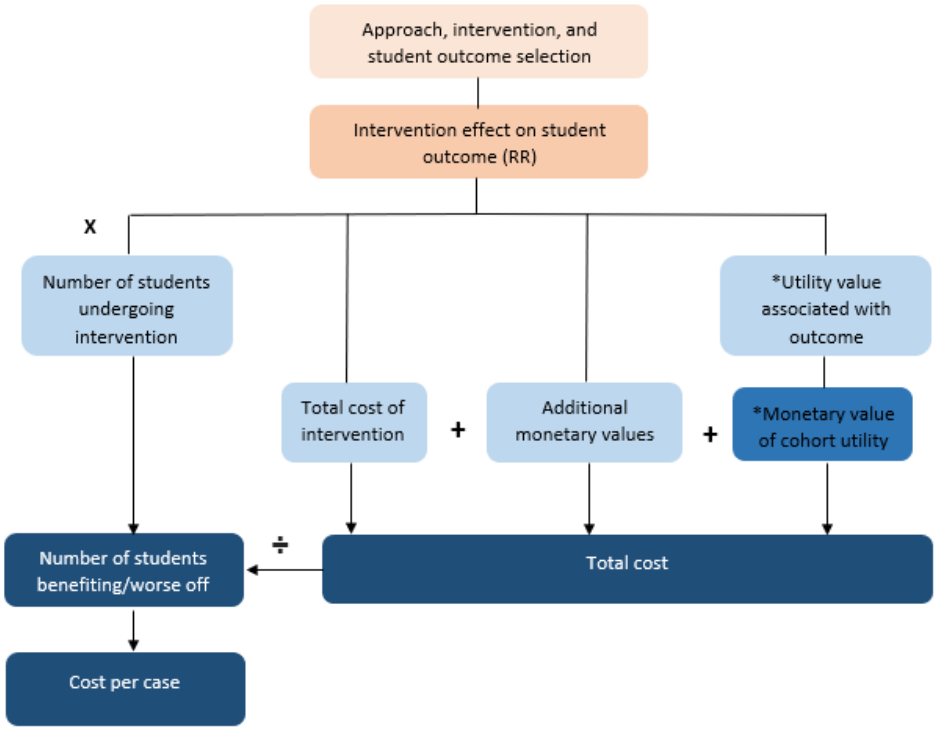
- Intervention cost
- Intervention effectiveness (RR)
- Additional monetary values
- Utility (Societal perspective only).

Key outputs of the model include:

- The number of students benefiting or worse off in a student outcome following an intervention
- The overall cost of implementing an intervention (including the monetisation of QALYs with a societal perspective)
- Cost per student case added, whereby ‘case’ refers to a change in the student outcome.

2.2 Model Structure

Figure 1: Model Structure



** = Only included in the model when a societal perspective is chosen*
Orange = inputs following NICE evidence review
Pale blue = user defined model inputs, medium blue = calculation, dark blue = key model results

The model structure is shown in Figure 1. The model user first selects the model perspective, 'educational' or 'societal'. Then, the approach, intervention, and student outcome to be studied is chosen from drop-down lists. The effectiveness of an intervention associated with the student outcome is then expressed in terms of the relative risk (RR) value. The total cost of the intervention and number of students undergoing the intervention are user defined.

A key output of the model is the number of students showing improvement/being worse off following the intervention, measured by a change in student outcome. This is calculated by multiplying the intervention-outcome RR value by the number of students undergoing the intervention. Total cost is also presented in the model. This is the sum of; total intervention cost, any additional costs gained or offset by introducing the intervention (additional monetary values) and, if a societal perspective is chosen, the monetary value of cohort utility. Finally, a cost per case of improvement/worsen is calculated by dividing the intervention cost by the number of students changing outcome. This is the cost of making one individual better or worse off following implementation of the intervention.

See Appendix A for further detail on model functionality.

2.3 Model Inputs

This section outlines the model inputs that are used to populate the economic model. The model is flexible, and all inputs can be user defined.

2.3.1 Intervention Effectiveness

Systematic reviews of the effectiveness evidence were conducted by NICE]. The results of these reviews were used to create a bank of intervention effectiveness data for a variety of student outcomes. A mix of standardised mean difference (SMD) and odds ratios (OR) were extracted as the measure of intervention effectiveness on student outcome. For the model, SMD and OR were converted into a relative risk (RR) which could then be used as a multiplier in the model to determine the number of students having an improved or worsened mental health and wellbeing outcome post-intervention. The conversion from SMD and OR to RR follow the method of Furukawa et al which assumes a normal distribution of the scales used to measure student outcomes [8]. Response is defined as a minimum percentage reduction *a%* from baseline score *b* to endpoint. If response rates are not indicated, they could be estimated by the imputation method which proposes a common raw response threshold *x* for the patients of the same arm, based on the mean of their baseline scores. For further information please refer to the cited paper. These thresholds are used in the model to determine the number of individuals with or without a mental health and wellbeing outcome.

The RR assumes that mental health and wellbeing outcomes are binary e.g. a pupil either has emotional distress or they do not. It compares the risk of an event (e.g. emotional distress) among the intervention group with the risk among the comparator group. A RR of 1.0 indicates identical risk among the two groups, a RR less than 1.0 indicates a decreased risk for the intervention group and a RR greater than 1.0 indicates an increased risk for the intervention group. For example, if 100 pupils partake in an intervention targeted to emotional distress with a RR of 0.9, then 10 students avoid emotional distress due to the intervention.

The interventions and outcomes included in the model for each approach (as described in section 1.2) are shown in Table 1-5. RR values are highlighted red where there is an estimated negative effect of an intervention on a student outcome. RR confidence intervals are also presented in the model. For confidence intervals that include 1 e.g. 0.92, 1.10, there will be more uncertainty to whether an intervention is offering an overall positive or negative effect on students. Confidence intervals are not used in the model calculations but provide a model user with a likely range in which the RR value could lie. Further details on the interventions included can be found in the NICE effectiveness reviews.

Table 1: Universal Approach

	Emotional distress	CI	Behavioural skills	CI	Social and emotional skills	CI		Emotional distress	CI	Behavioural skills	CI	Social and emotional skills	CI
Friends for Life	**1**	*[0.99, 1.01]*	**0.87**	*[0.76, 0.99]*			Op Volle Kracht	**0.94**	*[0.89, 1.00]*				
CBT	**1.13**	*[0.92,1.39]*					AOP	**1.06**	*[0.91, 1.23]*	**1.02**	*[0.99, 1.05]*		
FRIENDS	**1.01**	*[0.92, 1.10]*			**1**	*[0.95, 1.07]*	Mindfulness	**1.09**	*[1.00, 1.19]*				
Zippy's Friends			**1**	*[0.99, 1.01]*			HeadStrong	**1.07**	*[0.86, 1.34]*				
PATHS			**1.04**	*[0.92,1.19]*			MoodGYM	**2.05**	*[1.32, 3.16]*				
RAP	**0.89**	*[0.84, 0.94]*	**1.09**	*[0.90, 1.33]*	**0.94**	*[0.83, 1.07]*	Pozik Bizi	**1.19**	*[0.73, 1.93]*	**1.16**	*[1.02, 1.32]*		
LARS & LISA	**1.01**	*[0.92, 1.12]*					E-Couch	**0.96**	*[0.72, 1.28]*				
SPARX R	**1.24**	*[0.72, 2.13]*					E-GAD	**1.08**	*[0.84, 1.38]*				

Table 2: Universal Approach

	Emotional distress	CI	Behavioural skills	CI	Social and emotional skills	CI
MindOut	**1.38**	*[0.99, 1.92]*	**1.20**	*[1.08, 1.33]*	**1.08**	*[0.84, 1.38]*
Coping Power Universal	**1.33**	*[1.23, 1.44]*				
Taking Action Program	**0.98**	*[0.89, 1.08]*				
ThisWayUp	**1.19**	*[0.89, 1.59]*				
ITPFSA	**1.05**	*[0.98, 1.12]*				
StrongKids						
Yoga					**1.44**	*[0.54, 3.86]*
Working Things Out			**0.97**	*[0.88, 1.07]*	**0.95**	*[0.74, 1.22]*
Uplifting out health and wellbeing					**1.06**	*[0.81, 1.40]*

Table 3: Whole School Approach

	Behavioural skills	CI	Social and emotional skills	CI
Antibullying with curriculum	**0.91**	*[0.87, 0.95]*	**1.17**	*[0.86, 1.59]*
Antibullying without curriculum	**1**	*[1.00,1.00]*		

Table 4: Targeted approach

	Emotional distress	CI	Behavioural skills	CI	Self-esteem	CI	Prosocial behaviour skills	CI	Emotional distress – primary education	CI	Emotional distress – secondary education	CI	Behavioural skills- primary education	CI	Behavioural skills- secondary education	CI
MH group - specialist	1.16	*[1.00, 1.36]*	**1.08**	*[0.93, 1,26]*												
MH individual specialist	1.61	*[1.18, 2.20]*	**1.66**	*[1.10, 2.50]*	**1.43**	*[1.07, 1.91]*	**1.18**	*[1.01,1.37]*								
MH group – school staff	**0.97**	*[0.78, 1.21]*							1.01	*[0.73, 1.41]*	**0.88**	*[0.61, 1.27]*				
Computer based	2.5	*[1.33, 4.70]*														
SE group – school staff			**1.49**	*[0.95, 2.36]*												
SE group – specialist			**1.11**	*[0.77, 1.59]*									**1.08**	*[0.74, 1.58]*	**1.5**	*[0.41, 5.45]*
SE individual – school staff			**1.86**	*[0.33, 10.49]*												
SE individual – specialist not specified			**3.77**	*[0.95, 14.96]*												

Table 5: Transition Based Approach

	Emotional distress	CI	Behavioural skills	CI	Bullying perpetration	CI
Transition between schools	**1.02**	*[0.96, 1.09]*	**1.28**	*[0.71, 2.31]*	**0.98**	*[0.91, 1.05]*

2.3.2 Total Intervention Cost

The total cost of intervention should represent all costs associated with the setting up and running of the intervention e.g., staff time, rented space, worksheets, props. Given costing will vary across settings it was not possible to apply a specific cost to each intervention in the model. The evidence review provides specific study intervention cost per person. This information is reported in the individual evidence reviews produced by NICE [ref].

An example of total intervention cost breakdown for the FRIENDS intervention programme across 14 schools for both health- and school-led scenarios is shown in Table 6 [9]. This cost breakdown can be used as a guideline for decision makers.

