Assessment of the long-term societal benefits from Child and Adolescent Mental Health Services

In association with Jon Franklin

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Acknowledgements

Executive Summary

This report provides an assessment of the long-run societal benefits of treatments provided by Child and Adolescent Mental Health Services (CAMHS) in England in 2017/18. It forms part of Pro Bono Economics' ongoing work to support charitable organisations working in the field of mental health to highlight the scale of potential benefits from effective mental health support.

Background

Recent survey evidence suggests that one in eight 5 to 19-year olds in England have at least one diagnosable mental health difficulty – the equivalent of around 1.25 million children.[1] Without effective intervention, these difficulties can have a significant impact on the life chances of these young people affecting qualifications, employment, relationships and mental health as adults.[2]

The NHS CAMHS is central to England's approach to tackling these challenges. In 2017/18 the NHS spent £757 million on CAMHS.[3]

Despite the scale of this expenditure and the importance of this issue, there is relatively little evidence available on the effectiveness or long-term benefits from the services that CAMHS provide.

Scope of the study

Our report uses analysis of patient outcome data by the Child Outcomes Research Consortium (CORC) and evidence from research funded by the Department of Education to provide an initial estimate of the long-term societal benefits of treatments provided by CAMHS in 2017/18.[4] [5]

Key findings

We find that:

- There is very limited publicly available evidence on which to robustly measure the effectiveness of treatments provided by CAMHS.
- Using what is available, we estimate that the treatments provided by CAMHS in 2017/18 could provide between £1.3 and £2.1 billion in long-term societal benefits to individuals and total long-term savings to government of between £0.7 and £1.1 billion.
- This is equivalent to £3,400 - £5,500 in private benefits and £1,800 - £2,900 in savings to government per young person treated. The majority of these benefits are expected to come from increased employment and higher wage rates over the lifetime of the patients.
- This means that for every £1 spent on the CAMHS in 2017/18, £1.70 - £2.75 in benefits to individuals and a further £0.80 - £1.40 in savings to government could have been generated.

Implications

There is significant uncertainty around the estimated lifetime impacts of childhood mental health treatment and our analysis should be interpreted as indicative of the potential scale of benefits to individuals and government, based on the best publicly available evidence. However, our results provide a consistent picture of substantial long-term benefits from addressing mental health difficulties during childhood. Our work further

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[1] NHS Digital (2018a): *Mental Health of Children and Young People in England, 2017,* NHS Digital

[2] Office of Health Economics and the Mental Health Foundation (2014): *Childhood and adolescent mental health: understanding lifetime impacts,* Office of Health Economics and the Mental Health Foundation

[3] See Table 4 of NHS (2018a)

[4] Wolpert, M., Jacob, J., Napoleone, E., Whale, A., Calderon, A. & Edbrooke-Childs, J. (2016): *Child- and Parent-reported Outcomes and Experience from Child and Young People's Mental Health Services 2011-2015,* Child Outcomes Research Consortium

[5] Paull, G. & Xu, X. (2017): *Study of Early Education and Development (SEED): the potential value for money of early education*, Department for Education

supports the case for additional investment where treatments can demonstrate a significant, measurable improvement in outcomes and offers a potential approach to assessing the long-run cost effectiveness of such interventions.

Our study has also highlighted the relative scarcity of evidence on patient outcomes and the effectiveness of treatments provided by CAMHS. Our work is based on analysis of a set of data that is now five years old and could be significantly improved if:

- NHS Digital were able to publish significantly more information about the outcomes for the children and young people that CAMHS is treating. This would ideally include both aggregated statistics on the progress that young people make whilst in treatment using standardised, validated clinical measures as well as making patient level records available to accredited researchers.
- Updated evidence is developed using the Millennium Cohort Study on the long-term implications of childhood mental health, ideally using metrics that are broadly consistent with those being adopted by CAMHS for measuring changes in the mental health of patients over time.

We hope that this work serves to further stimulate the policy debate on how we, as a society, invest in the mental health of our children and young people. It offers a starting place for considering the long-term societal benefits of the services that we would be keen to see further developed as more evidence becomes available.

1 Introduction

This report explores the potential long-run societal benefits of Child and Adolescent Mental Health Services (CAMHS) in England. It forms part of Pro Bono Economics' ongoing work to support charitable organisations working in the field of mental health to highlight the scale of potential benefits from effective mental health support.

Objectives and scope of the analysis

Our report uses analysis of patient outcome data by the Child Outcomes Research Consortium (CORC) and evidence from the Department of Education to provide an estimate of the long-term societal benefits of treatments provided by CAMHS in England during 2017/18.[6] [7]

We would highlight that the data available on CAMHS patient outcomes and the long-term impacts of treatments is far from comprehensive and that our work represents the best estimate possible with the information currently available. However, we hope that this initial analysis will stimulate debate in this important area and lead to more data being shared with researchers to support the continual improvement of the service offered to young people.

