Full economic analysis to support NICE public health guidelines for 'Harmful sexual behaviour: identifying and helping children and young people who display harmful sexual behaviour'

National Institute for Health and Care Excellence

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Authors

Mariana Dates (Optimity Advisors), Gareth Harper (Optimity Advisors), Clive Pritchard (Optimity Advisors) and Tracey Jhita (Optimity Advisors)

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Declaration of authors' competing interests

No authors have competing interests.

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1 Context and objectives of the study

The Department of Health (DH) asked the National Institute for Health and Care Excellence (NICE) to develop a guideline on identifying and supporting children and young people who display harmful sexual behaviour (HSB). The final scope of the guideline is available at: https://www.nice.org.uk/guidance/gid-phg66/documents/sexually-harmful-behaviour-among-young-people-final-scope2.

To support the development of the guidelines, Optimity Advisors was commissioned to undertake an economic analysis, encompassing a review of the cost-effectiveness evidence and economic modelling of interventions put in place to identify and support children and young people who display HSB. The study was aimed at addressing the cost-effectiveness element of the review questions (set out on pages 7-8 of the final scope) relating to:

- multi-agency approaches to children and young people needing assessment;
- models or tools to assess the seriousness of sexual behaviour;
- assessment tools to identify the risk presented by children and young people who display HSB;
- interventions for those who display HSB.

Harmful sexual behaviour among young people is defined as "one or more children engaging in sexual discussions or acts that are inappropriate for their age or stage of development"[1]. These can range from using sexually explicit words and phrases and inappropriate touching, to full penetrative sex with other children or adults. Such behaviour can be harmful to the individual concerned, as well as other children and young people.

Current data suggests that between 20% and 66% of cases of harmful sexual behaviour are committed by children and young people[2]. In a study of the individual, family and abuse characteristics of 700 children and young people referred to nine UK services between 1992 and 2000 as a result of their sexually abusive behaviours, it was established that the victim was related to the perpetrator in 25% of cases[3]. Most of the perpetrators have themselves experienced physical, emotional or sexual abuse[4]. Over 4000 young people under 18 were

[1] NICE. (2014). Harmful sexual behaviour among children and young people: final scope

[2] Hackett, S. (2014) Children and young people with harmful sexual behaviours: Research Review. Dartington: Research in Practice

[3] Hackett et al. (2013) Individual, Family and Abuse Characteristics of 700 British Child and Adolescent Sexual Abusers. Child Abuse Review, 22(4).

[4] McCartan et al. (2011). Child and adolescent females who present with sexually abusive behaviours: a 10-year UK prevalence study. Journal of Sexual Aggression, 17(1): 4-14.

recorded as perpetrators of sexual offences against other children by police forces in England and Wales[5] in 2013/14, while an earlier survey found that adolescents with a learning disability made up 25% of the workload for 53% of youth offending teams[6]. As a result of the importance of this issue, children and young people who have sexually harmed others have received increasing attention from researchers and policy makers[7]. In addition, it is claimed that there is a growing recognition that young people who have sexually harmed should not be treated in the same way as adult sex offenders, but should be regarded as children in need themselves and a holistic perspective adopted.

Interventions

Hackett (2010) has established a continuum of sexual behaviours, from normal to violent[8] (Figure 1). As a result of the importance of this issue, children and young people who have sexually harmed others have received increasing attention from psychologists and policy makers (Hall, 2010). In addition, there is a growing recognition that young people who have sexually harmed should not be treated in the same way as adult sex offenders, but should be regarded as children in need themselves and a holistic perspective adopted.

If children and young people starting to display harmful sexual behaviour are identified at early stages, interventions can be offered to prevent the escalation of risk of harmful behaviours in those who have not yet behaved harmfully. Rehabilitation interventions can be delivered to reduce the risks of further harmful behaviour in those who have already exhibited such behaviour.

However, barriers and challenges have been identified to providing effective interventions for these target groups. For instance, in some cases, assessments by children's services have failed to identify potential risks in children and young people who ultimately are charged with criminal offences related to harmful sexual behaviour[9].

[5] NSPCC (2014) FOI request.

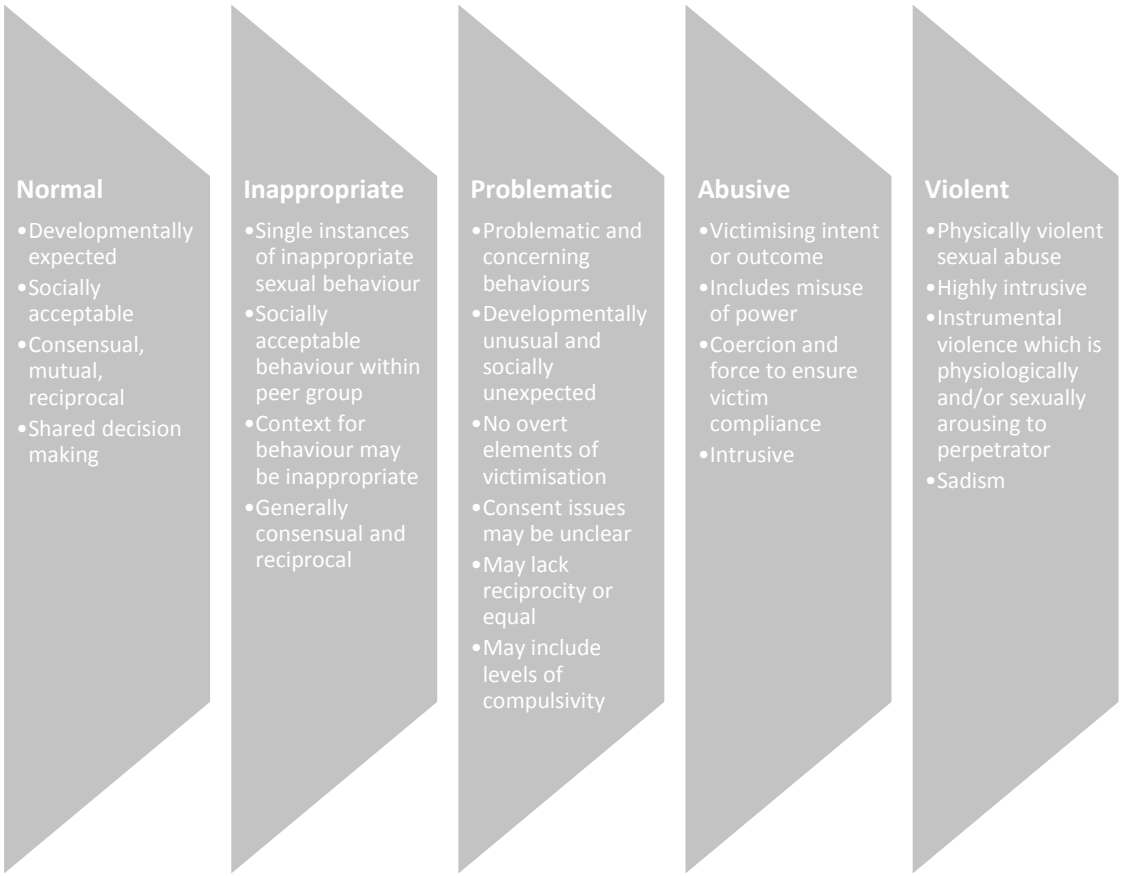
[6] Hackett, S. & Masson, H. (2003). Mapping and exploring services for young people who have sexually abused others: Findings from a two year research programme into policy, practice and services delivery across the UK and ROI. Paper presented at the Home Office and DoH Conference on Young People who Sexually Abuse – 17/10/03.

[7] Hall, S. C. (2010) Exploring Implications and Benefits of holistic Working with Young People who have Sexually Harmed Others. Unpublished PhD Thesis: De Montfort University. Available at: https://www.dora.dmu.ac.uk/handle/2086/4977

[8] Hackett, S. (2010) Children and Young People with Harmful Sexual behaviours, in Children Behaving Badly?: Peer Violence between Children and Young People (eds C. Barter and D. Berridge), John Wiley & Sons, Ltd, Chichester, UK. doi: 10.1002/9780470976586.ch9

[9] NICE. (2014). Harmful sexual behaviour among children and young people: final scope.

Figure 1: Continuum of Harmful sexual behaviour in children



Source: Hackett, S. (2014) Children and young people with harmful sexual behaviours: Research Review. Dartington: Research in Practice

There are a number of interventions targeted at victims of harmful sexual behaviour. However, we understand the scope to be exclusively focussed on activities and interventions targeted at children and young people who display sexually harmful behaviour, including the following:

- Commissioning and partnership work (among statutory, voluntary and independent sectors) to identify and help children and young people who display harmful sexual behaviour, in particular, the provision of help for children and young people on 'first disclosure' that they are displaying such behaviour.
- Early intervention projects that support parents and families and challenge negative behaviours, including harmful sexual behaviour.

- Prevention programmes, including those run by youth offender teams such as youth inclusion and support panels and the youth and criminal justice system.
- Interventions to manage harmful sexual behaviour among children and young people by: primary health care, children's services, early years services, education, neighbourhood policing teams, youth offending teams, child and adolescent harmful behaviour services, child and adolescent mental health services, national adolescent forensic services and national clinical assessment and treatment services.
- Assessment tools to identify the level of risk posed by children and young people who display harmful sexual behaviours and to identify how to manage their needs.

Multi-agency approaches involving health and social care, education, and the justice sector have been highlighted specifically as being key to identifying and helping children and young people at risk of or exhibiting such behaviour. However, a report on the effectiveness of multiagency work with young people who had committed sexual offences and were supervised in the community in England and Wales found that opportunities for early intervention at the onset of harmful sexual behaviours were often missed, and multiagency assessment and or intervention was not typical[10].

The remainder of the report details the review of cost-effectiveness evidence and the economic modelling carried out to address the review questions (see section 2). The economic modelling was carried out using two US-based studies adapted, as far as possible, to the UK context. Given the paucity of available data, the economic modelling results were supplemented with a brief summary of a UK study of young people who have exhibited HSB managed in a therapeutic community (Glebe House). Before presenting these results, the findings of the evidence review, which identified only one relevant study (one of the US studies on which the modelling exercise was based) are presented. Sections 3-5 cover the evidence review while sections 6 - 8 cover the economic modelling and Glebe House case study. Section 9 concludes.