Table 6: Example Total Cost of Intervention – FRIENDS intervention (2014 prices) [9]

Health-led FRIENDS (programme leaders are health professionals from outside the school) 14 schools 24 classes n = 509 children 21.21 children per class	**School-led FRIENDS (**programme leaders are teachers or members of the school staff with responsibility for delivering PSHE) 14 schools 25 classes n = 497 children 19.88 children per class
Leader training: leaders 6 health leaders 6 x 2 days (16 hours) Total 96 hours Hourly rate £12.47 Total £1,197	**Leader training: leaders** 25 school staff 25 x 2 days (16 hours) Total 400 hours Teacher hourly rate £28.93 [a] Total £11,572
Leader training: training Clinical psychologist and programme manager 2 days (16 hours) Hourly rate (£59 + £22.16) Total £1,299	**Leader training: training** Clinical psychologist and programme manager 2 days (16 hours) Hourly rate (£59 + £22.16) Total £1,299
Leader manual £159	**Leader manual** £625
Supervision of delivery 6 leaders x 13 sessions x 2.5 hours Attended supervision over three terms Total 195 hours	**Supervision of delivery** 25 school staff x 4 sessions x 2.5 hours Attend 4 sessions per delivery of

Hourly rate £12.47 Total £2,432 1 provider x 13 sessions x 2.5 hours Delivered supervision over 3 terms Total 32.5 hours Supervisor hourly rate £59[b] Total £1,918	FRIENDS Total 250 hours Teacher hourly rate £28.93 [a] Total £7,233 1 provider x 13 sessions x 2.5 hours Delivered supervision over 3 terms Total 32.5 hours Supervisor hourly rate £59 [b] Total £1,918
Supervision travel cost No additional travel cost Total £0	**Supervision travel cost** 25 teachers x 4 sessions x £22.50 round trip Total £2,250
Delivery **1) Teacher costs** No additional cost for supporting teacher Total £0 **2) Facilitator costs** 24 classes x 9 sessions x 2 leaders 2.5 hours per sessions Total 1,080 hours Hourly rate (trial records) £12.47 Total £13,468	**Delivery** **1) Teacher costs** Teacher needs 30 minutes of preparation time per session 25 classes x 9 sessions x 0.5 hours = 112.5 hours Teacher hourly rate £28.93 Total £3,225 **2) Facilitator costs** 25 classes x 9 sessions x 2 supporters (probably teaching assistant) 1 hour per session (no preparation) Total 450 hours Hourly rate (teaching assistant) £12.65 [c] Total £5,693
Travel 24 classes x 9 sessions x 2 leaders £22.50 per trip Total £9,720	**Travel** No cost, staff will be at the school
Children booklets 24 classes = 629 children £2,673	**Children booklets** 25 classes = 655 children £2,784
Total health-led cost = £32,866 **Inflated to 2020 prices [d] = £35,628**	**Total school-led cost = £36,629** **Inflated to 2020 prices [d] = £39,708**

[a] Average salary for a full-time qualified primary school teacher [source: Department for Education. School Workforce in England: November 2013. DfE, 10 April 2014. URL: www.gov.uk/government/statistics/school-workforce-in-englandnovember-2013 (accessed 25 September 2015)] divided by 1265 working hours (= 195 working days) per year (i.e. assumed same as full-time teachers) [source for working hours and days: Department for Education. School Teachers' Pay and Conditions Document 2013. DfE, 1 September 2013. URL: www.gov.uk/government/publications/schoolteachers-pay-and-conditions-2013 (accessed 25 September 2015)].

[b] Mean salary of a band 8A clinical psychologist. Gomes M, Grieve R, Nixon R, Edmunds WJ. Statistical methods for cost-effectiveness analyses that use data from cluster randomized trials: a systematic review and checklist for critical appraisal. Med Decis Making 2012;32:209–20. http://dx.doi.org/10.1177/0272989X11407341

[c] Approximate mid-point salary of £15,000 per year [source: National Careers Service. Job Profiles: Teaching Assistant. URL: https://nationalcareersservice.direct.gov.uk/advice/planning/jobprofiles/Pages/teachingassistant.aspx (accessed 25 September 2015)] divided by 1265 working hours (= 195 working days) per year (i.e. assumed same as full-time teachers).

[d] PSSRU Inflation Index 2020, NHSCII pay and prices

2.3.3 Additional Monetary Impact

There is an option within the model for the model user to include any additional monetary impact associated with the intervention. This is any additional costs gained or offset by introducing the intervention into a specific setting. Examples include:

- A cost *saved* due to no longer needing additional student support interventions in place.
- A cost *avoided* due to prevention of future action i.e. student exclusion or future staff training modules.

A cost saved is an immediate cashable cost which does not need to be implemented due to the intervention, while a cost avoided is an estimated future cost which does not need to be implemented due to the effect that the intervention has on individuals. Both costs saved and avoided can be included as additional monetary values.

Additional costs included in the model should consider the perspective of the model user. From an educational perspective the model user would want to include costs of moving students to another learning facility including admin, staff, resources etc. From a societal perspective, a model user may also have to think about not only the fees borne by the education sector but any indirect costs of the excluded student such as additional social care or hospitalisation cost estimation which lies outside the remit of the school environment.

2.3.4 Outcome Utility

In health economics, 'utility' is the measure of the preference or value that an individual or society gives a particular health state. It is generally a number between 0 (representing death) and 1 (perfect health). If a model user wishes to use utility in the model a societal perspective must be selected on the model set up page. This utility value should represent the change in utility expected (per individual) going from having an outcome (e. g. emotional distress) to no longer having this outcome. Utility values in this model are user-defined given the lack of evidence for utility values associated with the student outcomes used in the model. A utility point of reference page is included in the model with the aim to guide the model user to estimate a realistic utility value. There is also the option for the model user to define the number of years, and waning of utility over time, attributed to a utility change. Utility over time is discounted at 3.5% per year in line with current NICE recommendations. A monetary value of £20,000 is assigned to each QALY gain (also in line with NICE recommendations). It is important to note that with no evidence to inform utility estimation, there will be greater uncertainty in model results.

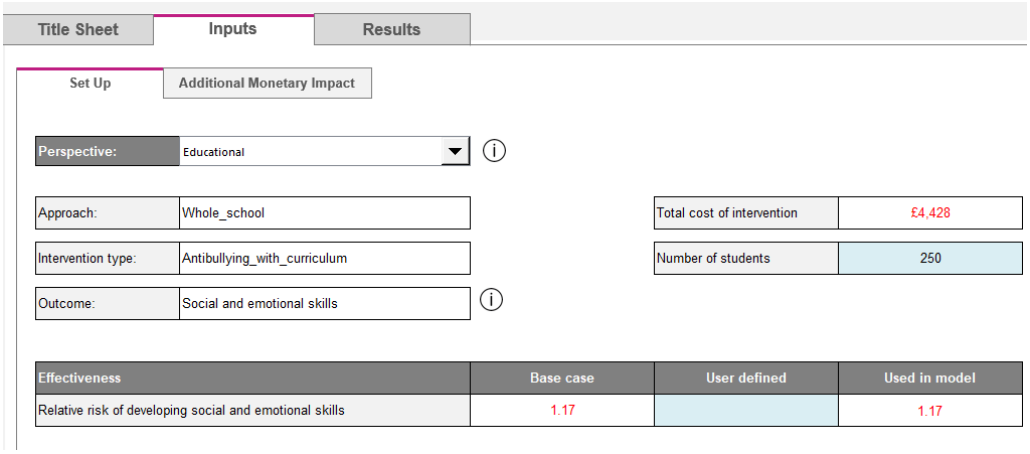
2.4 Worked Examples

Due to insufficient data to populate the model, only one worked example based on published figures was provided. Three further hypothetical scenario worked examples are also reported, the latter of which introduces the use of utility in the model. They are provided for illustrative purposes only. The data inputs used for each example are provided below.

2.4.1 Worked Example 1 – Whole school approach

'Antibullying with curriculum' and 'social and emotional skills' were the intervention and student outcome studied. This intervention-outcome combination had an RR value of 1.17. This RR value means the social and emotional skills are expected to increase for those individuals undergoing the intervention. The total cost of the intervention was set to £4,427.50 using KiVa intervention published cost per student of £17.71 (inflated to current prices) [see evidence reviews]. The number of students undergoing the intervention was set arbitrarily to 250. The model set up for this example is shown in Figure 2.

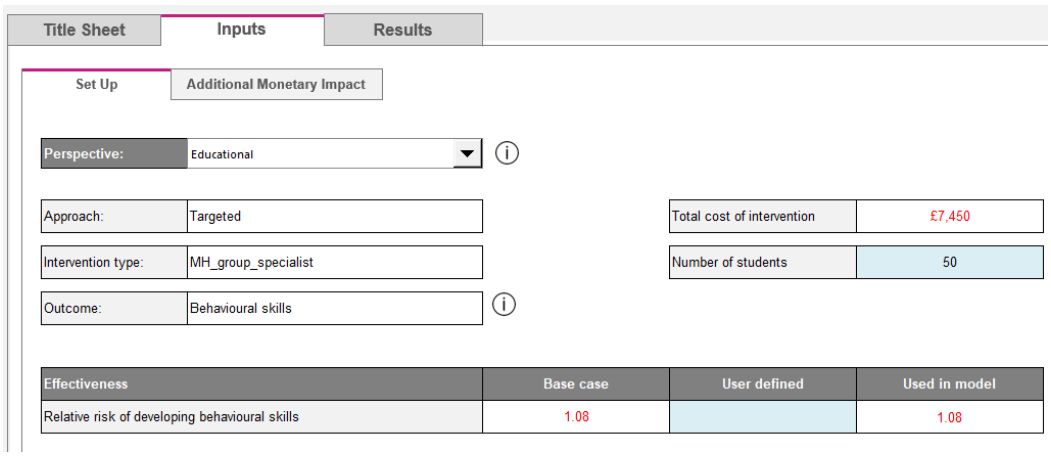
Figure 2: Worked Example 1 Inputs: Set Up



2.4.2 Worked Example 2 – Targeted approach

'Mental health, group-specialist' and 'behavioural skills' were the intervention and student outcome studied. This intervention-outcome combination had an RR value of 1.08. This RR value means self-esteem is expected to improve for those undergoing the intervention. The total cost of the intervention was set to £7,450 using the focussed PATHS intervention published cost per student of £149 (inflated to current prices) [see evidence reviews]. The number of students undergoing the intervention was set arbitrarily to 50 students. The model set up for this example is shown in Figure 3.

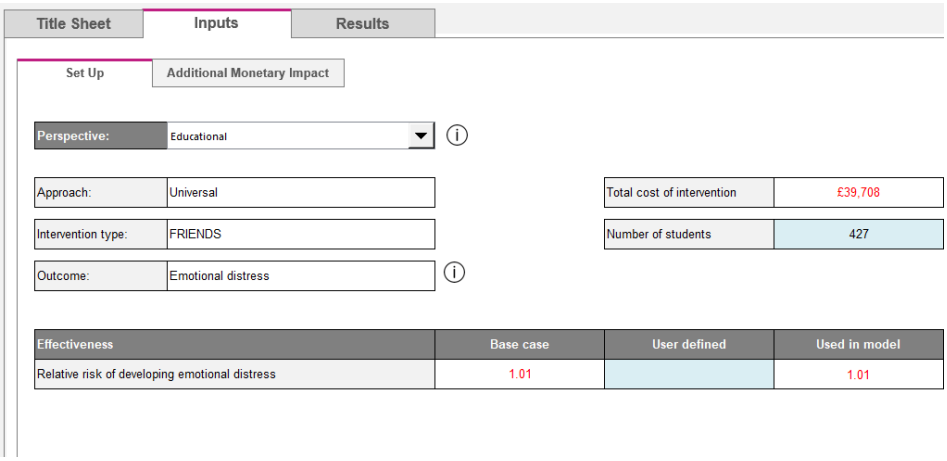
Figure 3: Worked Example 2 Inputs: Set Up



2.4.3 Worked Example 3 – Universal approach

FRIENDS under a universal approach and emotional distress were the intervention and student outcome studied. This intervention-outcome combination had an RR value of 1.01 [0.92, 1.10]. An RR value greater than 1 means that those undergoing the intervention were more likely to have emotional distress following the intervention. The total cost of the intervention and number of students undergoing the intervention were £39,708 and 427 students, based on the published figures [8] shown in Table 6. The model set up page using these inputs is shown in **Error! R eference source not found.**.