Structure of the report

The report is structured as follows:

- Section 2 provides background to the project.

- Section 3 describes the analytical approach taken in our analysis.

- Section 4 sets out the results of the analysis.

- Section 5 summarises the key conclusions of the analysis along with its implications.

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[6] Wolpert et al. (2016)
[7] Paull & Xu (2017)

2   Background

Recent survey evidence suggests that one in eight 5 to 19-year olds in England have at least one diagnosable mental health difficulty – the equivalent of around 1.25 million children.[8] Without effective intervention, these difficulties can have a significant impact on the life chances of these young people affecting qualifications, employment, relationships and mental health as adults.[9]

Estimates of societal cost of mental health difficulties

Estimates of the lifetime costs to the UK economy from childhood mental health difficulties tend to focus on a range of £260,000 - £295,000 per patient (adjusted to 2017/18 prices). For example:

- Friedli & Parsonage apply evidence from a longitudinal study in New Zealand to estimate the total lifetime costs of a single year cohort of children in the UK with conduct difficulties.[10] [11] They estimate a total cost of £6.25bn, this is equivalent to lifetime costs per individual who experienced conduct difficulties of around £280,000 (in 2017/18 prices). This estimate includes costs to the criminal justice system, costs to society from smoking, service usage for mental health treatment and lost earnings although does not incorporate costs from other childhood mental health difficulties.

- The Centre for Mental Health drew on the same evidence from New Zealand and focused purely on the costs of crime resulting from conduct difficulties.[12] They estimate that the total costs of crime per year that are attributable to all adults in the UK that suffered from conduct difficulties in childhood as £26bn, the equivalent of a lifetime cost of around £260,000 (in 2017/18 prices) per individual who experienced conduct difficulties in childhood.

- Place2Be estimate that a single case of mental disorder costs around an extra £295,000 over an individual's lifetime (in 2017/18 prices).[13] The methodology used to estimate the costs is a little unclear, however, it includes the costs of health, social care and education services (£30,000), a cost to the individual's wellbeing of (£165,000), lost earnings (£75,000) and the cost of benefits to the taxpayer (£15,000) and an impact on carers (£3,000).

Evidence on costs and impact of CAHMS

The NHS Child and Adolescent Mental Health Service is central to England's approach to tackling these challenges. In 2017/18 the NHS spent £757 million on CAMHS, including around £140m spent on nearly 200,000 hospital bed days and nearly £3.5m on more than 15,000 Child and Adolescent Psychiatry out-patient treatment episodes.[14] [15] [16]

Despite the scale of this expenditure and the importance of this issue, there is relatively little evidence available on the effectiveness or value for money of CAMHS. Research by CORC suggests that the average young person does experience an improvement in mental health whilst receiving CAMHS support, even after taking into account the natural recovery rate sometimes experienced by patients.[17]

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[8] NHS Digital (2018a)

[9] Office of Health Economics and the Mental Health Foundation (2014)

[10] Friedli, L. & Parsonage, M. (2007): *Mental health promotion: building an economic case,* Northern Ireland Association for Mental Health

[11] It should be noted that applying evidence from New Zealand to a UK context adds uncertainty to the conclusions.

[12] Centre for Mental Health (2009): *The chance of a lifetime: Preventing early conduct problems and reducing crime,* Centre for Mental Health

[13] Place2Be (2010): *Cost effective positive outcomes for children and families,* Place2Be

[14] See Table 4 of NHS (2018a)

[15] NHS Improvement (2018b): *National Schedule of reference costs,* NHS Improvement, service code 711 in "Total outpatient attendances" table.

[16] NHS Improvement (2018b), currency code CAMHSAPC in "Total other currencies" table.

[17] Wolpert et al. (2016)

Evaluations of other childhood mental health interventions suggest significant long-run benefits from treatments and support. For example:

- An evaluation of Place2Be's Counselling Service in Primary Schools linked changes in measures of Teacher/Parental SDQ total difficulties scores to estimates of long-term economic impacts.[18] The approach draws on relationships established in a separate study between childhood SDQ and economic costs of lifetime outcomes such as school truancy/exclusion, employment, smoking, criminal activity and adult depression.[19] The study highlights the inherent uncertainty in the analysis but estimates that every £1 invested in the service in 2016/17 results in benefits of £6.20 in terms of improved long-term outcomes. This is the equivalent of benefits in the region of £5,900 per child, including a saving to government of over £2,100 per child (in 2017/18 prices).

- An economic evaluation of Incredible Years, an initiative aimed at strengthening parent-child interactions and promoting children's emotional regulation and social skills, has been completed in Ireland.[20] This draws on detailed data from Randomised Control Trials in Ireland to estimate near-term costs and service usage and combines these estimates with long-term benefits based on evidence relating to the effects of conduct difficulties on crime, employment and educational outcomes. They estimate that the programme generates around £3.00 in fiscal benefits for each £1 spent on the programme.