[10] Criminal Justice Joint Inspection. (2013). Examining multi-agency responses to children and young people who sexually offend: A joint inspection of the effectiveness of multi-agency work with children and young people in England and Wales who have committed sexual offences and were supervised in the community.

2 Review questions

The review questions set out in the guideline final scope are as follows:

Question 1: What are the most cost-effective multi-agency responses to identifying and helping children and young people whose sexual behaviour indicates the need for assessment?
Question 2: How cost-effective are different models or tools in assessing the level of seriousness of children and young people's sexual behaviour?
Question 3: How cost-effective are assessment tools designed to identify the level of risk posed by, and address the needs of, children and young people who display harmful sexual behaviour?
Question 4: What types of interventions, including family and carer interventions, are cost-effective for children and young people who display harmful sexual behaviour?

3 Methodology of the evidence review

Search strategy

Optimity Advisors undertook bibliographic database searching in the following economic databases:

- NHS EED via Wiley Interface; and
- Econlit via EBSCO Host.

The search, provided in Appendix A, identified 255 potential studies for inclusion, however, after screening all titles and abstracts, all studies were excluded.

Literature searching for this review was run in conjunction with the parallel review of effectiveness conducted by a team from the School of Health and Related Research (ScHARR) at the University of Sheffield. The effectiveness review team conducted searches in several electronic databases[11] and only one study containing cost and limited economic information was passed on to Optimity Advisors[12].

The above study was reviewed was subjected to additional searches (see Appendix B). As a result, 473 additional abstracts and titles were screened. However, all studies were excluded. As the primary study by Borduin et al. (2009) mentions an unpublished cost-benefit analysis of multi-systemic therapy (MST) with juvenile sexual offenders[13], the author was contacted by email to enquire about the study. Prof. Borduin provided a copy of an updated version of the unpublished study, subsequently published online (Borduin and Dopp, 2015[14]).

The search strategies were developed alongside the search strategies for the review of effectiveness. All the searches have been recorded and are presented at Appendix A.

[11] MEDLINE, Embase, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effect, Cochrane Central Register of Controlled Trials, Health Technology Assessment Database, NHS Economic Evaluation Database, Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Social Care Online, PsycINFO, Social Policy and Practice, EPPI-Centre - Bibliomap, Dopher, TRoPHI, The Campbell Library.

[12] Borduin, C.M., Schaeffer, C.M., Heiblum, N., 2009. A randomized clinical trial of multisystemic therapy with juvenile sexual offenders: effects on youth social ecology and criminal activity. J Consult Clin Psychol 77, 26–37. doi:10.1037/a0013035

[13] Klietz, S. J., Borduin, C. M., & Schaeffer, C. M. (2007). Cost-benefit analysis of multisystemic therapy with juvenile sexual offenders. (Unpubished manuscript)

[14] Borduin, C.M., Dopp, A.R., 2015. Economic Impact of Multisystemic Therapy with Juvenile Sexual Offenders. J Fam Psychol. doi:10.1037/fam0000113

In order to identify further evidence (mostly grey literature), websites and electronic resources were also browsed and searched, with nil results. The list of resources searched is presented in Appendix C.

4 Inclusion criteria

The aim of the review to identify relevant economic and cost studies, including the following study types:

- cost-benefit analyses (CBA);
- cost-effectiveness studies (CEA);
- cost-utility analyses (CUA);
- cost-consequence analysis (CCA);
- cost analysis.

Inclusion criteria

Population:

- Children under the age of 10 and young people aged between 10 and 18 who display harmful sexual behaviour. The population includes those serving community sentences, those on remand and those serving custodial sentences.
- Children and young people up to the age of 25 who display harmful sexual behaviour and have special education needs or a disability.

Interventions:

- Commissioning and partnership work (among the statutory, voluntary and private sectors) to identify, assess and help children and young people who display harmful sexual behaviour.
- Models or tools, including checklists that can distinguish between: normal behaviour, behaviour that needs to be assessed and monitored, and behaviour that needs a legal response and treatment.
- Programmes that help parents, carers and families to challenge negative behaviours before they reach a need for formal interventions such as 'early help' projects and support from family nurse partnerships or telephone helplines.
- Assessment tools to identify the specific level of risk posed by children and young people who display harmful sexual behaviour and to identify how to address their needs.
- Interventions with children, young people and their families and carers to address harmful sexual behaviour. This includes behavioural or cognitive behavioural approaches and clinical treatments such as the 'Turn the page' or 'Good lives' models.

Comparator: no intervention, usual practice, or comparison of two or more intervention types.

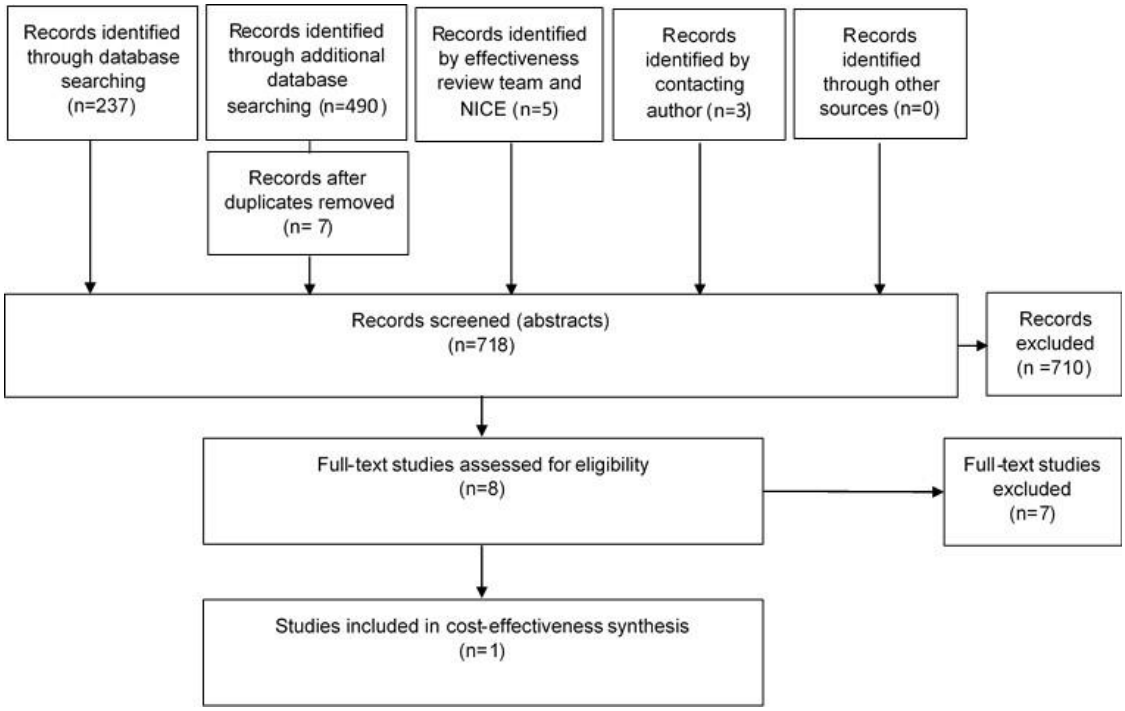
Outcomes: Expected outcomes for each of the review questions identified in the final scope are:
Question 1: Identified thresholds for action, improved notification and referral procedures, better information sharing and consultation, less reliance on exception reporting or serious incidents to highlight concerns.
Question 2: Improved identification of potentially harmful sexual behaviour and prevention activities to stop it becoming an entrenched pattern of behaviour.
Question 3: Improved assessment to help inform subsequent decisions about treatment, public safety and the safety of children and young people displaying harmful sexual behaviour.
Question 4: Stopping harmful sexual behaviour.

Settings: any settings where health services, education services, the criminal justice system, third sector and voluntary organisations deliver interventions to prevent, treat or deal with sexually harmful behaviours.

Limits:
Time: literature published from 1990 onwards will be eligible for inclusion.
Geography: literature from OECD countries will be included to optimise comparability.
Language: only material written in English will be included.

A total of 718 abstracts were screened for this review, 8 studies were screened in full-text and only one study met the above criteria for inclusion in the review (Figure 2).

Figure 2: flow of literature



Other sources: citation chasing and website searching

Studies excluded in full-text

The following studies have been excluded after screening them in full text:

Table 1: Studies excluded in full-text

	Study	Reason for exclusion
1	Borduin, C.M., Schaeffer, C.M., Heiblum, N., 2009. A randomized clinical trial of multisystemic therapy with juvenile sexual offenders: effects on youth social ecology and criminal activity. J Consult Clin Psychol 77, 26–37. doi:10.1037/a0013035	No economic evaluation performed, only cost data provided
2	Klietz, S.J., Borduin, C.M., Schaeffer, C.M., 2010. Cost-benefit analysis of multisystemic therapy with serious and violent juvenile offenders. J Fam Psychol 24, 657–666. doi:10.1037/a0020838	Intervention was not targeted to young sexual offenders
3	Dopp, A.R., Borduin, C.M., Wagner, D.V., Sawyer, A.M., 2014. The economic impact of multisystemic therapy through midlife: a cost-benefit analysis with serious juvenile offenders and their siblings. J	Intervention was not targeted to young sexual offenders

	Consult Clin Psychol 82, 694–705. doi:10.1037/a0036415	
4	Finkelhor, D., Ormrod, R., Chaffin, M., 2009. Juveniles Who Commit Sex Offenses Against Minors. Office of Juvenile Justice and Delinquency Prevention	No economic evaluation performed
5	Donato, R., Shanahan, M., Higgins, R., 1999. A cost-benefit analysis of child sex-offender treatment programs for male offenders in correctional services. Child Protection Research Group. University of South Australia	Interventions aimed at adult child sex-offenders
6	Hackett, S., Phillips, J., Masson, H., Balfe, M., 2013. Individual, Family and Abuse Characteristics of 700 British Child and Adolescent Sexual Abusers. Child Abuse Review, 22 (4). pp. 232-245. ISSN 0952-9136	No economic evaluation performed
7	Prentky, R., Burgess, A.W., 1990. Rehabilitation of child molesters: a cost-benefit analysis. Am J Orthopsychiatry 60, 108–117.	Interventions aimed at adult child sex-offenders

5 Borduin and Dopp (2015)

The economic impact study on MST for problem sexual behaviours (MST-PSB) conducted by Borduin and Dopp (2015) analyses a family based treatment compared with usual community services. The study assesses arrest data obtained in an 8.9-year follow-up from a randomised clinical trial with 48 young sexual offenders, who averaged 22.9 years of age at follow-up.