Figure 4: Worked Example 3 Inputs: Set Up



2.4.4 Worked Example 4 – Transition-based approach with utility

'Transition between schools' and 'bullying perpetration' were the intervention and student outcome studied. This intervention-outcome combination had an RR value of 0.98. This RR value means bullying perpetration is expected to reduce for those undergoing the intervention. A cost per student of £17.71, as seen using the KiVa intervention in Worked Example 1 (see section 2.4.1), was used since no cost of school transition was found in the evidence review. The total number of students was set arbitrarily to 200 students. An average change in utility value of 0.06 was used. This was informed by published utility values on bullying [14]. Therefore, a change in utility of 0.06 was assigned to a student with or without bullying perpetration (that is, bullying perpetration would lead to a 0.06 (absolute 6%) loss in health-related quality of life). The model set up and utility pages for this example are shown in Figure 5 and Figure 6.

Figure 5: Worked Example 4 Inputs: Set Up

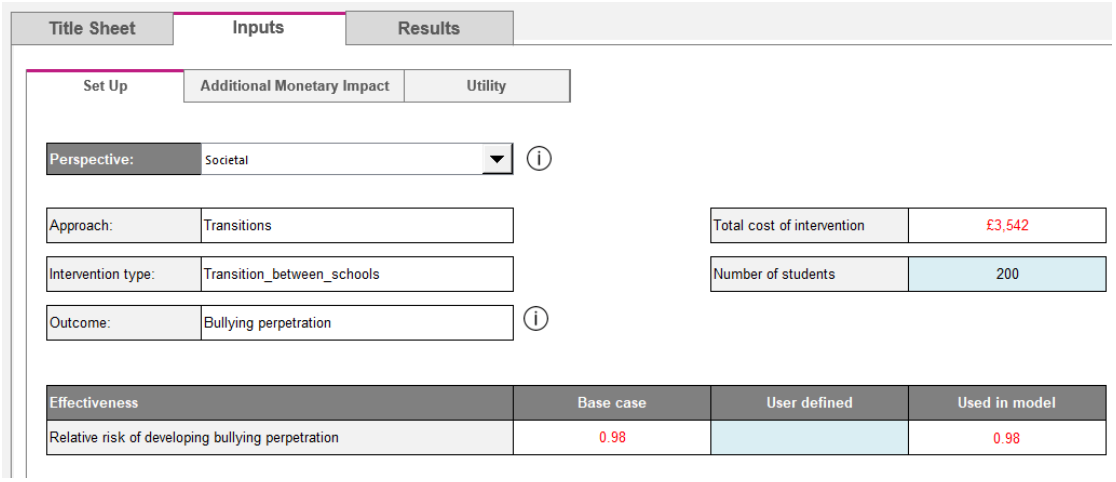
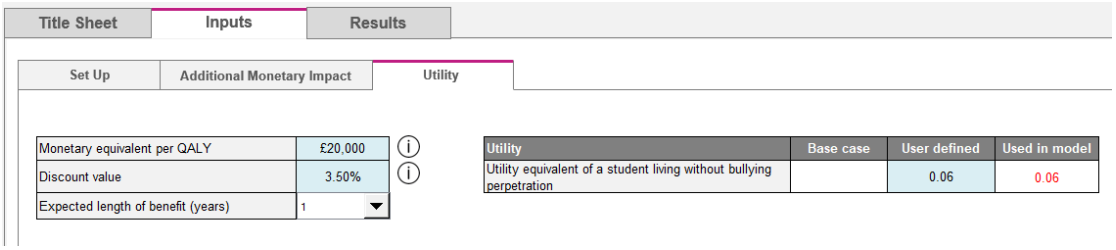


Figure 6: Worked Example 4 Inputs: Utility



3 Results

3.1 Worked Examples

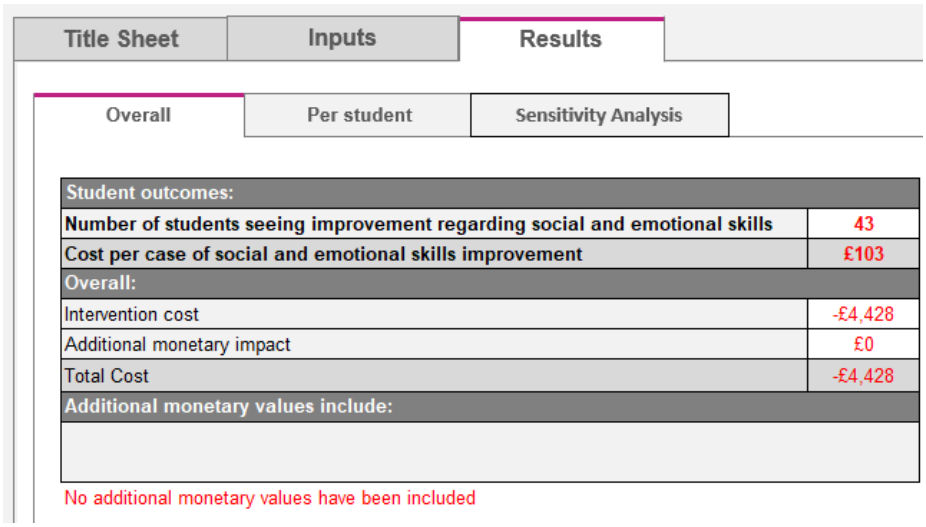
The following values were used in the case study analysis (as per Section 2.4):

3.1.1 Worked example 1: Whole school approach

- Total intervention cost: £4,427.50
- Number of students undergoing intervention: 250
- Intervention: Antibullying with curriculum
- Student outcome studied: Social and emotional skills
- Relative risk (RR) = 1.17

A RR of 1.17 means that following the intervention individuals are more likely to have social and emotional skills. For example, if the social and emotional skills RR of an intervention was 1.17 and 100 students underwent the intervention 17 students (100 x [1.17-1]) would see an improvement in social and emotional skills above the threshold. The analysis of the worked example suggests the antibullying with curriculum intervention would increase social and emotional skills of individuals compared to no intervention. It is estimated that 43 pupils out of the 250 will exhibit increased social and emotional skills due to the intervention at a cost per pupil of social and emotional skills improved of £103. The results page from the model is showed in Figure 7.

Figure 7: Worked Example 1: Results

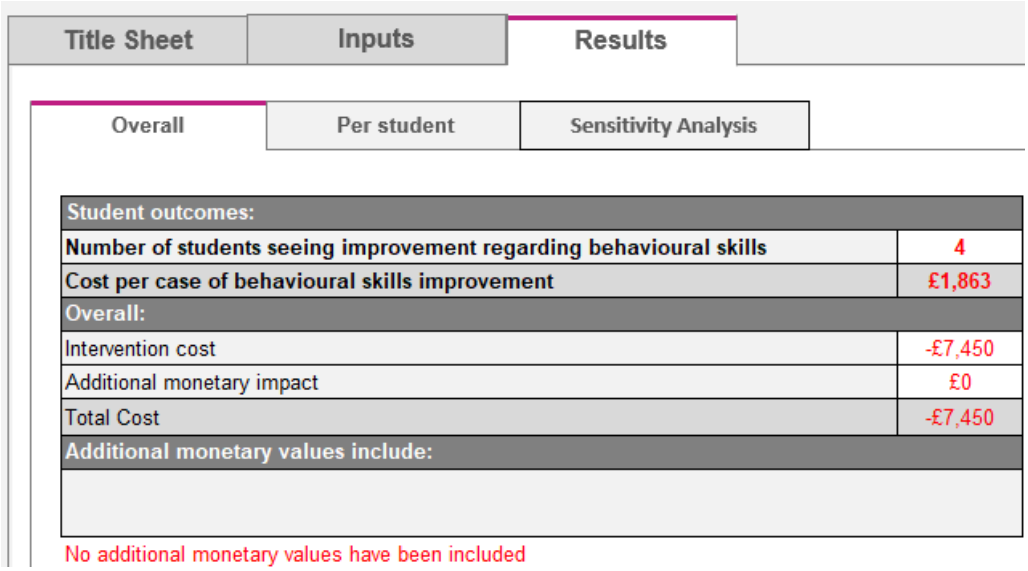


3.1.2 Worked example 2: Targeted approach

- Total intervention cost: £7,450
- Number of students undergoing intervention: 50
- Intervention: Mental health, group-specialist
- Student outcome studied: behavioural skills
- Relative risk (RR) = 1.08

A RR of 1.08 means that following the intervention individuals are more likely to have improved behavioural skills. For example, if the behavioural skills RR of an intervention was 1.08 and 100 students underwent the intervention 8 students (100 x [1.08-1]) would see an improvement in behavioural skills above the threshold. The analysis of the worked example suggests mental health group-specialist intervention would increase the behavioural skills of individuals compared to no intervention. It is estimated that 4 pupils out of the 50 will exhibit increased behavioural skills due to the intervention at a cost per pupil of behavioural skills improvement of £1,863. The results page from the model is showed in Figure 8.

Figure 8: Worked Example 2: Results



3.1.3 Worked example 3: Universal approach

- Total intervention cost: £39,708
- Number of students undergoing intervention: 427
- Intervention: FRIENDS
- Student outcome studied: Emotional distress
- Relative risk (RR) = 1.01

A RR of 1.01 means that following the intervention individuals are more likely to have emotional distress. For example, if the emotional distress RR of an intervention was 1.01 and 100 students underwent the intervention 1 student (100 x [1.01-1]) would see a worsening in emotional distress as determined by the threshold used. An RR of 1 would mean there is likely no difference between undergoing the intervention or not with respect to student emotional distress. The analysis of the worked example suggests the FRIENDS intervention would increase emotional distress compared to no intervention. It is estimated that 4 pupils out of the 427 will exhibit increased emotional distress due to the intervention at a cost per pupil with emotional distress increase of £9,927. The results page from the model is showed in Figure 9.