Our study adds to this pre-existing research by linking the evidence of clinical outcomes from CORC's analysis of CAMHS patients with evidence on the long-term impacts from improvements in childhood mental health to estimate the potential long-term societal benefits from CAMHS treatments.

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[18] Pro Bono Economics (2018): *Economic evaluation of Place2Be's Counselling Service in Primary Schools,* Pro Bono Economics

[19] Paull & Xu (2017)

[20] O'Neill, D., McGilloway, S., Donnelly, M., Bywater, T. & Kelly, P. (2010): *A cost-benefit analysis of early childhood intervention: evidence from an experimental evaluation of the incredible years parenting program*, Economics, Finance and Accounting Department Working Paper Series n207-10, Department of Economics, Finance and Accounting, National University of Ireland
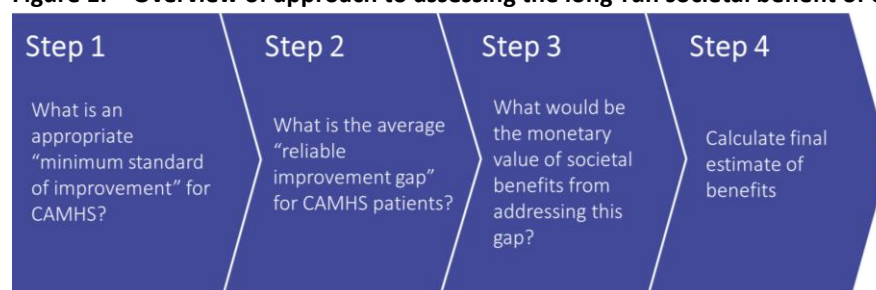
3 Analytical approach

This section describes the approach we have taken to estimating the long-run societal benefits from CAMHS treatments. Section 3.1 summarises our methodology on a step-by-step basis whilst Section 3.2 discusses the key limitations of the approach and the implications for how our findings should be interpreted.

3.1 Approach to assessing the long-run societal benefits of current CAMHS

We use published statistics on NHS Referrals, adjusted for the proportion of individuals that do not receive treatment, to identify the number of individuals receiving treatment from CAMHS in 2017/18. We then apply the average improvements in SDQ score for these individuals to evidence that estimates the long-run economic benefits from an improvement in childhood SDQ score to assess the overall societal benefit of CAMHS treatment provided in 2017/18. Our approach is summarised in Figure 1, each step is reviewed in more detail below.

Figure 1. Overview of approach to assessing the long-run societal benefit of current CAMHS

Step 1	Step 2	Step 3	Step 4
What is an appropriate "minimum standard of improvement" for CAMHS?	What is the average "reliable improvement gap" for CAMHS patients?	What would be the monetary value of societal benefits from addressing this gap?	Calculate final estimate of benefits

Step 1: How many individuals were treated by CAMHS in 2017/18?

We base our estimate of the number of people treated by CAMHS on data for the number of referrals to secondary NHS mental health services for children under the age of 18.[21] We exclude in-patients from our estimate as these are assumed to be the most severe and hard to support cases that would require more specific evidence to model (equivalent to 4.8% of the total referrals).[22] This gives us a total volume of referrals of 503,000 for the year 2017/18.

Research from the Education Policy Institute estimate that around 24.2% of people referred to CAMHS do not receive treatment, with the most common reason cited that the children's mental health difficulties were "not serious enough to meet the eligibility criteria".[23] The data behind this study is based on 54 Freedom of Information Requests and will not necessarily be representative of the overall NHS service. However, in the absence of any better available information, we have applied this estimate to the total number of out-patient referrals to calculate the number of people that received some form of treatment from CAMHS in 2017/18. This gives an estimate of 381,000 young people treated by CAMHS in 2017/18. Our approach is summarised in Table 1, below:

Table 1   Breakdown of NHS CAMHS referrals

Total out-patient referrals in 2017/18	Estimated number of out-patient referrals rejected	Estimated number of out-patients receiving treatment from NHS CAMHS
503,000	122,000	381,000

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[21] NHS Digital (2018b)

[22] This will mean that our estimate of the long-run impacts is likely to be more conservative than if all beneficiaries were included.

[23] Education Policy Institute (2018): *Access to children and young people's mental health services – 2018*, Education Policy Institute

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Step 2: What is the average improvement in SDQ score that can be attributed to CAMHS?