MST-PSB, an adaptation of standard MST aimed at young sexual offenders (see related effectiveness review for more detail[15]), consists of interventions at family and at peer level, with services provided in home, school and/or neighbourhood settings. At family level, MST-PSB aims to: a) reduce caregiver and youth denial about sex offences and their sequelae; b) remove barriers to effective parenting; c) help caregivers develop plans for risk reduction, relapse prevention and victim safety; and d) promote affection and communication among the family. At peer level, MST-PSB interventions are conducted by the youth's caregiver guided by a therapist and often consist of active support and encouragement of relationship skills and associations with non-problem peers and substantive discouragement of relationships with deviant peers. At school level, a therapist supports caregivers to develop strategies for monitoring and promoting the youth's academic performance. In some cases, individual interventions are also used with the youths or caregivers to modify their social perspective-taking skills, belief system or attitudes that contributed to sexual offending. MST-PSB has an average length of treatment of 7 months and a relatively small therapist caseload of four or five families. In this study, participants received about three hours of MT-PSB per week. Therapists were available to respond to clinical problems 24 hours a day, seven days a week.

Youths in the usual care group received cognitive-behavioural group and individual treatment through the treatment services branch of the local juvenile court. Youths attended group treatment (with four to six youths, all juvenile sexual offenders and participants in the clinical trial) for 90 minutes twice a week and individual treatment for 60-90 minutes a week. Group treatment focused on helping each participant to: a) accept personal responsibility for their sexual offences, b) eliminate deviant cognitions, c) learn new social skills, including anger management, d) develop victim awareness and empathy and e) engage in behaviours and thoughts that prevent relapse. Individual therapy was provided by a different therapist from the group intervention and was designed to address barriers and reinforce progress in the group intervention.

[15] A systematic review examining the evidence for identifying and helping children and young people who display harmful sexual behaviour undertaken by Fiona Campbell, Evgenia Stepanova, Simon Hackett, Andrew Booth, Anthea Sutton, and commissioned by NICE.

Participants were the full sample of 48 youths who participated in a randomized clinical trial (Borduin et al., 2009). In the original study, juvenile sexual offenders and their families were referred consecutively by juvenile court personnel and randomly assigned to MST-PSB (n=24) or Usual Community Services (UCS; n=24). Families were eligible to participate in the study if the youth:

- had been arrested for a serious sexual offense (i.e., rape/sexual assault or molestation of younger children) with a subsequent order for outpatient sexual offender counselling;
- was currently living with at least one caregiver; and
- showed no evidence of psychosis or serious intellectual disability.

The youths averaged 4.33 previous arrests for sexual and nonsexual offences. The mean age of the youths was 14 years. 95.8% were boys, 72.9% were white, 27.1% were black and, among all youths, 2.1% indicated Hispanic ethnicity. 31.3% lived with only one caregiver (who in all cases was a biological parent). The primary caregiver of the youths in the study included biological mothers (91.7%), biological fathers (6.3%), or stepmother (2.1%). Families averaged 3.3 children and 54.8% of the families were of lower socioeconomic status (Class IV or V).

For the study, researchers obtained participants´ juvenile and adult criminal records in the US state of Missouri to assess the treatment conditions at an average of 8.9-years follow-up. The study applied the Washington State Institute for Public Policy (WSIPP) model to the arrest records[16]. The model, which runs in Excel, is an integrated set of estimates and computational routines designed to produce internally consistent benefit-cost ratios. The model provides monetary estimates of a range of costs associated with criminal offences such as taxpayer expenses and tangible and intangible losses to victims. The model also provides formulas for comparison of the relative costs and benefits of different interventions. In the study, the year 2013 was used as baseline year for all monetary values and measured rearrests, taxpayer benefits, crime victim benefits and cumulative benefits.

Analyses performed by the authors were based on three sets of measures:

- Effectiveness: reductions in arrests during the 8.9-year follow-up for youths in the MST-PSB compared to the usual care conditions;
- Costs: resources used to provide MST-PSB vs. resources used to provide usual care; and
- Benefits: benefits to taxpayers and crime victims.

[16] For more information on the model see "Benefit-Cost Technical Documentation. Washington State Institute for Public Policy Benefit-Cost Model". (July 2015). http://www.wsipp.wa.gov/TechnicalDocumentation/WsippBenefitCostTechnicalDocumentation.pdf

The authors calculated the net benefit of MST-PSB for usual community services using the WSIPP model. The model calculates taxpayer benefits of avoided felony crimes, based on estimates of the annual marginal capital and operating expenses for six public agencies: police and sheriff's offices; superior courts and county prosecutors; jail and community supervision for adult felons; juvenile detention and supervision; state juvenile rehabilitation and adult detention. The model also considers crime victim tangible and intangible benefits. Tangible benefits are defined in terms of avoided expenses in these six areas: property damage or loss, medical care, mental health care, police and fire services, victim services and lost productivity. To calculate intangible values, the WSIPP model places a monetary value on the pain and suffering of victims of fatal and non-fatal crimes. For non-fatal crimes, including sexual crimes, intangible benefits have been estimated by subtracting tangible expenses associated with the crime from the amount of compensatory damages awarded by a jury.

For the analyses, Borduin and Dopp (2015) assumed that all eleven categories of offence included in the study (i.e. murder/manslaughter, sexual, robbery, assault, property, drug, theft/larceny, stolen property, fraud, misdemeanour assault, and misdemeanour drug) resulted in taxpayer expenditures. The authors also assumed that property crimes resulted in tangible, but not intangible, losses, and they did not include tangible or intangible losses for six categories because two categories (i.e. felony and misdemeanour drug) were considered victimless and for the other four (i.e. theft/larceny, stolen property, fraud, misdemeanour assault) a distribution of expected crimes was not available from any source.

Results of the analyses were expressed in terms of a net benefit estimate and a benefit-cost ratio. Crime victim intangible benefits are the largest component of benefits in the model. The model estimates that the net present value in 2013 US dollars of the taxpayer benefit was $96,366, the crime victim tangible benefit was $85,084 and the crime victim intangible benefit was $147,637. The cumulative benefits of MST-PSB were $343,455 per participant (see Table 4, page 7). Borduin and Dopp (2015) associate lower rates of post-treatment arrests in the MST-PSB group versus the usual community services condition with lasting reductions in expenses for both taxpayers and crime victims. According to the authors, every dollar spent on MST-PSB resulted in savings of $14.41 to the taxpayer, $12.84 in tangible benefits to crime victims and $21.55 in intangible benefits to crime victims over the 8.9-year follow-up. Taking all benefits together, Borduin and Dopp (2015) estimate that the total net benefit of providing MST-PSB resulted in a return of $48.81 per dollar spent.

Limitations of the study identified by the authors are as follows: individuals may not have continuously lived in Missouri throughout the follow-up period; MST-PSB and usual care costs come from a single provider site and may not be generalisable to other providers; the study

did not capture all possible benefits; the study did not capture cost shifting to other sectors such as mental health or primary care, and, given the small sample size, replication of the study is necessary. In addition to the limitations identified by the authors, it is important to note that MST-PSB has not been evaluated independently as the team led by Borduin and those conducting the evaluation are also providers of the MST-PSB intervention. As per quality appraisal of the study in Appendix F, the study is partly applicable and has potentially serious limitations.

6 Economic Modelling Methods

The aim of the economic evaluation is to compare the costs and benefits of interventions for HSB in children and young people primarily from the perspective of the public sector but also, where applicable, from a societal perspective. Relevant costs include intervention costs (e.g. staff time to deliver the intervention) and wider societal cost impacts which might include those incurred by the following:

- NHS;
- Local authorities;
- Criminal justice system;
- Education system;
- Young people and their families;
- Wider society, including impacts such as work productivity.

For public health interventions, benefits are generally defined in terms of health and wellbeing. The quality adjusted life year (QALY) is widely used by NICE to assess the benefits of its programmes and allows comparisons to be made across a wide range of possible uses of public funds. It is a useful summary measure of health but may not capture other aspects of wellbeing. In the current context, while the scope is constrained to interventions targeted at children and young people exhibiting or at risk of exhibiting HSB, it is relevant to consider QALY benefits to those who are subject or potentially subject to HSB.

The results of the economic analysis can be reported in a number of ways, such as:

- Cost-effectiveness analysis, in which results are reported as the cost per unit of outcome (e.g. cost per high risk young person identified) of one intervention relative to a comparator or comparators (e.g. do nothing or standard service provision);
- Cost utility analysis, in which results are reported in the form of cost per QALY gained;
- Cost-consequences analysis, in which a balance sheet of costs and benefits is presented without identifying a single summary measure of benefit.

The original scope for the economic analysis was to answer questions 1 to 4 presented in section 2 ‘Review questions’. However, it was felt that the evidence identified on identification and risk assessment (review questions 1-3) was insufficient to generate meaningful estimates of cost-effectiveness. On the other hand, the limited evidence available has permitted modelling of interventions in children and young people who display harmful sexual behaviour

(review question 4). Due to a lack of quantitative evidence found in the evidence reviews, particularly with regard to identification and risk assessment tools, a decision was made in conjunction with NICE to remove questions 1 to 3 from the scope of the analysis.