Figure 9: Worked Example 3: Results

Student outcomes:	
Number of students with worsening emotional distress	4
Cost per case of emotional distress worsen	£9,927
Overall:	
Intervention cost	-£39,708
Additional monetary impact	£0
Total Cost	-£39,708
Additional monetary values include:	

No additional monetary values have been included

3.1.4 Worked example 4: Transitions-based approach

- Total intervention cost: £3,542
- Number of students undergoing intervention: 200
- Intervention: Transition between schools
- Student outcome studied: Bullying perpetration
- Relative risk (RR): 0.98
- Utility value assigned to bullying perpetration: 0.06
- Length of utility benefit: 1 year

The results show that the intervention would be not offer a monetary benefit. 4 students are estimated to reduce acts of bullying. The monetary value assigned to this ([4 x 0.06] x cost per QALY of £20,000 = £4,800) offsets the cost of the intervention 3,542) resulting in a positive net benefit of £1,258. The results page from

the model is shown in Figure 10 and the graphical output is shown in Figure 11. The model also provides a per student graph on the model results worksheet (not shown).

Figure 10: Worked Example 4: Results

Title Sheet | Inputs | Results

Overall | Per student | Sensitivity Analysis

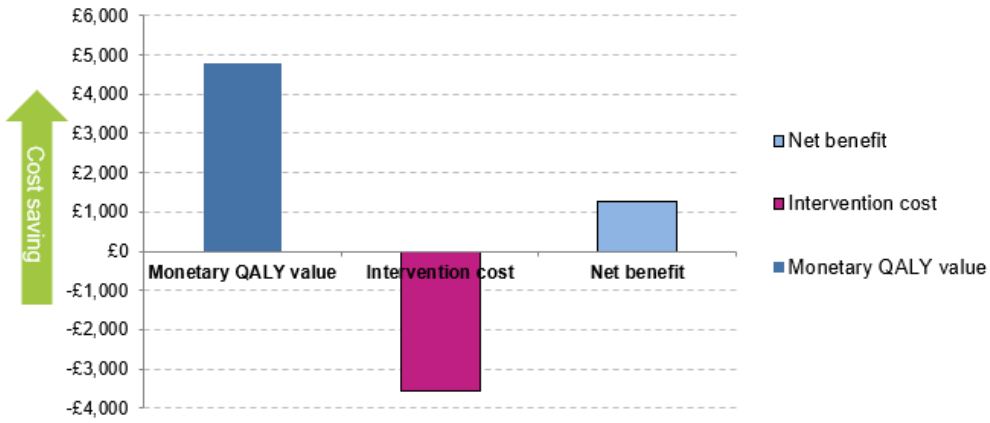
Student outcomes:	
Number of students seeing improvement regarding bullying perpetration	4
Cost per case of bullying perpetration improvement	£886

Overall:	
Intervention cost	-£3,542
Additional monetary impact	£0
Monetary QALY value	£4,800
Net benefit	£1,258

Additional monetary values include:

No additional monetary values have been included

Figure 11: Worked Example 4: Results Graph



3.2 Sensitivity Analysis

One-way sensitivity analysis allows the model user to see how the monetary benefit changes when the value of an input changes. It enables a model user to see at what value a model input (intervention cost, number of students, utility value, RR value) would need to be for the intervention to offer a positive monetary benefit. Each input variable is varied independently assuming all other input variables remain the same.

3.2.1 Worked example 1: Whole school approach

The relative risk of the antibullying with curriculum intervention on social and emotional skills is 1.17 which means for 250 students, 43 show an improvement in social and emotional skills following the intervention. There is a cost per pupil of social and emotional skills improved of £103. As the intervention cost increases so does the cost per pupil of social and emotional skills improved as the number of students undergoing the intervention and the intervention RR is held constant. Figure 15 shows how the cost per pupil of increased social and emotional skills changes with respect to total intervention cost.

Figure 12: Worked example 1 sensitivity analysis - Intervention cost

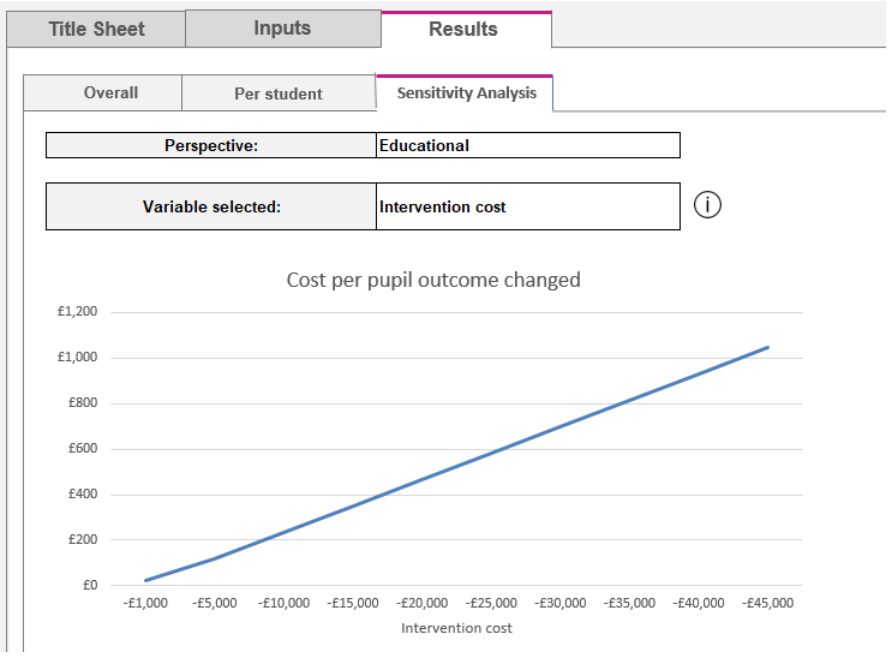


Figure 13 shows that as the number of students undergoing the intervention increases the cost per pupil improvement in social and emotional skills decreases. This means there is a lower cost per individual for seeing an improvement in social and emotional skills.

Figure 13: Worked example 1 sensitivity analysis – Number of students

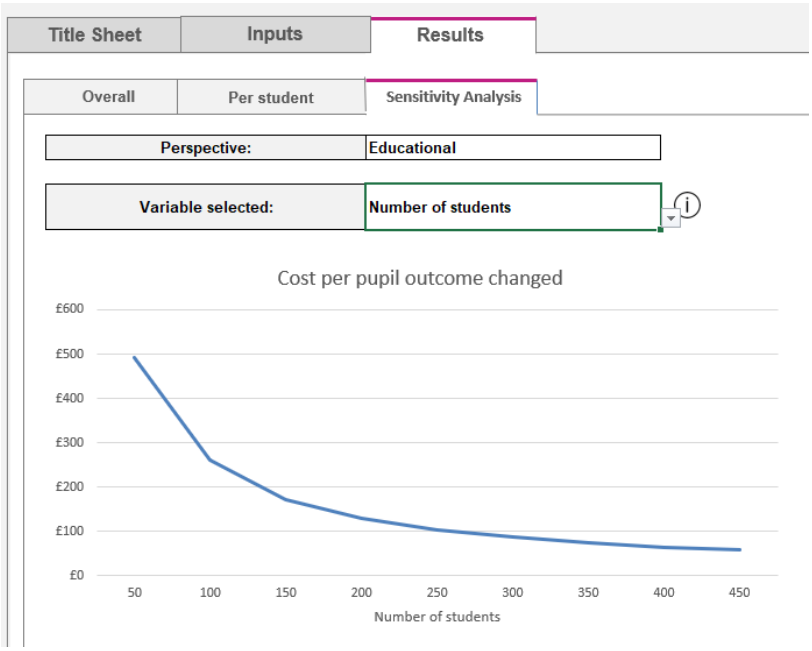
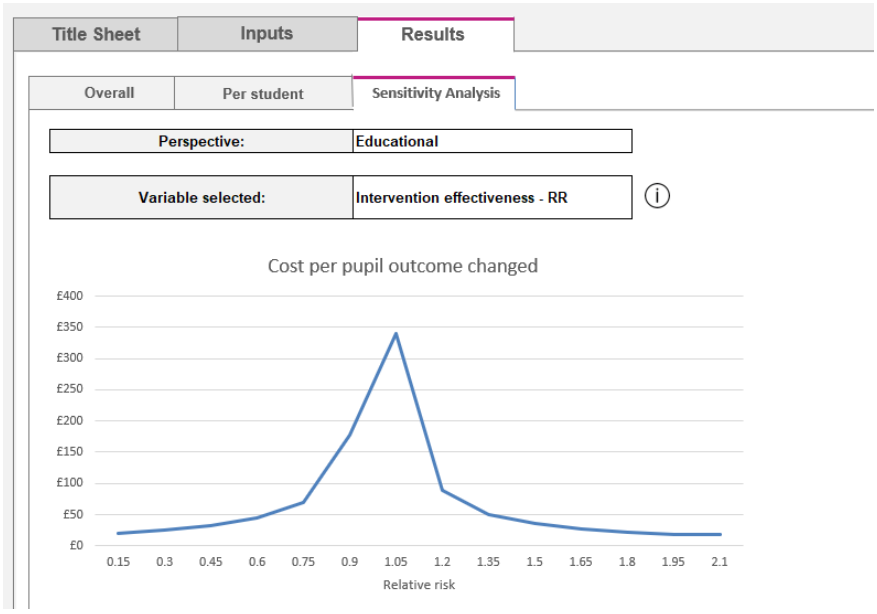


Figure 14 shows the impact on cost per pupil seeing an improvement in social and emotional skills. Note, as the RR moves from above to below 1 there is an estimated reduction in social and emotional skills for students undergoing the intervention. Therefore, with an RR below 1 the diagram shows the cost per pupil of decreased social and emotional skills opposed to the cost per pupil of increased social and emotional skills as seen in the original model result with a RR of 1.17.

Figure 14: Worked example 1 sensitivity analysis – Relative risk



3.2.2 Worked example 2: Targeted approach

The relative risk of the mental health – group, specialist intervention on behavioural skills is 1.08 which means for 50 students, 4 show an improvement in their behavioural skills following the intervention. There is a cost per pupil with behavioural skills improved of £1,863. As the intervention cost increases so does the cost per pupil of behavioural skills improved as the number of students undergoing the intervention and the intervention RR is held constant. Figure 15 shows how the cost per pupil of increased behavioural skills change with respect to total intervention cost.