Step 2 of our approach uses analysis from CORC reviewing information on mental health outcomes for a sample of individuals who received care from CAMHS. The data used by CORC for their study comprises patient-level data from across 75 services taking part in the Children and Young People's Improving Access to Psychological Therapy (CYP IAPT) programme over the period 2011-2015.[24] In total, the CORC data includes more than 96,000 episodes of care relating to 91,000 individual young people

There are a range of different clinical measures used in the CORC dataset. We have chosen to focus on SDQ for two key reasons:

- It is already being used as a national measure of children's mental health by the ONS in their Measures of Children's Wellbeing.[25]
- It is a measure used in literature linking childhood difficulties to longer terms economic outcomes used in Step 3 of our analysis.[26]

CORC's dataset enables the calculation of the average change in SDQ Total Difficulties Score between two observations. However, it is important to note that evidence from other studies suggests that not all of this change should be attributed to treatment as we might expect outcomes to improve over time, even in the absence of treatment.[27]

To address this concern the CORC analysis used a measure known as the "Added Value Score". This approach uses a formula, calibrated using historical survey evidence, that adjusts raw changes in Total Difficulties scores for the improvement in SDQ scores that would be expected without treatment to leave an estimate of the additional impact that a treatment has provided. Further details are provided in Annex A. [28]

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[24] CYP IAPT service transformation programme was launched in 2011 to train a selection of practitioners, supervisors and managers, alongside providing additional resources for infrastructure and building regional and national collaborations to support best practice. As part of this process CORC lead a collaboration of organisations to support services in collecting routine outcome and experience measures for children and families for central collation and analysis. The data provided is primarily from NHS CAMHS out-patients although there may be some data from non-CAMHS providers and there may also be a small number of in-patients included.

[25] ONS (2018): *Children's well-being measures*, ONS

[26] Paull & Xu (2017)

[27] Ford, T., Hutchings, J., Bywter, T., Goodman, A. & Goodman, R. (2009): *Strengths and Difficulties Questionnaire Added Value scores: evaluating effectiveness in child mental health interventions,* British Journal of Psychiatry, vol 194(6), pp. 552-586

[28] Ford, T., Hutchings, J., Bywter, T., Goodman, A. & Goodman, R. (2009): *Strengths and Difficulties Questionnaire Added Value scores: evaluating effectiveness in child mental health interventions,* British Journal of Psychiatry, vol 194(6), pp. 552-586

> **The Strengths and Difficulties Questionnaire (SDQ)**
>
> The Strengths and Difficulties Questionnaire (SDQ) is a brief behavioural screening questionnaire used with children. It can be used for various purposes, including clinical assessment, evaluation of outcomes, research and screening.
>
> There are different versions of the questionnaire for completion by children, teachers or parents. It asks about 25 attributes, some positive and others negative, that are then grouped into five "sub-scales":
>
> 1) Emotional symptoms
> 2) Conduct problems
> 3) Hyperactivity / inattention
> 4) Peer relationship problems
> 5) Prosocial behaviour
>
> The scores for the first four of these sub-scales are often added together to generate a "Total Difficulties score" that ranges from 0-40, with higher scores meaning greater difficulties. Each 1 point decrease in the total difficulties score corresponds with an improvement in mental health.
>
> *Source: www.sdqinfo.com*

We adopt the Added Value Score estimate from CORC's analysis as an estimate of the average improvement in SDQ score that can be attributed to CAMHS treatment. In order to link the findings from this analysis to the evidence used in Step 3 we need to express changes in SDQ attributed to CAMHS as a proportion of the standard deviation - also known as the effect size.

In Wolpert et al (2016), CORC estimate that this added value effect size for CAMHS is between 0.20 and 0.32. We use this range throughout our analysis.[29]

Step 3: What is the monetary value of childhood improvements in SDQ score?

We draw on an approach established by Paull & Xu[30] that links changes in SDQ Total Difficulties score, measured in standard deviations, to a range of long-term economic outcomes. We make three adjustments to the original estimates:[31]

- Prices are uprated to 2018 levels using the ONS GDP Deflator.

- The costs of crime are updated to reflect the latest costs of crime estimates from the Home Office.[32]

- An adjustment is made to account for the fact that CAMHS supports children of different ages (see Table 6 in Annex B) and therefore the benefit of improved outcomes in later life will occur sooner than for children who are older.

Table 2 summarises the assumed impacts of a one standard deviation change in SDQ Total Difficulties score unit costs, this includes: the change in probability that an outcome will occur for each standard deviation change in childhood SDQ at age , the monetary value of savings associated with this change if it occurs at Age 7 from the original Paull and Xu paper (in 2015 prices), the value of this change uprated to 2018 prices and then the final age weighted monetary value of this change that takes into account the age distribution of children attending CAMHS.