Therefore the economic analysis presented in this report is focused on answering question 4. To do this, a decision analytical model was developed. The model is focused on the population with abusive/violent behaviours, as there is peer-reviewed evidence from randomized trials for the effectiveness of interventions targeted at this population which are feasible for economic modelling. In this group, the available evidence available to populate a 'decision-analytic' cost-effectiveness model allowed intervention costs in the UK setting to be estimated, with monetised downstream impacts limited to criminal justice system (CJS) savings.

Interventions

The design of the economic model and the choice of interventions to model was informed by the effectiveness and cost-effectiveness reviews and by the issues of concern to the Public Health Advisory Committee (PHAC). We asked the PHAC to consider three topics when selecting the interventions for the economic model. These are as follows:

Use of the intervention:

- The PHAC should select ***interventions which they would like adopted;***
- The PHAC may wish to avoid extreme interventions which will likely not be widely used;
- The PHAC should look at the economic model as presenting the wider public with a "business case" for investing in certain interventions.

Cost of interventions:

- Certain interventions are likely to cost very little;
- If an intervention is "low cost" and is expected to generate a reduction of future offending rates then an economic model is likely not required to prove cost-effectiveness;
- The PHAC should select interventions for modelling where there is ***doubt around the value*** of investing a large amount of money.

Effect:

- Certain interventions are widely known to be effective;
- The PHAC should select interventions where ***effectiveness is not widely known*** and cost is significant – these interventions will benefit from economic modelling to assess cost-effectiveness for the wider public.

Based on this assessment, two interventions of interest were suggested by the PHAC for consideration in the economic model:

1. **Multi-systemic therapy for problem sexual behaviours (MST-PSB)**
2. **Cognitive behavioural therapy (CBT)**

MST-PSB and CBT targets the abusive and violent behaviours of children with HSB. The following sections provide more detail of each intervention.

Multi-systemic therapy for problem sexual behaviours (Borduin and Dopp, 2015)

MST-PSB is a type of therapy that targets a set of identified risk behaviours through individualized interventions. The interventions integrate methodologies from clinical settings, CBT and family therapy. This study focused on a form of MST that is specifically targeted at sexual behaviours.

The study recruited 48 juvenile sexual offenders who were referred by juvenile court personnel in two US counties in the mid-western United States. Requirements for participation in the study were that the youth was arrested for a serious sexual offence with a subsequent order for outpatient sexual offender counselling, was currently living with at least one parent figure and showed no evidence of psychosis. The mean age of participants was 14 years. Since youths enrolled in the study had been arrested for a serious sexual offence, it may be that they correspond broadly with the over 4000 young people recorded by police forces in England and Wales in 2013/14 as perpetrators of sexual offences against other children. However, it may be that those enrolled in the Borduin and Dopp (2015) study would be considered, compared with the perpetrators identified in England and Wales, to be at a more severe point along the spectrum of behaviours. Due to the small sample size in this study and potential differences in characteristics between the young people enrolled in the trial those of interest from NICE's perspective, caution should be used in generalizing from this study to the context of England and Wales, even for children and young people with apparently similar histories.

Participants were randomised to MST-PSB or usual community services (UCS) which consisted of cognitive behavioural group or individual treatment. Mean length of treatment for both groups was 30.8 weeks with an 8.9 year follow up period. The authors estimated that the costs of delivering the intervention were $12,745 per youth compared with $5,561 per youth for UCS.

At the end of the follow up period it was estimated that 42% of youths in the MST group reoffended compared with 75% of youths in the comparator group. The mean re-offending rate for all crimes (including sexual and felony crimes) was 1.38 re-arrests for the MST-PSB group compared with 5.04 re-arrests for the UCS group. Taxpayer and crime victim benefits have been estimated at $182,789 for each young person receiving MST, or a return on investment of $38.52 per $1 spent.

Limitations

This study has a number of limitations which limit its relevance to the England and Wales setting. The small sample, of 48 young offenders, enrolled into the study, and potential differences in their characteristics compared with the population of perpetrators of sexual offences against other children in England and Wales, have been noted. Secondly, the outcomes and benefits are based on the US context, where sentencing policy is different from that in the UK. The implication of this difference for the model is that the reported baseline level of offending may not be applicable in the UK. However, it may be reasonable to assume that the same relative changes in criminal behaviour can be achieved with this treatment in the UK. Sensitivity analysis around the effect size can then be performed to explore the effects of changing the impact on costs.

Another limitation is the comparator intervention in Borduin and Dopp (2015) of usual community services, consisting of a form of cognitive behavioural therapy (CBT). In the US this is considered usual care for juvenile sexual offenders but, in the UK, a mixture of services is provided. In a report by the University of Edinburgh and the NSPCC, it has been estimated that, in the UK, youths referred to local authorities are often provided with MST, CBT, family work or community based one to one therapy (NSPCC, 2013). We propose maintaining the comparator of CBT for the economic modelling, with the caveat that the local context will need to be considered as the relevance of the estimates from the economic analysis will depend on current local authority provision of services. To aid with interpretation of estimates given differences in local practice, sensitivity analysis was conducted on the costs and effects to explore uncertainty with regard to the impact of the comparator on the overall cost effectiveness of MST-PSB.

For these reasons, and as caution should be used when considering how the results of a single study may be extrapolated beyond the particular circumstances of the trial, transferring the results of the study directly across to the England and Wales context may well be inappropriate. While sensitivity analysis can be used to explore the responsiveness to the

results of changes in input parameters, the likely impacts of different interventions should a trial of this kind be replicated in the England and Wales setting are currently a matter of speculation. This is an area where additional research is urgently needed.

Cognitive Behavioural therapy (Carpentier et al., 2006)

CBT for children with sexual behavioural problems (SBP) is a form of group therapy based on behavioural modification and psychoeducational principles. During the group sessions, topics such as inappropriate sexual behaviour, sex education and learning concrete sexual behaviour rules and self-control techniques are covered.

The study randomized 135 children with SBP referred by child welfare, law enforcement and juvenile courts, physicians, school personnel and mental health centres in the US to CBT or Play Therapy (PT). PT is based on psychodynamic play therapy which is client centred. Therapists were on hand to provide minimal direction and also provide reflections and probe into feelings and interpret patterns of play. Each treatment group was given twelve sessions lasting 60 minutes each.

Children were included in the study if they had clinically significant SBP, were aged between 5 and 12 years old and the child and the caregiver were fluent in English. Children were excluded after assessment if their Kaufmann Brief Intelligence (KBIT) IQ score was less than 65, clinicians judged the child too severe for outpatient treatment, the child and parents dropped out of randomisation or refused to be randomised to treatment. Out of the 135, only 13 participants had one or more arrests for a sexual offence. The follow up period for the study was 10 years.

A comparison group of 156 children was selected from the same outpatient clinic and selected for inclusion if they were seen during the same time frame as the treatment group, were aged between 5 and 12 years, had no reported history of SBP and they did not have a diagnosis of autism, pervasive developmental disorder or childhood psychosis. In this group, ADHD was the primary disorder diagnosed followed by adjustment disorder, oppositional defiant disorder and a mixture of learning, parent-child relationship and school behavioural problems.

At the end of the follow up period, those allocated to the CBT group had a reduced likelihood of being arrested for sexual offences compared with those in the PT group ($p<0.05$). When comparing CBT against the comparison group, the difference was not statistically significant. For nonsexual offences, group differences (CBT vs PT vs comparison), including those adjusting for baseline differences, were not statistically significant. Caution is needed when interpreting the CBT vs control group estimate as the control group were drawn from a different sub-

population (ADHD) with no reported history of SBP. Therefore, concrete conclusions of CBT vs no treatment cannot be made based on the findings from the study, only that CBT is more effective than PT.

Limitations

Like the MST-PSB study, the main limitations for this study are the contextual differences between the US and the UK and the appropriateness of the comparator intervention. We have applied the same methodology used for MST-PSB to overcome these limitations.

Conceptual model

In principle, we would like the analysis to encompass all the important costs and benefits of an intervention, covering a broad range of perspectives (LA, NHS, CJS). A useful way of organising the relevant information is in the form of a decision analytic model such as that illustrated in Figure 3.

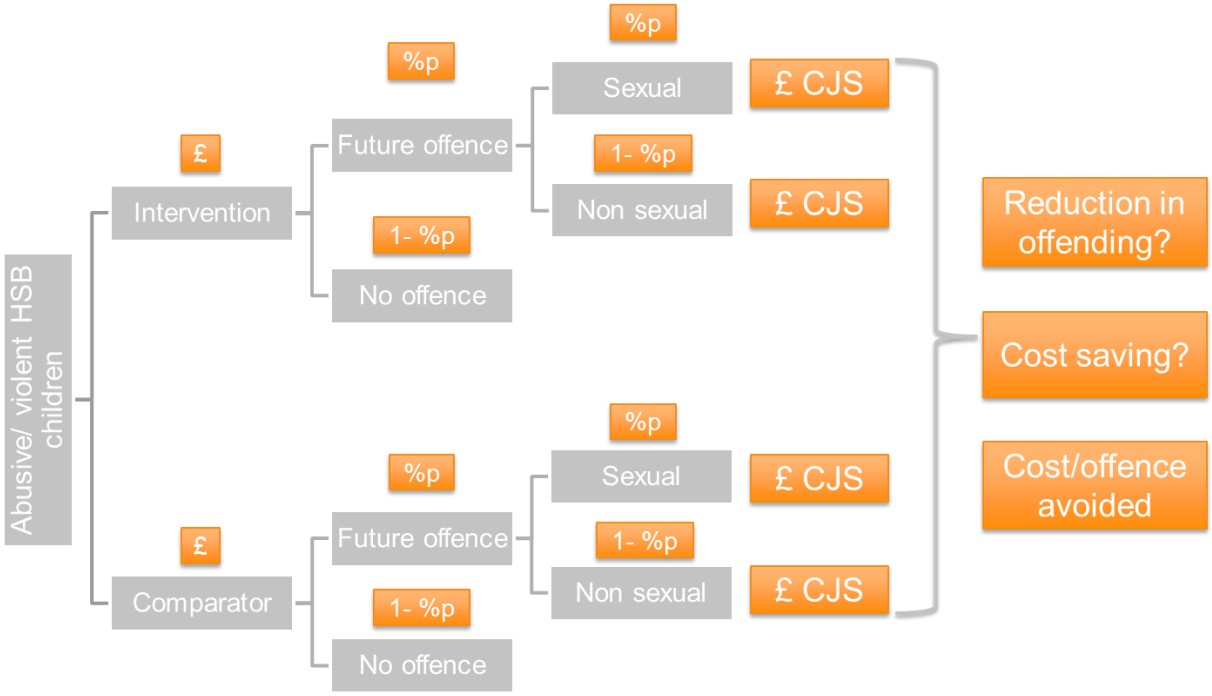
The conceptual model is based on the MST-PSB and CBT interventions described in the previous section. These interventions are targeted at abusive/violent behaviours. Children who are classed as having abusive/violent HSB enter the model and can either be assigned to the intervention or the comparator. Both interventions measure impact in terms of a reduction in the probability of future offending, split between sexual and non-sexual offences.