Figure 15: Worked example 2 sensitivity analysis - Intervention cost

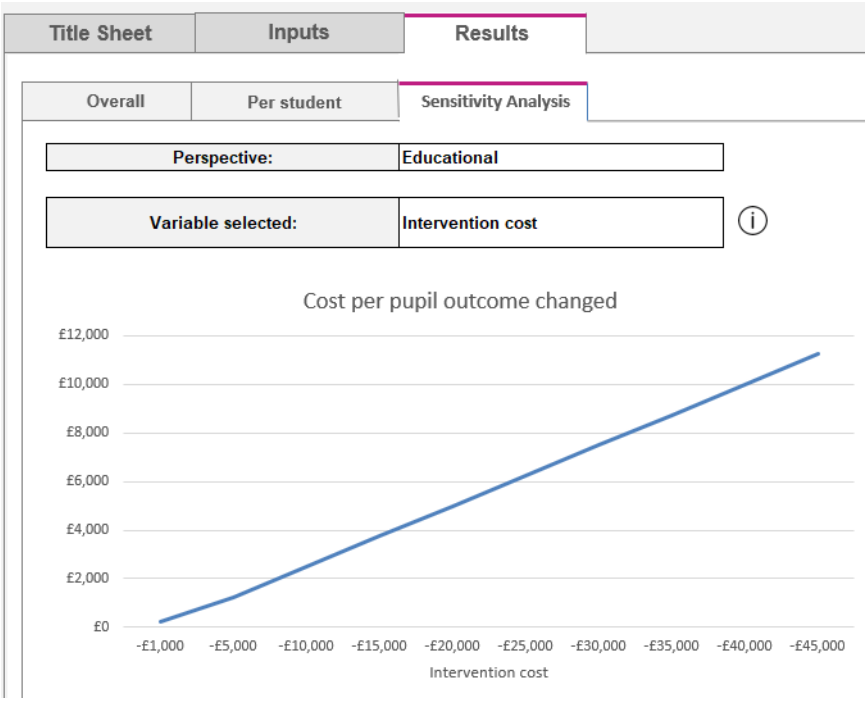


Figure 16 shows that as the number of students undergoing the intervention increases the cost per pupil improvement in behavioural skills decreases. This means there is a lower cost per individual for seeing an improvement in an individuals behavioural skills.

Figure 16: Worked example 2 sensitivity analysis – Number of students

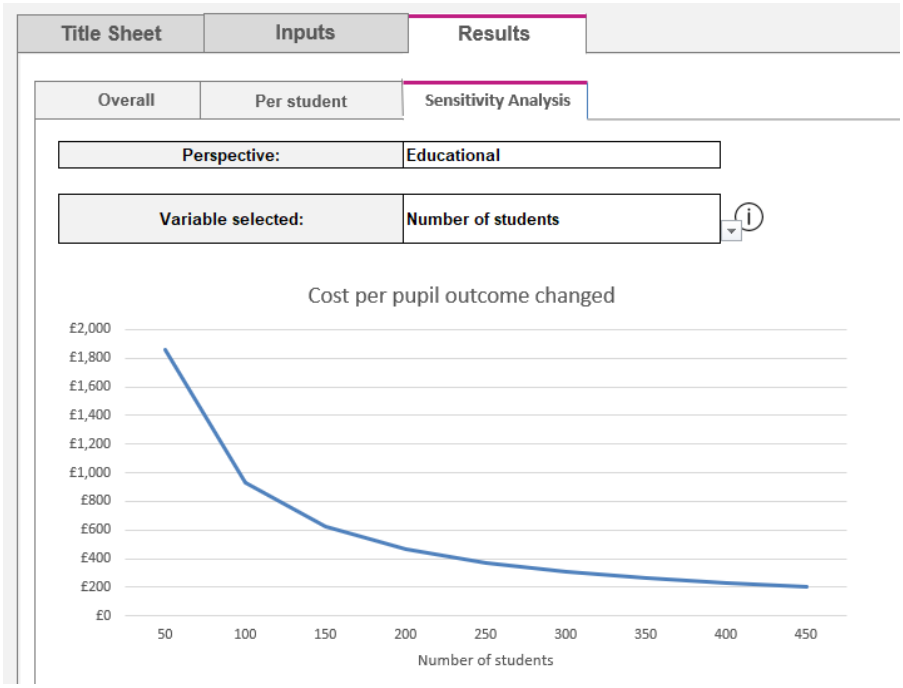
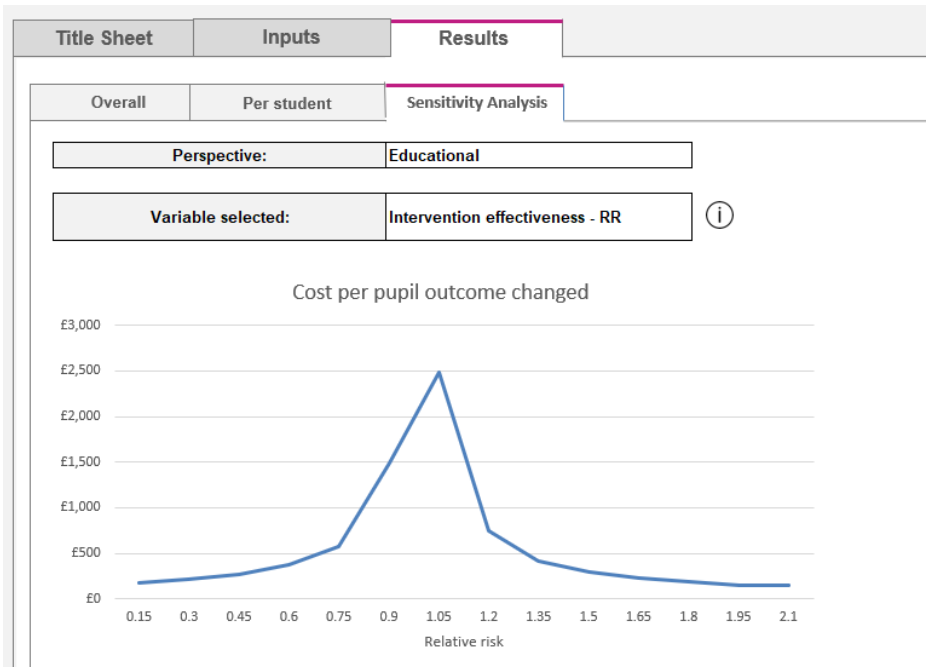


Figure 17 shows the impact on cost per pupil seeing an improvement in behavioural skills. Note, as the RR moves from above to below 1 there is an estimated reduction in behavioural skills for students undergoing the intervention. Therefore, with an RR below 1 the diagram shows the cost per pupil of decreased behavioural skills opposed to the cost per pupil of increased behavioural skills as seen in the original model result with RR of 1.08.

Figure 17: Worked example 2 sensitivity analysis – Relative risk



3.2.3 Worked example 3: Universal approach

The relative risk of the FRIENDS intervention on emotional distress is 1.01 which means for 427 students, 4 show an increase in emotional distress following the intervention. There is a cost per pupil with emotional distress increase of £9,157. Since the intervention is estimated to have a negative impact on student emotional distress there will always be a negative impact for any range of cost of intervention or number of students. Seen in Figure 18 and Figure 19.

Figure 18: Worked example 3 sensitivity analysis - Intervention cost

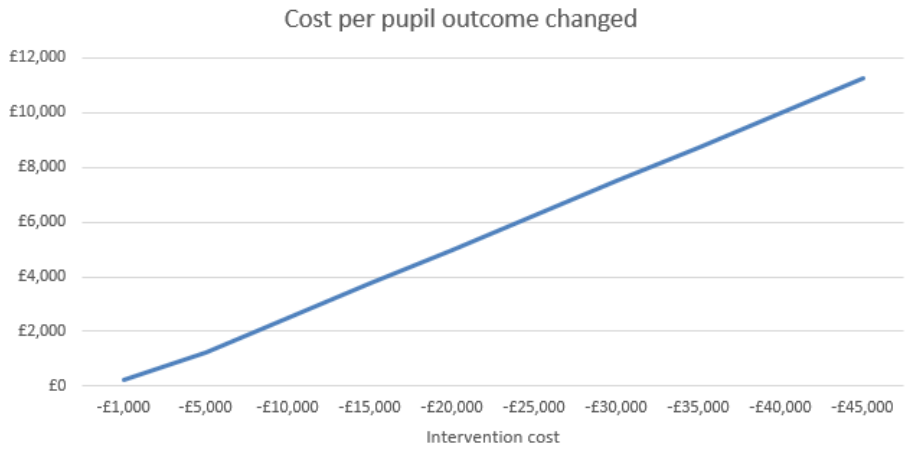


Figure 19: Worked example 3 sensitivity analysis – Number of students

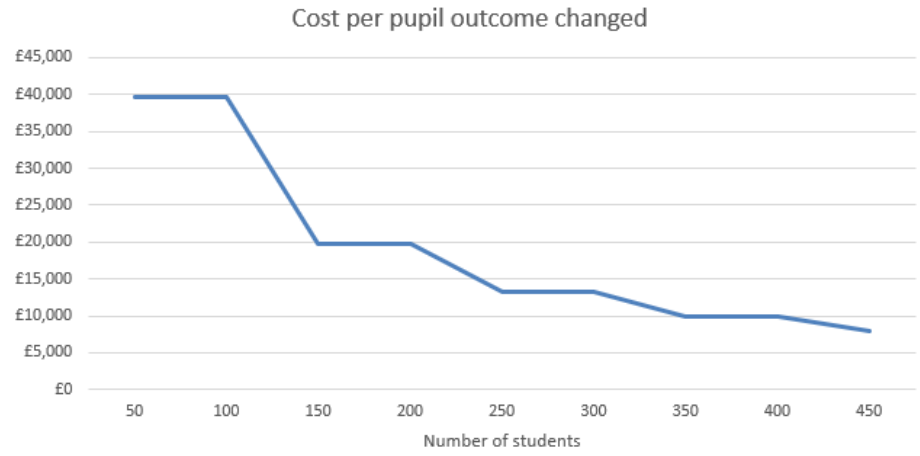
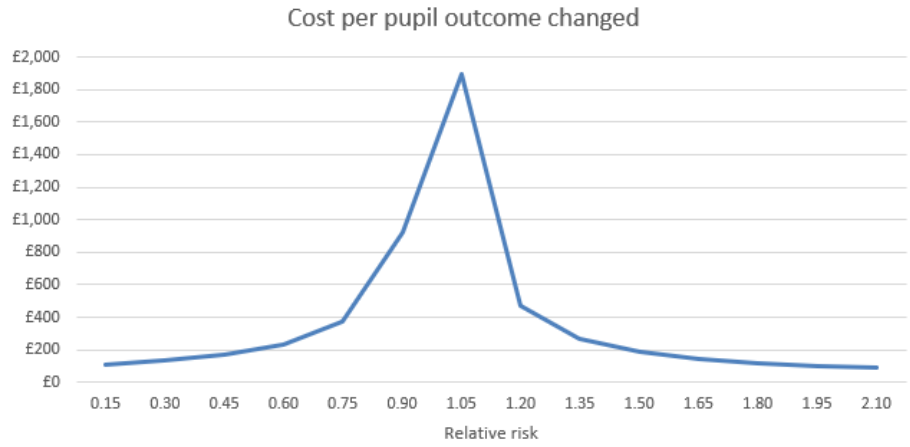


Figure 20 shows the impact on cost per pupil seeing a worsening in their emotional distress. Note, as the RR moves from above to below 1 there is an estimated reduction in emotional distress for students undergoing the intervention. Therefore, with an RR below 1 the diagram will show the cost per pupil of reduced emotional distress opposed to the cost per pupil of increased emotional distress as seen in the original model result with RR of 1.01.