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[29] Wolpert et al. (2016), p59 – 95% confidence interval for estimate of added value.
[30] Paull & Xu (2017)
[31] Further details of adjustments made to Paull & Xu estimates are provided in Annex B.
[32] Home Office (2018): *The economic and social costs of crime – second edition,* Home Office Research Report 99

Table 2   Summary of long-run impacts from a 1 standard deviation change in childhood SDQ Total Difficulties score

Type of benefit	Savings at Age 7 (2015 prices)	Savings at Age 7 (2018 prices)	Age-weighted average
Reduced truancy – government (age 11-16)	£79	£84	£73
Reduced exclusion – government (age 13-16)	£56	£60	£52
Reduced smoking – private (age 16-60)	£636	£676	£933
Reduced smoking – government (age 16-60)	-£233	-£248	-£342[33]
Reduced smoking – wider society (age 16-60)	£277	£294	£406
Reduced crime – government (age 16-60)	£169	£180	£248
Reduced depression - government (age 16-60)	£490	£521	£719
Higher employment - private (age 16-60)	£4,838	£5,142	£7,096
Higher employment - government (age 16-60)	£3,115	£3,311	£4,569
Higher wages - private (age 16-60)	£5,759	£6,121	£8,447
Higher wages - government (age 16-60)	£2,262	£2,404	£3,318

Step 4: Calculate estimate of total benefits

The estimated impacts in Table 2 are multiplied by the average change in SDQ that can be attributed to CAMHS treatment from Step 2 and the total number of patients that received treatment from CAMHS in 2017/18 from Step 1 to estimate a monetary value of long-term societal benefits from CAMHS treatments.

$$Total\ Benefits = Savings\ from\ 1\ s.d.\ change\ in\ SDQ * average\ improvement\ in\ SDQ * number\ of\ patients$$

We divide this estimate of total benefits by publicly available estimates of the costs of CAMHS services to estimate a Cost-Benefit Ratio that shows the value of benefits generated for each pound spent.

$$Cost - Benefit\ Ratio = \frac{Total\ benefits}{Cost\ of\ CAMHS\ service}$$

3.2   Key assumptions and limitations

Our indicative estimates are based on the best available evidence, however, there are some important limitations to this evidence that should be considered:

- CORC describe the CYP IAPT dataset as "flawed, uncertain, proximate and sparse" and there are likely to be "unknown biases".[34] In addition to this, just a small proportion of their dataset (4%) contains a pair of parental SDQ measures suitable for the analysis of added value scores. It is unclear whether this will create a positive or negative bias to our estimate but certainly adds to the uncertainty around the analysis completed in this paper and how representative it will be of the wider CAMHS population.[35] However, we note that there is currently no alternative source available for CAMHS outcome information and therefore

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[33] Paull & Xu (2017) estimate that the impact of reduced smoking on government finances is negative due to the decline in tax revenues offsetting the reduced costs to the NHS.

[34] Wolpert, M., & Rutter, H. (2018): *Using flawed, uncertain, proximate and sparse (FUPS) data in the context of complexity: learning from the case of child mental health*, BMC medicine, vol. 16(1), p 82.

[35] It could be argued that the sample will reflect those receiving the most sustained and extensive support which is more likely to have a positive impact, but equally it could be the case that our sample is comprised of the patients with the most challenging symptoms and are therefore the least likely to improve.

it represents the best possible estimate of the average impact of CAMHS for a patient. To reflect this uncertainty we have used a range of average improvements in SDQ (0.20-0.32) reflecting the 95% confidence interval from CORC's analysis to help reflect this uncertainty.

- The SDQ measure is unlikely to be the most appropriate metric for assessing the progress of an individual's symptoms in all cases; recent work by CORC has tended to use a wider range of different metrics to capture a patient's progress.[36] Whilst we recognise that SDQ is unlikely to provide a perfect picture it has been used as a widespread indicator of patients' mental health and, at present, the SDQ is the only measure with an established methodology for linking changes to future outcomes.[37]

- We are unable to identify exactly how much of the change in SDQ scores can be attributed to CAMHS interventions and how much is due to other support received elsewhere or would have occurred naturally. We have used a "added-value" estimate to adjust the change in individual SDQ scores to reflect this. The adjustments used to create the Added Value Score have an empirical basis, drawing on data from the 2004 British Child and Adolescent Mental Health Survey and follow-up survey, however, as noted by Wolpert et al. "its applicability to those accessing specialist services has not been fully explored".[38]

- The approach used in the Paull & Xu paper to estimate long-run economic impacts of childhood differences in SDQ relies on retrospective evidence from a paper by Carneiro et al.[39] That paper uses data from the National Child Development Survey (NCDS), a longitudinal study based on individuals born in March 1958. As such, this effectively assumes that links between SDQ scores in childhood and later outcomes have remained similar since this time.

- The NCDS used teacher ratings of children's behaviour using the Bristol Social Adjustment Guides (BSAG) to assess "social skills" and not specifically mental health. It is therefore assumed by Xu and Paull that standardised improvements in the BSAG measure would approximate to improvements on the SDQ scale. In practice, however, the correspondence between these rating scales is unlikely to be perfect.