Based on the evidence available, the cost data used in the economic model are the implementation costs of the interventions (which will most likely be incurred by the LA), and the downstream benefits which, in the case of (re)offending, will predominantly be CJS savings. Both interventions have a long follow up period (8.9 years for MST-PSB and 10 years for CBT) and thus give an estimate of offending into adulthood and the costs associated per offence. CJS costs are direct and therefore will only be incurred on an incident basis, rather than year on year savings after the point of intervention. If an intervention results in a positive net benefit purely on the basis of CJS costs, then no further evidence is required to justify it (given that the avoidance of crime will be associated with other positive benefits).

However, there may be wider societal impacts of the interventions for the cohort, in terms of health, education and employment, which would generate costs savings year on year and allow for a lifetime time horizon for the model. As there is a lack evidence of the transition

probabilities for this population and these wider impacts, the time horizon of the model reflects the follow up periods used for each of the interventions.

Figure 3: Conceptual economic model



Model parameters

Population

Currently rates for sexual offending amongst juveniles provide the best estimate of the prevalence of HSB but there is consensus amongst experts that these figures underestimate the size of the problem (Home Office, 2006; Hackett et al., 2013). A Freedom of Information request by the NSPCC found that, in 2013, 4,209 young people under 18 in England and Wales were recorded as perpetrators of sexual offences against other children. Research also suggests that between a quarter and one third of reported sexual abuse is committed by children and adolescents. The NSPCC uses 30% as the figure for the percentage of sexual abuse committed by children and young people.

The baseline population for the MST-PSB intervention was juvenile sexual offenders. We therefore use the estimated number of juvenile sexual offenders (4,209) as the cohort for the model. The target population for the CBT model will be different as the majority of the participants had no history of offending, but were deemed to have clinically significant HSB. However, for the UK, there is little evidence on the number of children with clinically significant HSB. We used the same number of children as the MST-PSB model in order to be able to compare the magnitude of cost savings on a near like for like basis.

Intervention Costs

Borduin & Dopp (2015) estimate the costs for MST-PSB and usual care to be $12,745 and $5,561, respectively. However, these are based on US costs of resources. A UK cost of MST was obtained from PSSRU[17], which gave an estimated cost per therapy session of £122[18] (when uprated to 2015/16 prices using the GDP deflator). This cost is based on a UK cost-effectiveness study of MST by Cary et al. (2013). CBT session costs were also based on PSSRU unit costs and were estimated to be £94 per session. This cost is based on a cost per hour per team member from a multi-disciplinary Child and Adolescent Mental Health Service (CAMHS) team.

The number of treatment sessions and the duration of the intervention were obtained from Borduin & Dopp (2015) to calculate an overall cost of treatment per youth of **£11,147** for MST-PSB and **£5,216** for CBT (Table 2 and Table 3).

Table 2: MST costs

Parameter value	MST-PSB (£2014)	Source
Cost per session	£122	PSSRU (2014) Each therapy session lasts for 1 hour
Number of hours of intervention per week	3	Borduin & Dopp (2015)
Number of weeks of treatment	30	Borduin & Dopp (2015)
Total cost per person	£11,147	Calculation

[17] PSSRU, 2014. Unit Costs of Health and Social Care. Canterbury: PSSRU

[18] PSSRU estimated unit cost to be £119 based on 13/14 base prices. Figure uplifted for 14/15 base price.

Table 3: CBT costs

Parameter value	CBT (£2014)	Source
Cost per session	£94	PSSRU (2014)
Number of hours of intervention per week	4.25	Borduin & Dopp (2015)
Number of weeks of treatment	30.1	Borduin & Dopp (2015)
Total cost per person	£5,216	Calculation

For the CBT intervention (Carpentier et al., 2006), the costs of the intervention and comparator are based on a bottom up costing of the resource components of each treatment protocol outlined in the study (Table 4 and Table 5). The same cost per session of CBT applied to Borduin and Dopp (2015) have been used to estimate intervention costs for the Carpentier et al. (2006) intervention. However CBT was delivered differently in this study. All sessions were group based, and treatment included parents and carers of the children. Costs of PT were obtained from research published by PTUK (2011) which estimated the cost per session as £49[19]. Based on these costs and resource requirements, the total costs per youth were estimated to be **£2,248** for CBT and **£1,174** for PT.

Table 4: CBT costs

Parameter value	CBT (£2014)	Source
Cost per session	£94	PSSRU (2014)
Number of sessions	12	Carpentier et al. (2006)
Number of groups in a session	2	Carpentier et al. (2006). Each session consisted of two groups, one for children and one group for parents and carers.
Total cost per person	£2,248	Calculation

Table 5: PT costs

Parameter value	PT (£2014)	Source
Cost per session	£49	PTUK 2011 - http://www.playtherapy.org.uk/

[19] PTUK estimated unit cost to be £45 based on 2011 base prices. Figure uplifted for 15/16 base price

Parameter value	PT (£2014)	Source
		AboutPTUK/Research1.htm
Number of sessions	12	Carpentier et al. (2006)
Number of groups in a session	2	Carpentier et al. (2006). Each session consisted of two groups, one for children and one group for parents and carers.
Total cost per person	£1,174	Calculation

Effectiveness

The main measure of effectiveness for the interventions is reduction in future offending. Effectiveness of the interventions and their comparators are taken directly from the studies. The MST-PSB study (Borduin & Dopp, 2015) measures the reduction in re-offending for both sexual and non-sexual offences over an 8.9 year follow up period (Table 6).

Table 6: Effect size for MST-PSB (Borduin and Dopp, 2015)

Treatment group	% re-arrests (Total crime)	% of rearrests attributable to sexual offence	% of rearrests attributable to non-sexual offence
MST-PSB	41.7%	9.1%	90.9%
Usual care	75%	22.3%	77.7%

The CBT study (Carpentier et al., 2006) measures reductions in future sexual offending over a 10 year follow up period (Table 7). Carpentier et al. (2006) stated that non-sexual offending was 12 times the rate of sexual offending[20]. This multiplier was applied to sexual offending in the model, to estimate the costs and benefits associated with non-sexual offending for the study.

Table 7: Effect size for CBT over 10 year (Carpentier et al., 2006)

Treatment group	% 1 or more future sexual offences
CBT	2%

[20] It should be noted that between the CBT and PT, there was no significant difference in rates of offending. However, evidence by presented by Dr Eileen Vizard at a PHAC committee meeting suggested that rates of non-sexual offending in this cohort are significant. Therefore in order to account for this in the CBT model, we decided to use the figure given in the paper to estimate the magnitude of CJS costs associated with non-sexual offending and to help comparison of estimates with the MST-PSB estimates.

PT	10%

Each study presented a survival curve for offending based on the follow up data of participants. An earlier report of the MST study published by Borduin et al. (2009) found that arrests for participants in each treatment protocol happened within the first 3 years of follow up, after which no more arrests were identified. The probability of being arrested in each year was lower for the MST-PSB group than for the CBT group.

Carpentier et al. (2006) found that rate of arrests declined over the entire 10 year follow up for both groups. However the CBT group had a lower probability of arrest in each year compared to the PT group.

Based on these curves, we assumed a distribution of effect which would allow for appropriate discounting of costs over the years.

Costs of crime

From an initial review of data related to costs of crime we have identified two sources which could potentially provide relevant UK costs for the economic model:

- The National Audit Office, 2011. The cost of a cohort of young offenders to the criminal justice system;
- The Home Office, 2005. The economic and social costs of crime against individuals and households.

Optimity engaged with Ministry of Justice experts to validate which are the most relevant costs to use for the model, and to identify any assumptions that may be required in order to calculate costs accurately. From this discussion, it was decided that the National Audit office costs would be the most appropriate to use, as they specifically relate to costs of dealing with crime for juvenile offenders.

Table 8 outlines the costs of youth offending by different categories of offence based on the National Audit Office report. The costs are based on a cohort of over 80,000 juvenile offenders in the UK aged between 10-17 years who committed their first proven offence in the year 2000. The cost calculations include the costs of police, courts, offender management teams, and custody. Estimates exclude the cost of unrecorded crime. They also exclude the societal costs of both recorded and unrecorded crimes, such as the costs of the physical and emotional

impact on victims or the costs businesses and individuals incur in anticipation of crime. The costs presented in the report are expressed in 2008/9 prices and have been adjusted for inflation in Table 7.

Table 8: Costs of crime by offence category (National Audit Office, 2011)

Offence category	Cost (under 18)	Cost (over 18)	Average
Violence against the person	£7,834	£14,570	£11,202
Sexual offences	£4,653	£12,474	£8,564
Burglary	£1,891	£3,951	£2,921
Robbery	£5,500	£10,803	£8,151
Theft and handling stolen goods	£3,031	£4,597	£3,814
Fraud and forgery	£1,490	£3,557	£2,523
Criminal damage	£962	£510	£736
Drug offences	£1,604	£2,865	£2,234

An average of the non-sexual crimes (£4,512) was used for the CBT model (Carpentier et al., 2006), as no information was given in the paper about the prevalence of the different types of non-sexual offences committed.