Figure 20: Worked example 3 sensitivity analysis – Relative risk



3.2.4 Worked example 4: Transition-based approach

The relative risk of the transition between schools' intervention on bullying perpetration is 0.98 which means for an arbitrary 200 students, 4 show a reduction in bullying. This reduction in bullying is estimated to be equivalent to £4,800 when using a utility gain of 0.06 and cost per QALY of £20,000. Therefore, unless the intervention cost is higher than £4,800, the intervention net benefit remains positive as seen in Figure 21.

Figure 21: Worked example 4 sensitivity analysis - Intervention cost

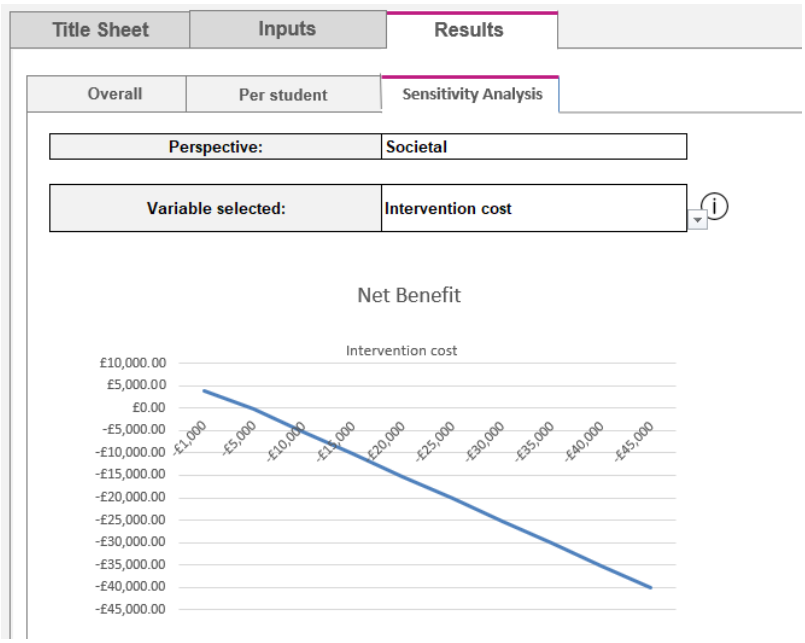
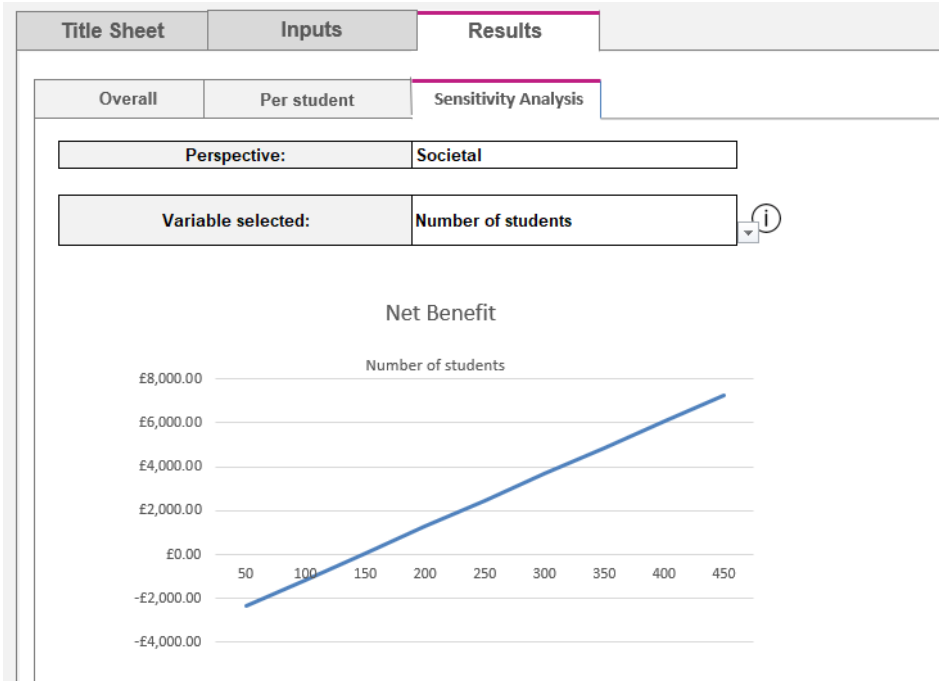


Figure 22 shows that as the number of students undergoing the intervention (transitions between schools) increases so does the net benefit, this is because the cost, RR of the intervention and utility assigned to reduction in bullying is held constant while the intervention is estimated to reduce bullying.

Figure 22: Worked example 4 sensitivity analysis – Number of students

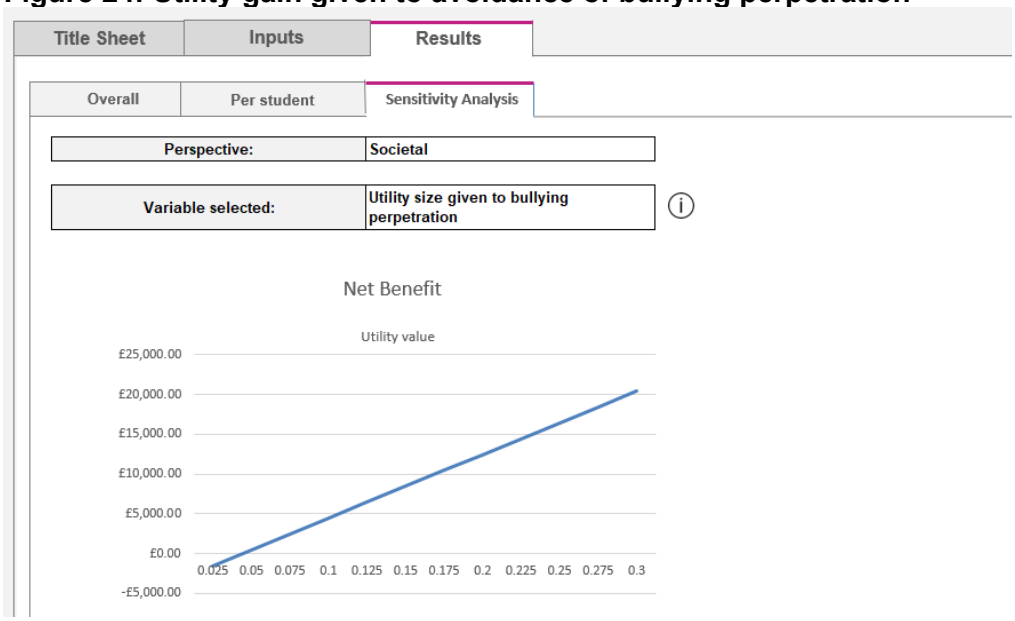


When varying the RR value (intervention effectiveness) attributed to the transition between school intervention on bullying perpetration there is an increase in net benefit for RR values below 1 and a decrease in net benefit for RR values above 1 (Figure 23).

Figure 23: **Worked example 4 sensitivity analysis – Relative risk**

There is an increase in net benefit as the utility value attributed to a change in bullying perpetration increases, negative net benefit is shown when utility gained from bullying perpetration avoided goes below 0.0442 (Figure 24). If the utility per student gained from a reduction in bullying perpetration was at 0.0442 this would mean overall utility would be 0.177 (0.0442 x 4 students) with a monetary value of around £3542 (0.177 x £20,000 cost per QALY). Since the intervention cost is set at £3542, any decreases in utility per person below 0.0442 will result in an overall negative net benefit.

Figure 24: Utility gain given to avoidance of bullying perpetration



4 Discussion

The review of evidence indicates that school interventions promoting social and emotional wellbeing in primary and secondary education are likely to influence a range of outcomes. The large range of interventions on offer and the circumstances in which an intervention is implemented make it difficult to draw robust conclusions regarding the effectiveness of an intervention and the economic impact.

The worked examples demonstrate that results can vary for different student outcomes, interventions and settings and generalising the results is difficult. The model calculates the expected student outcome changes following an intervention, but it does not tell decision makers what they should do. Further, it is important to recognise that a range of factors will affect the cost-effectiveness of interventions in practice. For example, a student's personal and family life, the quality of the staff supporting the intervention, the way the intervention is delivered or the structure of the educational institution.

4.1 Model Limitations

The key limitations of model are:

- The lack of evidence to link to longer term outcomes i.e., over a student's lifetime. Hence, the focus of the model is on short term outcomes. This means that using a one-year model time horizon could likely underestimate the true benefits of an intervention on a student outcome and underestimate a potential decline in student wellbeing if no intervention was in place.
- The lack of evidence on utility values associated with evidence review student outcomes. Hence, these will need to be estimated instead by the model user with support from the model utility point of reference guide. This limitation could bias the results in either direction i.e., a model user might apply a utility at the top or bottom 'end' of the gain, rather than the real average.
- The effectiveness values extracted from the evidence review are from *studies* of interventions rather directly from the interventions themselves. It is important to be aware that each study comes with its own limitations. For limitations of study effectiveness data please refer to corresponding evidence reviews.
- Most RR values were converted from standardised mean difference (SMD) values found in the evidence reviews. This involves the dichotomisation of continuous variables above and below a determined threshold specific to the outcome scale used in the study. Using a threshold to determine whether a pupil has an outcome or not is oversimplistic.
- Conversion from SMD to RR was only possible where outcome scales have a pre-determined threshold to define the normal range. Many of the scales used are not designed to do this. For example the Strengths and Difficulties

Questionnaire score can be categorised in normal, borderline and abnormal. This means that some studies were left out of the analysis.

- If students do not move across this threshold value this does not mean they have not seen any benefit in their mental health and wellbeing. A student can see an improvement in their mental health and wellbeing but not enough to cross over the threshold. This is a major limitation of the model as we assume if a student is not crossing over the threshold, they are seeing no change in outcome.
- Several RR 95% confidence intervals overlap 1. Therefore, it is not known for certain whether an intervention will have a significant impact on student outcome.
- There are some interventions that make students better off in one outcome while worse-off in another. For example, the universal intervention RAP is estimated to increase the behavioural skills of students (RR=1.09) while worsening social and emotional skills (RR=0.94) compared to no intervention. There is not available evidence to know the combined effect of an intervention across student outcomes. The model acts as a guide for model users but does not make recommendations on which outcomes are considered of greater importance.
- The model focuses on the interventions and outcomes identified through the NICE evidence reviews. Therefore, the model does not explore whether the intervention funding could be better spent elsewhere.

4.2 Concluding Remarks and Future Work

Implementing mental health and wellbeing interventions at school can have wider ramifications across society. This could include benefits to the health care system and local authorities. Taking self-esteem as an example, children and young people with low self-esteem are more at risk of developing depression, anxiety, self-harming and other mental health problems [10]. Implementation of interventions across schools may also represent an improvement in the culture relating to mental health and wellbeing at school and demonstrate an environment where students feel more comfortable seeking help without judgement from their peers or family. These factors are not quantified in the model due to the lack of reliable data to capture these benefits. It is recognised that early intervention into the mental health and wellbeing of children and young people can lead to greater benefits to society in the future [11,12]. In the Timpson Review of School Exclusions the view of local authorities is that "*the cost to the public purse was and continues to be disproportionate to what early intervention with the pupil/family would have cost*" [13].