- The NCDS observed children's outcomes at age 7 and 11, but not during intervening years. This paper draws on the approach adopted by Little and Paull and Xu in assuming that the reported impacts in Carneiro et al. at Age 7 are a reasonable proxy for children of other ages.[40][41]

- Our estimated benefits do not include all benefits that could be considered for a full economic cost-benefit analysis. For example, we do not include the value to the patients from an improvement in the quality of life or the benefits from reduced demand for physical health.[42] This means that the estimated return to society in this paper is likely to be conservative.

- Finally, it should be noted that the impacts of treatment may fade-out over time. We are implicitly assuming that this fade-out effect is in line with underlying recovery rates observed in the NCDS longitudinal panel.

These limitations mean that our estimate of the potential benefits delivered by CAMHS should be viewed as indicative of the broad scale of potential benefits and not precise estimates. For our analysis we explore the uncertainty created by the limitations in the available evidence in Section 4.3, however, there is a need for

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[36] Wolpert et al. (2016)

[37] NHS Digital (2018a)

[38] Wolpert et al. (2016)

[39] Carneiro, P., Crawford, C. and Goodman, A., (2011): *The Impact of Early Cognitive and Non-Cognitive Skills on Later Outcomes*, University College London, Institute for Fiscal Studies and Georgetown University, American Economic Association 2012 Annual Meeting Conference Paper

[40] Pro Bono Economics (2018)

[41] Paull & Xu (2017)

[42] The potential importance of the fiscal savings from reduced demand for physical health services as a result of improved mental health services is highlighted for adults in: Layard R. & Clark D. (2014): *Thrive; the power of psychological therapy*, Penguin Books

further research in this area to support more robust assessments of the potential societal benefits of CAMHS and potential improvements of its services.

4 Key results of the analysis

This section sets out the results of our analysis. Section 4.1 provides an assessment of the long-run societal benefits of CAMHS and Section 4.3 explores the sensitivity of conclusions to alternative scenarios for long-run societal impacts. All costs are discounted and presented in 2018 prices.

4.1 What is the potential long-term societal benefit of CAMHS treatments?

To estimate total benefits, we use the estimated average change in SDQ that can be attributed to CAMHS treatment, apply this to estimates of the long-run monetary impacts from an improvement in SDQ and multiply this by the estimated number of CAMHS patients in 2017/18, as outlined in Section 3.1.4.

Table 3 summarises the total long-term benefits from employment outcomes as a result of the interventions CAMHS provided in 2017/18 in terms of improved lifetime income for patients and associated fiscal impact for government. These fall into two main categories; firstly, the benefit from reduced periods of unemployment and, secondly, the benefit from individual's improved ability to command higher wage roles.

Table 3   **Summary of long-term employment benefits from CAMHS treatments provided to individuals in 2017/18**

	Benefit to individuals	Benefits to government
Increased Employment	£0.5-0.9 billion	£0.3-0.6 billion
Improved wages	£0.6-1.0 billion	£0.3-0.4 billion
Total benefits	**£1.2-1.9 billion**	**£0.6-1.0 billion**

We find that the potential total long-term benefits to individuals treated in CAMHS during the year 2017/18 from improved employment outcomes could be between £1.2 and £1.9 billion. This is equivalent to an average increase in income for patients of £3,100 - £5,000 over their career or around £70-£110 per year. The savings to government are equivalent to £1,600 - £2,500 per patient and are equivalent to a flow of savings of around £14-£22 million per year.

Other long-term societal benefits are summarised in Table 4. These benefits are relatively smaller in scale but amount to around a further £0.1 billion in benefits to individuals from reduced smoking and a further £0.1 billion in fiscal benefits to the government.

Table 4   **Summary of other societal benefits from CAMHS treatment provided to individuals in 2017/18**

	Benefit to individuals	Benefits to government
Reduced truancy & exclusion		£0.01-0.02 billion
Reduced smoking	£0.1-0.2 billion	(-£0.03) - (-£0.04) billion[43]
Reduced crime		£0.02-0.03 billion
Reduced depression in adulthood		£0.05-£0.9 billion
Total benefits	**£0.1-0.2 billion**	**£0.06-0.09 billion**

The overall long-term potential benefits to individuals from CAMHS treatments delivered in 2017/18 could be between £1.3 billion and £2.1 billion and total savings to government could be between £0.7 and £1.1 billion, this is equivalent to £3,400 - £5,500 in private benefits to patients and £1,800 - £2,900 in savings to

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[43] This is a cost to government due to reduced tax income from VAT and excise duties on tobacco products.

government per patient. This means that for every £1 spent on CAMHS in 2017/18 it might generate £1.70 - £2.75 in benefits to individuals and £0.80 - £1.40 in savings to government.