Borduin & Dopp (2015) did provide data on the prevalence of offences falling under the non-sexual offence category, which were then mapped to UK crime categories (Table 9). This prevalence was applied to the associated cost of the crime in order to provide a weighted unit cost (Table 10). Based on this, the cost of a non-sexual crime was estimated to be £3,245 for MST-PSB and £3,662 for CBT.

Table 9: Distribution of arrests by treatment protocol

UK Arrest category	MST-PB	CBT
Homicide	0%	0%
Common assault/ violence against person	12.12%	19.01%
Robbery	3.03%	0.00%
Burglary in a dwelling	0.00%	0.00%
Theft	9.09%	4.14%
Criminal damage	33.33%	44.63%
Fraud and forgery	3.03%	2.48%

Drug offences	30.30%	7.44%

Table 10: Weighted unit cost of crime by treatment protocol

UK Arrest category	MST-PB	CBT
Homicide	£0.00	£0.00
Common assault	£1,493.43	£2,741.00
Robbery	£271.68	£0.00
Burglary in a dwelling	£0.00	£0.00
Theft	£381.34	£203.23
Criminal damage	£269.90	£422.91
Fraud and forgery	£84.09	£80.54
Drug offences	£744.69	£213.97
Total	£3,245	£3,662

In addition, whilst the scope of the guidance is to focus on costs and benefits related to the perpetrator, it is important to consider the potential benefits the interventions may have by preventing people becoming victims of crime as, economically, these are large.

Quality Adjusted Life years (QALYs)

When performing an economic evaluation for NICE guidance, the standard reference case to assess cost-effectiveness of an intervention takes into account the impact on health, usually measured in terms of QALYs[21]. A QALY is 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 QALY is equal to 1 year of life in perfect health[22].

A large demographic study carried out in the UK by Hackett et al. (2013) found that 66% of children who had been identified as displaying HSB often had experienced abuse and 38% were identified as having learning difficulties. Whilst the research shows that children displaying HSB are likely to have health problems mostly related to mental health, there is no evidence of the impact in terms of QALYs that interventions to treat HSB have on children with these behaviour patterns.

[21] NICE, 2014. Developing NICE guidelines: The manual. London: NICE

[22] NICE: https://www.nice.org.uk/glossary?letter=q

Instead, if we want to assess any potential impact on QALYs as a result of intervention, we would need to look at it from the victim's perspective. There is evidence of the QALY losses for adults who have experienced crime, in particular sexual crimes (Dolan et al., 2005). Table 11 presents the QALY loss by crime category for a victim of crime.

The QALY estimates presented by Dolan et al. (2005) are based on physical injury categories from the British Crime Survey. The estimates take into account the psychological trauma as well as the physical impacts associated with the crime (Acute Stress Disorder and PTSD). The calculation of the QALY estimates are based on the Global Burden of Disease study's disability weightings and take into account the duration of time spent in the health state.

Table 11: QALY losses associated with different categories of crime

Physical injury category	Discounted QALY loss
Homicide	17.791
Serious wounding	0.191
Other wounding	0.031
Common assault	0.007
Rape	0.561
Sexual assault	0.16
Robbery	0.28

The main limitations of these estimates for use in the economic model are as follows:

- The victims of the children with HSB are usually children themselves (Hackett et al., 2013). At present there is no evidence for the QALY losses for children who are victims of crime;
- The number of victims of a child with HSB is uncertain. Hackett et al. (2013) found, in their study sample of 700 children, that 75% had three victims or less. However, the authors found that, in a small number of cases, the number of victims could not be estimated as the individuals' problematic behaviours were so frequent.

Due to the lack of appropriate information on QALYs, it has been assumed for the modelling that:

- Children's QALYs would be the same as adults;
- The number of victims per offender is 3, based on the study by Hackett et al. (2013).

If the interventions are shown to have a positive net benefit (i.e. the cost savings from avoided crime are greater than the cost of the intervention), then there are likely to be wider benefits in terms of QALY gains (even though we do not know the magnitude), which will serve to enhance the cost-effectiveness of the intervention.

Cost effectiveness metrics

Ideally the cost-effectiveness of an intervention should be estimated by producing an incremental cost effectiveness ratio (ICER). As indicated in the NICE methods manual[23], an ICER helps the PHAC to form recommendations. ICERs are calculated as follows:

$$\frac{Cost\ of\ intervention - cost\ of\ comparator}{QALYs\ of\ intervention - QALYs\ of\ comparator}$$

The incremental cost divided by the incremental QALY gain of an intervention gives the ICER. The resulting ICER is then compared against a threshold of £20,000 - £30,000. ICERs below this threshold are generally taken by NICE to indicate that the intervention is cost-effective.

In the previous section, limitations with estimating the QALYs for the analysis were discussed. In light of these limitations and in discussion with NICE and the PHAC committee, it was decided that developing an ICER was not appropriate, but instead cost-effectiveness should be estimated by calculating the net benefit of the intervention. Net benefit[24] is calculated as follows:

$$(Total\ costs\ of\ comparator - total\ costs\ of\ intervention) + £QALY\ gains$$

If the net-benefit is positive, this indicates that the incremental benefits of the intervention outweigh the incremental costs when compared against the counterfactual intervention and can be interpreted as cost-effective.

Costs and benefits are both discounted at 3.5% annually, in line with the HM Treasury 'Green Book' guide (2011)[25] to public policy appraisals.

[23] http://www.nice.org.uk/article/pmg20/chapter/1%20Introduction%20and%20overview

[25] The Green Book – Appraisal and Evaluation in Central Government (http://www.hm-treasury.gov.uk/d/green_book_complete.pdf).

7 Results

MST-PSB (Borduin & Dopp, 2015)

Table 11 presents the aggregate results of the economic analysis for MST-PSB vs CBT. As the study on which the results are based enrolled young people who had been arrested for a serious sexual offence, it was considered that they could potentially apply to the population of 4,209 perpetrators of sexual offences identified in England and Wales, albeit with the caveats noted above about the design of the Borduin and Dopp (2015) trial. After making adjustments to the intervention and crime-related costs to reflect the UK context more closely, the costs per young person were found to be similar in MST and CBT groups, with a slight advantage in favour of MST. The cost of a session of MST, of £122, was based on that presented in the PSSRU Unit Costs of Health and Social Care publication (Curtis, 2014), uprated for inflation. That figure in turn is reported as being based on the study by Cary et al. (2013) who compared MST and usual services among young people referred from two youth offending services in England (although sex offenders were explicitly excluded from the trial). The cost for a session of MST was combined with the number of sessions of MST reported by Borduin and Dopp (2015) to give a total cost per person of £11,147. MST costs include salaries, overheads and capital but may not capture the characteristic of MST whereby therapists are available to respond to clinical problems 24 hours a day, seven days a week. The cost per person of CBT was similarly based on an hourly cost reported in Curtis (2014) and the total time associated with CBT from Borduin and Dopp (2015), giving a cost per person of £5,216.

Similarly, the costs reported for MST and CBT in the US analysis gave a higher cost for MST (US$12,745 versus US$5,561). In both cases, the lower rate of re-offending among those in the MST-PSB group generates cost savings associated with reduced CJS which result in the intervention providing a net cost saving, consisting of the difference in the sum of intervention and CJS costs. That is, the reduction in CJS spending is estimated to exceed the cost of the intervention. Including QALY benefits adds to the overall monetary benefit of MST. The difference between QALY losses in the MST and CBT groups gives a gain of 255 QALYs in the MST group. These are valued at £20,000 each (the lower end of NICE's reference range for assessing cost-effectiveness of £20,000-£30,000 per QALY), giving a total value of £5.1m.

Table 12: Cost-effectiveness results of MST-PSB vs CBT

	MST-PSB (intervention)	CBT (comparator)	Difference (MST - CBT)
Cost of intervention (£m)	£46.9	£22.0	£25.0
Number of re-offenders post intervention	1754	3157	-1403
Criminal Justice System costs (£m)	£8.9	£74.0	-£65.1
Total costs (£m)	£55.8	£96.0	-£40.2
QALY loss (victims)	-75	-331	255
Net benefit (£m, incl. £QALYs)			£45.3

Sensitivity analysis

The results of the cost benefit analysis (CBA) are dependent on the input data that is used and any uncertainty around these estimates could potentially lead to an under or overestimation of the benefits and costs. Therefore, it is critically important to establish the extent to which the model results are sensitive to changes in parameter inputs (say, if the effectiveness of MST-PSB was lower than reported in the published study). Both one and two way sensitivity analyses were carried out to estimate the impact on net benefit.