The economic model is designed to be as flexible as possible. The aim is to provide a simple, user-friendly calculator to allow organisations to insert their own specific model inputs. Some of these input values are likely to be estimates and, as such,

inbuilt sensitivity analysis has been included into the model so that users can see how changes in their inputs will affect their results.

It is impossible – and unwise – to draw broad conclusions from the scenarios documented in this report due to substantial variability in the interventions available and heterogeneity across schools. However, it is recommended that decision makers make use of the model to understand the potential economic and wellbeing implications when considering the introduction of a new intervention in school and help identify any gaps in current research. Therefore, more accurately guiding future research with the aim of improving the mental health and wellbeing of children and young people.

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Appendices

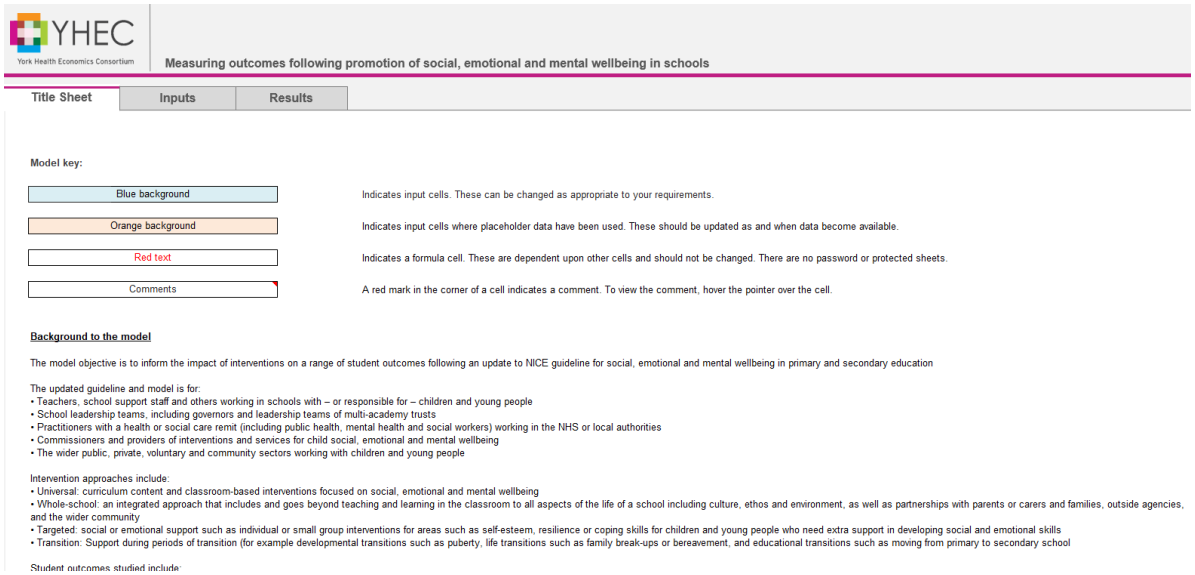
Appendix A – Model User Guide

This user guide is intended to support the use of a cost-calculator to aid decision making relating to social, emotional and mental wellbeing at school.

Title Sheet

The title sheet, shown in Figure A.1, contains a description of the model and brief instructions on model use.

Figure A.1: Model title sheet



Inputs

The model set up sheet is shown in Figure A.2. The user can replace input variables with their own values in cells with a blue background. The results will automatically update. It is recommended that the user enters their own data to ensure the most realistic results are generated. Model perspective, total cost of the intervention and number of students undergoing the intervention is user defined. To input the intervention cost the 'Go to intervention cost breakdown table' button should be selected and a cost breakdown box will appear. The model user can either input intervention cost variables separately i.e. Staff, hourly rate, travel costs, resources, or insert a total user defined intervention cost. Once costs have been inputted the model user can go back to the set-up page.

The user can select from three drop down lists to select the approach, intervention, and outcome to be studied. Note: outcomes labelled 'X – Outcome' do not have any evidence relating to the selected intervention, therefore, if this outcome and intervention combination wish to be studied the RR value must be user defined. With available evidence found in the NICE evidence review, an RR value, representing effectiveness of the intervention on the outcome, is stated in the effectiveness table. This table also has a user-defined option. The

model user can click on the button to see the effectiveness values for all approach, intervention, and outcomes alongside the confidence intervals of each RR value. This is shown in Figure A.3. These RR values are the underlying evidence used to populate the effectiveness table on the set-up page.

Figure A.2: Model Set Up

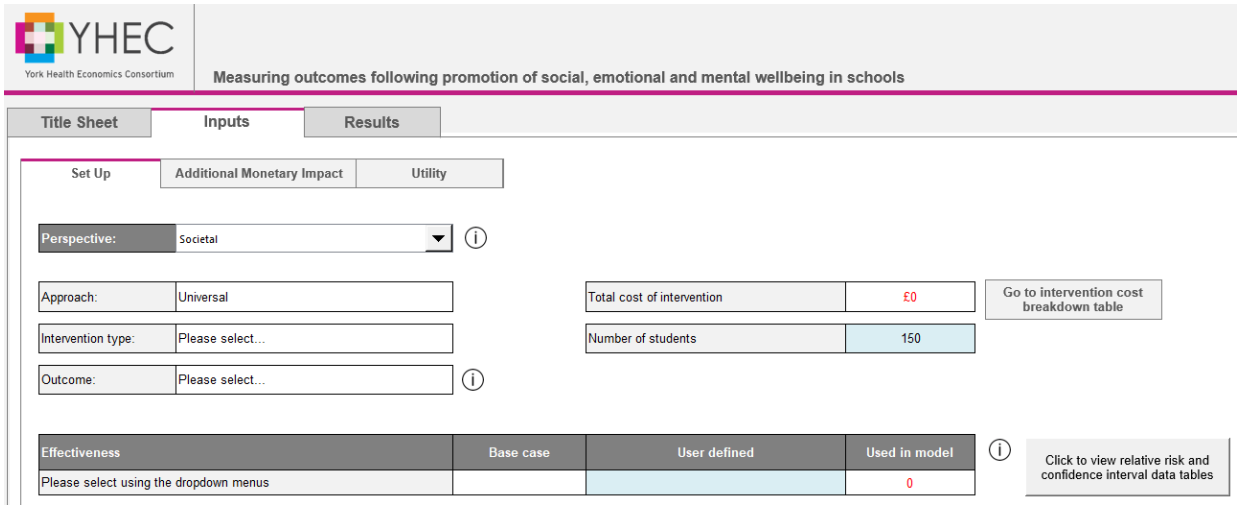


Figure A.3: RR Tables

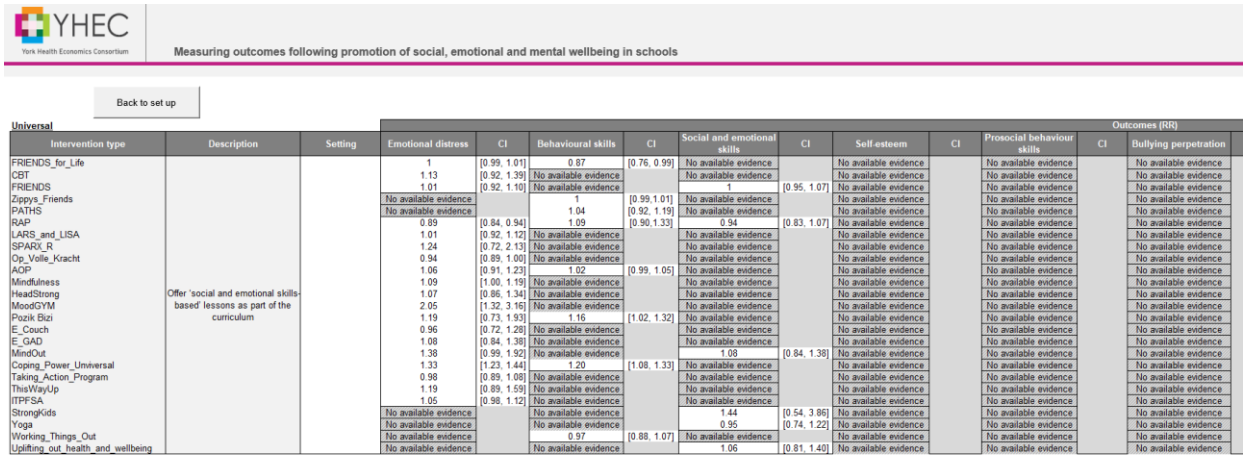
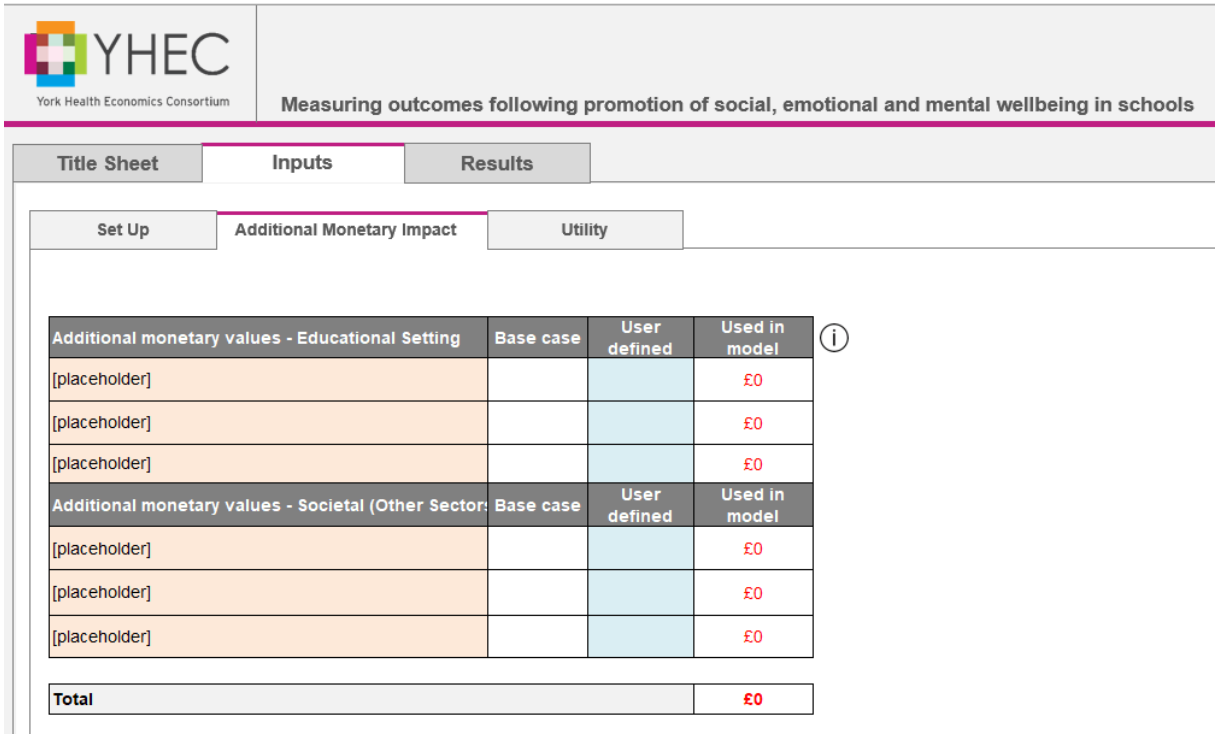


Figure A.4: Additional Monetary Impact



Additional monetary impact is an optional input for the model user. This is shown in Figure A.4. This additional impact section is designed to encapsulate any costs attributed to the intervention or the improvement of student outcomes which is not included in total cost on the set-up page or student utility under the societal perspective. Additional monetary impacts could be the cost saving of not having to run an existing intervention or health care cost savings related to a change in student outcomes. There is no direct evidence in the model relating intervention-outcome selection to additional monetary impact values, therefore, this section relies on user defined input alone and can be specific to each scenario and model user.