4.2 Sensitivity analysis

In this section we use a sensitivity test to explore the implications of uncertainty around the relationship between near term improvements in SDQ and long-term outcomes – one of the key areas of uncertainty highlighted in Section 3.2. We explore the implications of this for our analysis by adopting a high and low range of effects.

We use uncertainty in estimates from the evidence that underlies Paull & Xu's paper to adjust the estimates described in Section 3.1.3.[44] The high and low scenarios adjust the impact of a change in childhood SDQ Total Difficulties score in the following ways:[45]

- Truancy and exclusion: +/- 27% from the central case.
- Smoking: +/- 31% from the central case
- Crime: +/- 75% from the central case
- Depression: +/- 21% from the central case
- Employment: +/- 38% from the central case
- Wages: +/- 28% from the central case

Table 5 describes the results of the sensitivity on the long-term societal benefits of CAMHS.[46] Adopting a range of alternative relationships with long-term outcomes further widens the range of estimates but does not change the high-level picture that the existing CAMHS is likely to be providing significant long-run benefit to the UK economy and government revenues.

Table 5   Sensitivity test – total societal benefits of CAMHS compared to core scenario

	Benefit to individuals	Benefits to government
Core scenario	£1.3-2.1 billion	£0.7-1.1 billion
Sensitivity 1 – Alternative relationships with long-term outcomes	£0.9-£2.7 billion	£0.4-£1.4 billion

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[44] We adjust the size of the effects up and down from the central case presented in Paull and Xu (2017) by a range of +/- one standard error based on the underlying estimates from Carniero et al. (2011).
[45] Further details are available in Annex B.
[46] The range represents the impact of applying the low end of the range of long-term impacts with the lower, "value added" estimate of the SDQ impact of CAMHS and the high-end of the range is based on combining the high end of the range of long-term impacts with the higher, average change in SDQ estimate of the SDQ impact of CAMHS.

5 Summary of findings

Our analysis has reviewed the long-run societal benefits of CAMHS. We have concluded that:

- There is very limited publicly available evidence on which to robustly measure the effectiveness of treatments provided by CAMHS.
- Using what is available, we estimate that the treatments provided by CAMHS in 2017/18 could provide between £1.3 and £2.1 billion in long-term societal benefits to individuals and total long-term savings to government of between £0.7 and £1.1 billion.
- This is equivalent to £3,400 - £5,500 in private benefits and £1,800 - £2,900 in savings to government per young person treated. The majority of these benefits are expected to come from increased employment and higher wage rates over the lifetime of the patients.
- This means that for every £1 spent on the CAMHS in 2017/18, £1.70 - £2.75 in benefits to individuals and a further £0.80 - £1.40 in savings to government could have been generated.

5.1 Implications

There is significant uncertainty around the estimated lifetime impacts of childhood mental health treatment and our analysis should be interpreted as indicative of the potential scale of benefits to individuals and government, based on the best publicly available evidence. However, our results provide a consistent picture of substantial long-term benefits from addressing mental health difficulties during childhood. Our work further supports the case for additional investment where treatments can demonstrate a significant, measurable improvement in outcomes and offers a potential approach to assessing the long-run cost effectiveness of such interventions.

Our study has also highlighted the relative scarcity of evidence on patient outcomes and the effectiveness of treatments provided by CAMHS. Our work is based on analysis of a set of data that is now five years old and could be significantly improved if:

- NHS Digital were able to publish significantly more information about the outcomes for the children and young people that CAMHS is treating. This would ideally include both aggregated statistics on the progress that young people make whilst in treatment using standardised, validated clinical measures as well as making anonymised patient level records available to accredited researchers.

- Updated evidence is developed using the Millennium Cohort Study on the long-term implications of childhood mental health, ideally using metrics that are broadly consistent with those being adopted by CAMHS for measuring changes in the mental health of patients over time.

We hope that this work serves to further stimulate the policy debate on how we, as a society, invest in the mental health of our children and young people. It offers a starting place for considering the long-term societal benefits of the services that we would be keen to see further developed as more evidence becomes available.

Annexe A: Details of CORC Analysis

This section provides additional details relating to the analysis of the CORC dataset.

Approaches to measuring outcomes for children's mental health services in the UK

CORC has played a leading role in the development of approaches to measuring outcomes for children's mental health services in the UK. They have reviewed a range of measures and approaches including:

- service experience scores;

- personal goal achievement;

- whether patients cross a clinical threshold from "high difficulties" to a lower level of difficulties;

- the Reliable Change Index (RCI), which is used to identify the minimum detectable change in a clinical measure of mental health given the reliability of the measure when individuals are tested and retested at two different points in time[47]; and

- Added Value Scores that use an algorithm to account for the change in average SDQ score that might be expected for a group had they not received any treatment. [48] [49]

A consensus appears to have been reached that routine outcome monitoring using such measures is both feasible and desirable.[50] However, challenges have been highlighted with the use of any statistically based measure as they will not necessarily align with the clinical significance of a changes over time and all are sensitive to the clinical measure used and selection of appropriate thresholds.