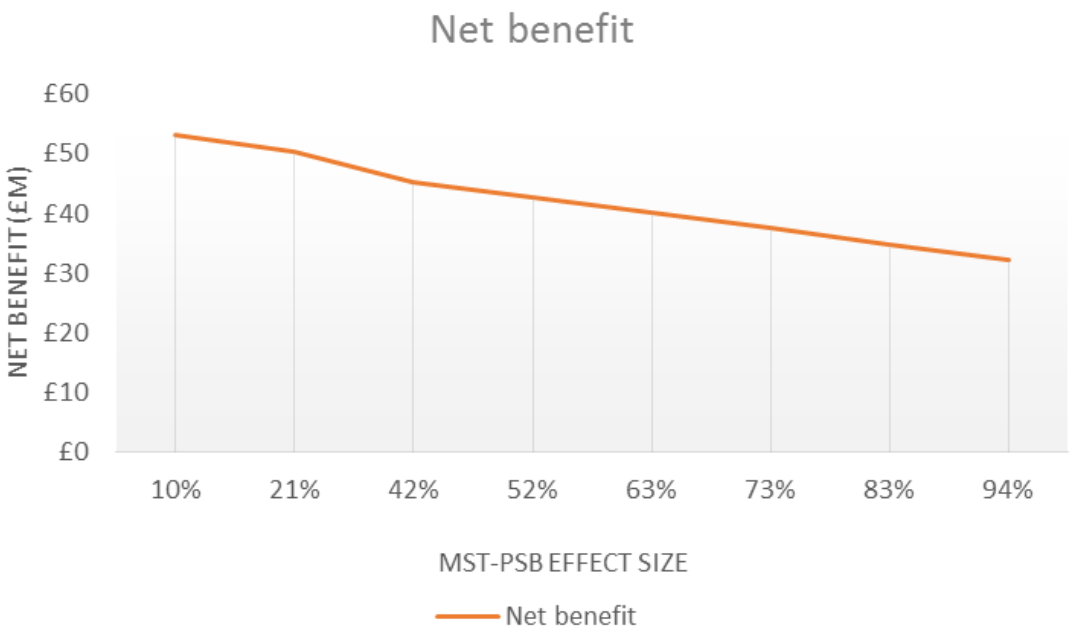
As the analysis suggested that MST dominates CBT in the population studied, that is, it is cost saving and generates QALY gains, it was important to vary the input parameters on costs and effectiveness to explore the change in these variables which would be required, firstly, for MST no longer to be cost saving and, secondly, not to be cost effective. Since the cost savings in the base case (Table 11) were comprised largely of savings in CJS costs, and these are, in turn, influenced by assumptions about effectiveness, sensitivity of the results was tested primarily in response to changes in effectiveness. Differences in effectiveness are made up of three elements:

- Probability of re-offending;
- Number of offences committed;
- Type of offence committed.

The initial sensitivity analysis we conducted was to investigate the sensitivity of the results to changes in the effectiveness of MST, as reflected in the post-intervention reoffending rate (base case 42%). **Error! Reference source not found.**4 presents the results of a one-way sensitivity analysis of re-offending rates post intervention for MST-PSB (Scenario 1). The results show that net benefit is relatively insensitive to changes in the rate of re-offending, and this is

predominantly driven by lower costs of offending related to the mean number of arrests for those who offend (1.38 for MST-PSB vs 5.04 for CBT).

Figure 4: Effect of re-offending rates on net benefit (Scenario 1)

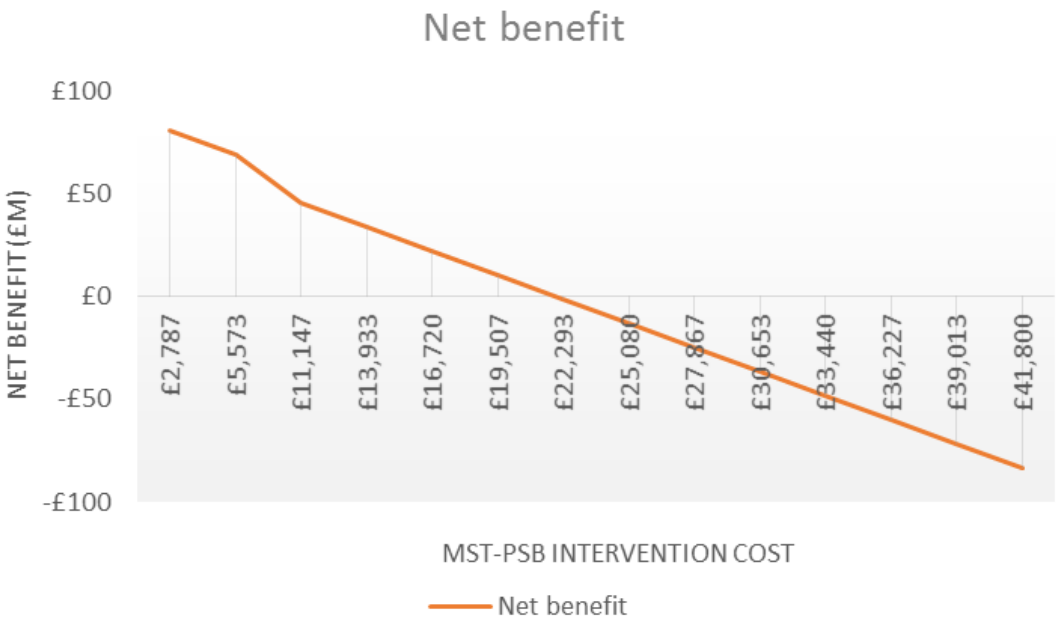


Even with a rate of re-offending for MST above that observed in the CBT group, MST continued to generate a cost saving on the basis of intervention costs and CJS costs and, consequently, a net benefit when the value of QALYs is included. To capture the impact of varying the number of offences, a worst case scenario was investigated whereby the probability of re-offending and the number of offences in the MST group were set equal to those in the CBT group (scenario 2). While MST still generates some benefits under these extreme assumptions (due to the distribution of crimes), the cost per QALY gained for MST versus CBT was around £48,000 and therefore MST would not be considered cost-effective relative to NICE's reference range of £20-30,000 per QALY.

Since MST remains cost saving over a range of values for the effectiveness parameters, and as engagement with the PHAC and with NICE has suggested that the intervention costs of MST may be underestimated in the model, a sensitivity analysis was conducted on the cost of MST

(£11,147 per youth in the base case). Figure 5 presents the results of a one way sensitivity analysis for intervention cost (Scenario 3). Under the base case scenario, MST-PSB is more costly per youth than CBT (£11,147 vs £5,216), but nevertheless provides an overall cost saving and net benefit (including the value of QALYs) relative to CBT. In order for the intervention to continue to generate a positive net benefit, the maximum cost per youth for MST-PSB cannot exceed £21,905 with all other base case assumptions maintained.

Figure 5: Effect of intervention cost on net benefit (Scenario 3)



Finally, the results of the two way sensitivity analysis for both costs and effects (probability of re-arrest) are presented in Table 13. All other input parameters (such as mean number of arrests) remain unchanged from the base case.

As the rate of re-offending increases, in order for the intervention to continue to generate a positive net benefit, MST-PSB costs need to fall. One combination of values for which MST-PSB no longer generates a positive net benefit is a post intervention re-offending rate of 73% coupled with a cost per youth of £20,271.

Table 13: Effect of intervention cost and re-offending rates on net benefit

Effect	Intervention cost													
	£2,534	£5,068	£10,135	£12,669	£15,203	£17,737	£20,271	£22,804	£25,338	£27,872	£30,406	£32,940	£35,473	£38,007
10%	£89	£79	£57	£47	£36	£25	£15	£4	-£7	-£17	-£28	-£39	-£49	-£60
21%	£87	£76	£55	£44	£33	£23	£12	£1	-£9	-£20	-£31	-£41	-£52	-£63
42%	£82	£71	£50	£39	£28	£18	£7	-£4	-£14	-£25	-£36	-£46	-£57	-£68
52%	£79	£68	£47	£36	£26	£15	£4	-£6	-£17	-£28	-£38	-£49	-£60	-£70
63%	£76	£66	£44	£34	£23	£12	£2	-£9	-£20	-£30	-£41	-£52	-£62	-£73
73%	£74	£63	£42	£31	£20	£10	-£1	-£12	-£22	-£33	-£44	-£54	-£65	-£76
83%	£71	£60	£39	£28	£18	£7	-£3	-£14	-£25	-£35	-£46	-£57	-£67	-£78
94%	£69	£58	£37	£26	£15	£5	-£6	-£17	-£27	-£38	-£49	-£59	-£70	-£81

CBT (Carpentier et al., 2006)

Table 14 and Table 15 present the results of the economic analysis for CBT vs PT. The results are presented separately for sexual offences and all offences due to the nature of the results presented in the study. As mentioned previously, Carpentier et al. (2006) presented the main results in terms of future sexual offending, but made reference to the findings in their study that non-sexual offences were 12 times the rate of sexual offending.

The intervention is more costly than the comparator (PT) by approximately £4.5 million. However when considering sexual-offending alone, the intervention generates a positive net benefit. When adding the costs associated with non-sexual offending, the net benefit is even greater. In terms of net benefit per person, for sexual offences only this is around £600. When including non-sexual crimes, the net benefit is around £5,600 per person. In addition because of reduced re-offending, particularly in terms of sexual offences, the intervention generates QALY gains associated with a reduction in victims of sexual crimes.

Table 14: Cost-effectiveness results of CBT vs PT (sexual offences only)

	CBT (intervention)	PT (comparator)	Difference
Cost of intervention (£m)	£9.5	£4.9	£4.5
Number of re-offenders post intervention	84	421	-337
Criminal Justice System costs (£m)	£0.7	£4.7	-£4.1
Total costs (£m)	£10.1	£9.7	£0.4
QALY loss (victims)	-37	-186	149
Net benefit (£m, incl. £QALYs)			£2.5

Table 15: Cost-effectiveness results of CBT vs PT (all offences)

	CBT (intervention)	PT (comparator)	Difference
Cost of intervention (£m)	£9.5	£4.9	£4.5
Number of re-offenders post intervention	1010	4209	-3199
Criminal Justice System costs (£m)	£4.8	£29.8	-£25.0
Total costs (£m)	£14.3	£34.7	-£20.4
QALY loss (victims)	-37	-186	149
Net benefit (£m, incl. £QALYs)			£23.4