Figure A.5: Utility (Societal Perspective)

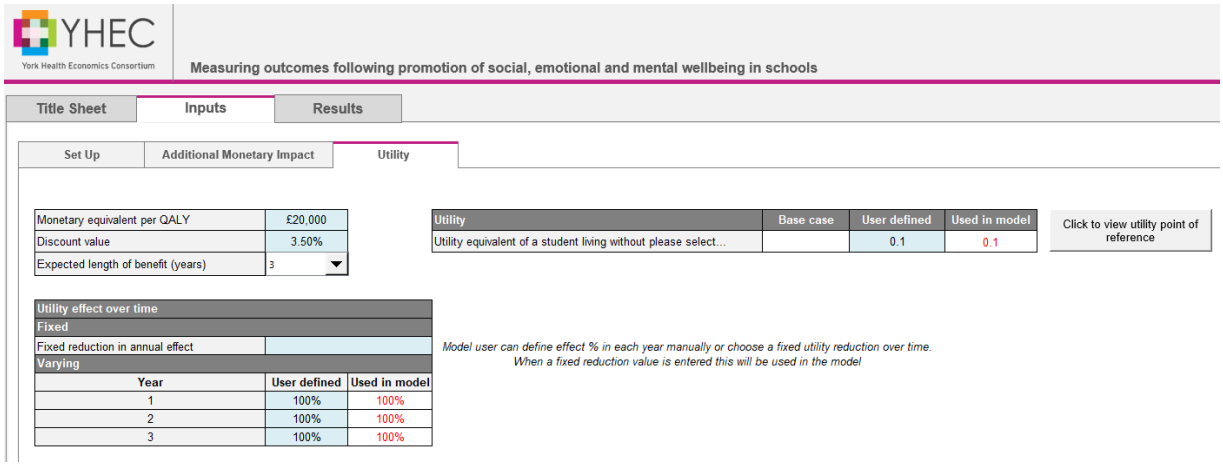
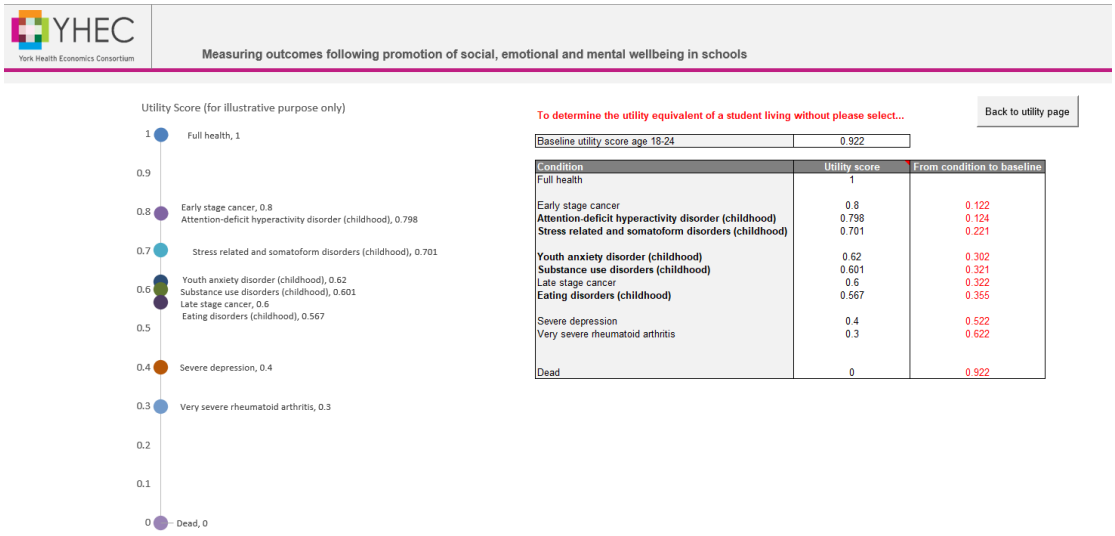


Figure A.6: Utility Point of Reference



The utility input and utility point of reference sheets are shown in Figures A.5-A.6. Utility is user defined. Given the difficulty in accurate estimation of outcome attributed utility value the point of reference sheet is to aid with this estimation by providing change in utility for several other health conditions both mental and physical. This is shown both in table and graphical format. Relating to utility, base case monetary equivalent per QALY and discount values are presented. These follow current NICE recommendations but can be changed if required. Finally, if the model user believes the intervention effect will last over several years the model is flexbile to include this with a defined effectiveness waning. Following the evidence review intervention effect on student outcomes did not tend to extend beyond a one year time horizon, therefore, the recommendation is to keep length of benefit at one year, unless sufficient evidence becomes available.

Results

The overall results sheet is shown in Figure A.7. The costs are broken down into intervention cost, additional monetary impact and monetary QALY value. Net benefit is a sum of these components. A cost per case value is also presented in the summary table which is a sum of the intervention cost and additional monetary impact divided by the number of students benefitting/worse off from the intervention. A text box provides a summary of any additional monetary values if included. A model user can also view a per student breakdown of results, shown in Figure A.8.

Figure A.7: Results – Overall

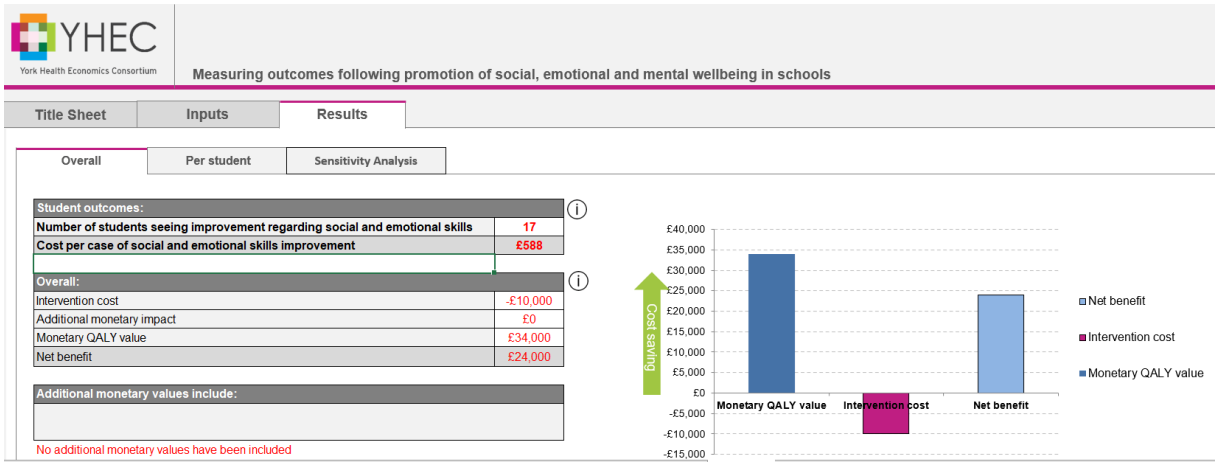
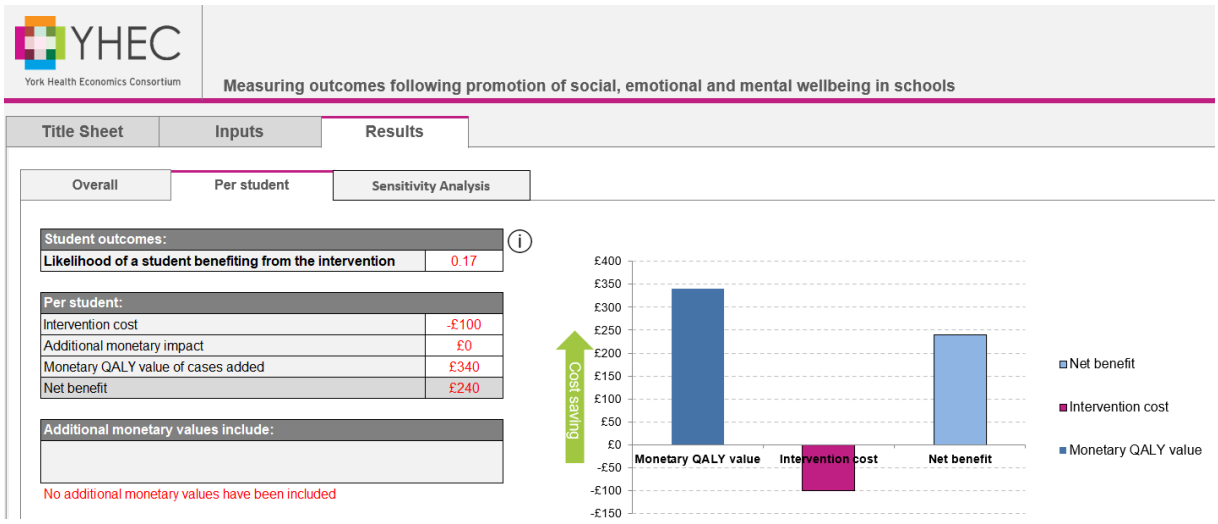


Figure A.8: Results – Per Student



The sensitivity analysis sheet, shown in Figure A.9, allows the user to explore uncertainty. The user can select input variable they would like to explore from the dropdown list. The graphs show one-way sensitivity analysis meaning only one input is changed in each graph. Hence, it does not represent combinations of input changes.

Figure A.9: Sensitivity Analysis


YHEC
York Health Economics Consortium
Measuring outcomes following promotion of social, emotional and mental wellbeing in schools
Title Sheet
Inputs
Results
Overall
Per student
Sensitivity Analysis
Perspective:
Societal
Variable selected:
Utility size given to emotional distress
Net Benefit
Utility value
£100,000.00
£80,000.00
£60,000.00
£40,000.00
£20,000.00
£0.00
-£20,000.00
Cost saving
0.025 0.05 0.075 0.1 0.125 0.15 0.175 0.2 0.225 0.25 0.275 0.3