Estimating Added Value Scores

The Added Value Score adjusts raw changes in SDQ Total Difficulties to reflect the typical change in scores that would be expected over time. CORC's analysis uses the formula from Ford et al. (2009):

SDQ Added Value Score =   2.3

+0.86 * baseline TD score

-1.0 * follow-up TD score

+0.2 * baseline impact score

-0.3* baseline emotional difficulties subscale score

The formula was based on an analysis of the British Child and Adolescent Mental Health Survey 2004 and a follow-up study which estimated relationship between observations that were 4-8 months apart which corresponds relatively well with the average length of treatment in the CYP IAPT dataset of between 6 and 7 months.[51]

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[47] This is known as the test-retest reliability.
[48] Wolpert et al. (2014)
[49] Wolpert et al. (2012)
[50] Children and Young People's Mental Health and Wellbeing Taskforce (2015)
[51] Wolpert et al. (2016)

Annexe B: Approach to estimating long-term societal benefits

This section provides some additional details regarding the assumptions relating to long-term societal benefits.

Approach to age adjustments

Table 6 summarises the approach taken to adjusting estimates from Paull & Xu (2017) linking changes in childhood SDQ with long-term economic outcomes.

Table 6   **Overview of age adjustments**

Age Group	0-4 years	5-9 years	10-14 years	15-19 years
Proportion of patients in CORC report	3%	23%	42%	31%
Assumed mid-point	Age 2	Age 7	Age 12	Age 17
Cost adjustment approach	Take change in costs for Age 7 and further discount by 3.5%[52]	Take change in costs for Age 7 and uprate by 15%[53]	Take change in costs for Age 7 and uprate by 36%[54]	Take change in costs for Age 7, excluding truancy benefits[55] and uprate by 62%[56]

Costs of crime

We have updated the estimates for the adult costs of crime used in Paull & Xu (2017) to reflect latest unit costs of crime information from the Home Office[57]. We have made three key adjustments to the Home Office estimates:

- As we do not have information about the breakdown of different types of crime committed we have taken a "trimmed mean" by excluding the costs of homicide and cyber-crime. These crimes are viewed as outliers compared to the other costs; homicide because it is extremely rare but carries an extremely high cost and cyber-crime because it has an extremely high frequency but low cost and detection rate.
- In order to keep our estimate conservative, we only include costs incurred by government in our estimates. This includes the following cost components: health services, victim services, police costs and other criminal justice costs. We have not included the most sizeable components of the Home Office costs relating to physical and emotional harm caused to individuals.
- We have uprated our unit cost estimate to reflect the measure of crime used in the studies underlying the Paull and Xu estimates. Their estimates are based on self-reported "dealings with courts or police". We have uprated the cost of crime to reflect costs incurred by government in the 46% of cases where there is no suspect identified as, in these incidences, individuals would not have had a "dealing with the police".

As a result of these changes our estimate of the costs of crime is 4.4 times higher per person than the Paull & Xu estimate.

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[52] This is the Treasury Green Book discount rate for one year.
[53] This is the Treasury Green Book discount rate for four years (difference between age 7 and age 3)
[54] This is the Treasury Green Book discount rate for nine years (difference between age 12 and age 3)
[55] Truancy benefits are expected to primarily accrue at age 11-16 so are not included for this age group.
[56] This is the Treasury Green Book discount rate for fourteen years (difference between age 17 and age 3)
[57] Home Office (2018)

Assumptions for Sensitivity 1

The range of assumptions used for Sensitivity 1 are described in Table 7. We take the central estimates for each coefficient and create a scenario range of +/-1 standard error based on the evidence in Tables 4.1, 4.3 and 4.5 in Carniero et al. (2011). This helps to capture some of the uncertainty in the relationship between SDQ scores and longer-term outcomes although will not capture the uncertainty in whether it is reasonable to transpose changes in the Bristol Social Adjustment Guide to SDQ or uncertainty around the unit costs of these lifetime outcomes.

Table 7   Range of assumptions used for Sensitivity Test 1

Type of benefit	Age-weighted average
Reduced truancy – government (age 11-16)	£53 to £93
Reduced exclusion – government (age 13-16)	£38 to £66
Reduced smoking – private (age 16-60)	£646 to £1,220
Reduced smoking – government (age 16-60)	£-237 to £-447
Reduced smoking – wider society (age 16-60)	£281 to £531
Reduced crime – government (age 16-60)	£62 to £435
Reduced depression - government (age 16-60)	£567 to £870
Higher employment - private (age 16-60)	£4,393 to £9,799
Higher employment - government (age 16-60)	£2,828 to £6,309
Higher wages - private (age 16-60)	£6,082 to £10,812
Higher wages - government (age 16-60)	£2,389 to £4,247