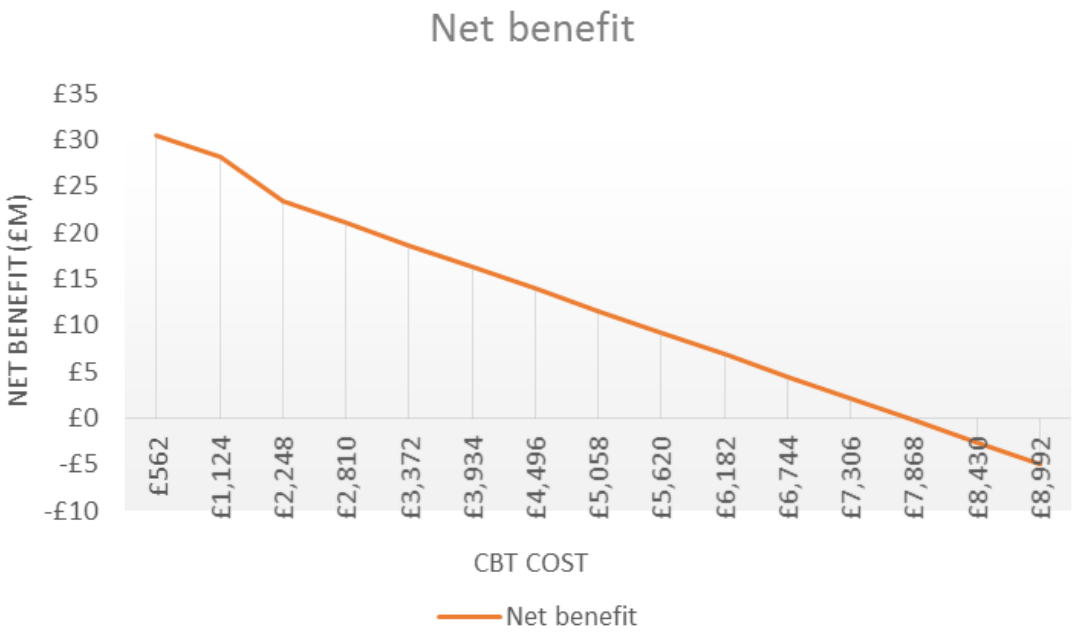
Sensitivity analysis

As before, sensitivity analysis was performed to estimate the extent to which variations in key parameters would impact on the model results. The sensitivity of the model was assessed for the following key parameters:

- Cost of CBT per youth = £2,248
- Effectiveness of CBT (post intervention sexual offending rate) = 2%

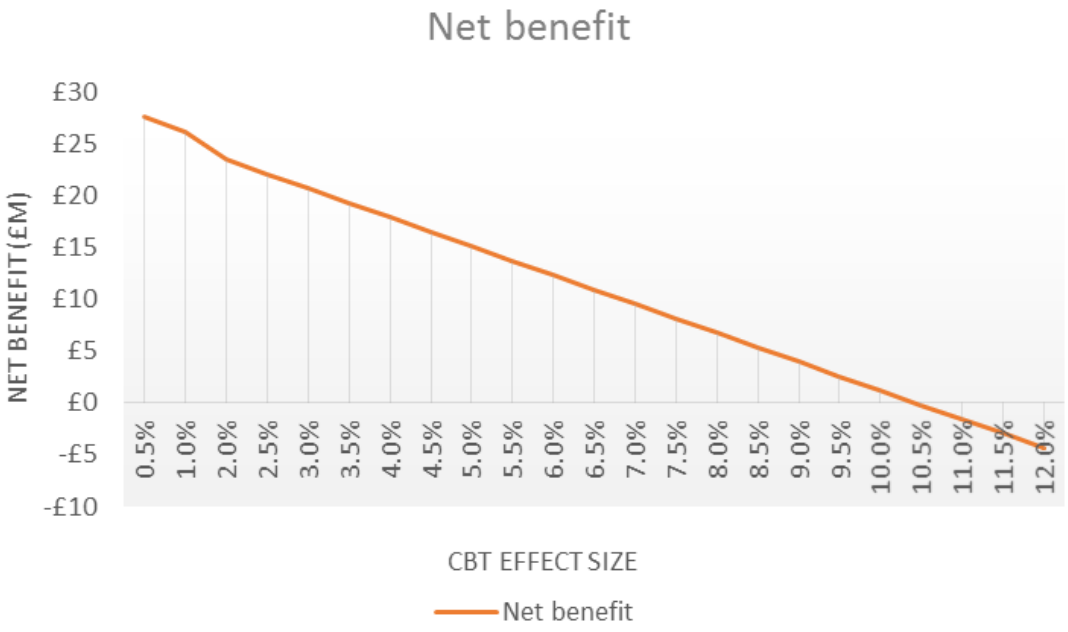
Both one and two way sensitivity analyses were carried out to estimate the impact on net benefit (all offences). Figure 6 presents the results of a one way sensitivity analysis for intervention cost (Scenario 1). Under the base case scenario, CBT was more expensive than PT (£2,248 vs £1,174). The threshold cost per youth at which CBT no longer generates a net benefit (including the value of QALYs) is £7,812.

Figure 6: Effect of intervention cost on net benefit (Scenario 1)



Like MST-PSB, the context in which the intervention was delivered in the study (US based) may mean that effectiveness is not directly transferrable. **Error! Reference source not found.** presents the results of a one-way sensitivity analysis of sexual offending rates post intervention for CBT (Scenario 2). If the rate of sexual offending post intervention for CBT reaches 10.5%, the intervention would no longer generate a net benefit.

Figure 2: Effect of sexual offending rates on net benefit (Scenario 2)



Finally, the results of the two way sensitivity analysis for both costs and effects is presented in Table 16. As in scenarios 1 & 2, all other input parameters remain unchanged from the base case. As the rate of sexual offending increases, in order for the intervention to continue to generate a positive net benefit, CBT costs need to fall. Equivalently, as the cost of CBT increases, the re-offending rate needs to fall to maintain a positive net benefit.

Table 16: Effect of intervention cost and sexual offending rates on net benefit

Effect size	Intervention cost														
	£546	£1,092	£2,184	£2,730	£3,276	£3,822	£4,368	£4,914	£5,460	£6,006	£6,552	£7,098	£7,644	£8,190	£8,736
0.5%	£35	£32	£28	£26	£23	£21	£19	£16	£14	£12	£9	£7	£5	£3	£0
1.0%	£33	£31	£26	£24	£22	£20	£17	£15	£13	£10	£8	£6	£3	£1	-£1
2.0%	£31	£28	£24	£21	£19	£17	£14	£12	£10	£8	£5	£3	£1	-£2	-£4
2.5%	£29	£27	£22	£20	£18	£15	£13	£11	£9	£6	£4	£2	-£1	-£3	-£5
3.0%	£28	£26	£21	£19	£16	£14	£12	£9	£7	£5	£3	£0	-£2	-£4	-£7
3.5%	£26	£24	£20	£17	£15	£13	£10	£8	£6	£3	£1	-£1	-£3	-£6	-£8
4.0%	£25	£23	£18	£16	£14	£11	£9	£7	£4	£2	£0	-£3	-£5	-£7	-£9
4.5%	£24	£21	£17	£14	£12	£10	£8	£5	£3	£1	-£2	-£4	-£6	-£9	-£11
5.0%	£22	£20	£15	£13	£11	£8	£6	£4	£2	-£1	-£3	-£5	-£8	-£10	-£12
5.5%	£21	£19	£14	£12	£9	£7	£5	£2	£0	-£2	-£4	-£7	-£9	-£11	-£14
6.0%	£19	£17	£13	£10	£8	£6	£3	£1	-£1	-£4	-£6	-£8	-£10	-£13	-£15
6.5%	£18	£16	£11	£9	£7	£4	£2	£0	-£3	-£5	-£7	-£9	-£12	-£14	-£16
7.0%	£17	£14	£10	£8	£5	£3	£1	-£2	-£4	-£6	-£9	-£11	-£13	-£15	-£18
7.5%	£15	£13	£8	£6	£4	£2	-£1	-£3	-£5	-£8	-£10	-£12	-£15	-£17	-£19
8.0%	£14	£12	£7	£5	£2	£0	-£2	-£4	-£7	-£9	-£11	-£14	-£16	-£18	-£21
8.5%	£13	£10	£6	£3	£1	-£1	-£4	-£6	-£8	-£10	-£13	-£15	-£17	-£20	-£22
9.0%	£11	£9	£4	£2	£0	-£3	-£5	-£7	-£10	-£12	-£14	-£16	-£19	-£21	-£23
9.5%	£10	£7	£3	£1	-£2	-£4	-£6	-£9	-£11	-£13	-£16	-£18	-£20	-£22	-£25
10.0%	£8	£6	£1	-£1	-£3	-£5	-£8	-£10	-£12	-£15	-£17	-£19	-£22	-£24	-£26
10.5%	£7	£5	£0	-£2	-£5	-£7	-£9	-£11	-£14	-£16	-£18	-£21	-£23	-£25	-£27
11.0%	£6	£3	-£1	-£4	-£6	-£8	-£10	-£13	-£15	-£17	-£20	-£22	-£24	-£27	-£29
11.5%	£4	£2	-£3	-£5	-£7	-£10	-£12	-£14	-£16	-£19	-£21	-£23	-£26	-£28	-£30
12.0%	£3	£1	-£4	-£6	-£9	-£11	-£13	-£16	-£18	-£20	-£22	-£25	-£27	-£29	-£32

8 Glebe House

Introduction

Glebe House is a registered independent Children's established in 1965 (and as a therapeutic community since 1969) to cater for damaged and challenging male adolescents who had failed in previous care or custodial settings but, since the early 1990s, has specialized in known male perpetrators of sexual abuse in late adolescence. A longitudinal evaluation has been published on the Glebe House website by Boswell et al. (2014).

Methods of the Evaluation

The study ran from November 2001 to July 2014. Between January 2002 and March 2010, 58 of 59 young men who joined the community agreed to participate in the study. Of these, 43 satisfied the criteria for inclusion in the annual follow-up group (the ongoing cohort). These were completion of the therapeutic programme (usually after two years) or leaving in a planned way, that is, with agreement from all relevant parties that all the necessary work had been completed to reach the optimum point for a return to the outside community. Semi-structured qualitative interviews were conducted among this group a few weeks after arrival at Glebe House, before departure, six months after departure and at yearly intervals thereafter. The final member of the ongoing cohort was interviewed in 2014, two years after leaving Glebe House.

Attempts were made to follow up the 15 who did not meet either criterion for entry into the ongoing cohort (the early leavers). Five of these dropped out within a few weeks before they could be interviewed, although information was obtained from staff interviews and case notes, while the remaining 10 remained for periods ranging from four to 18 months. A comparison group was also enrolled in the study, consisting of 43 of those who had been referred to Glebe House over the study period but had not become residents.

The comparison group was matched with the ongoing group on the basis of age and approximate date of referral. As the only data available on this group was for (re)convictions, this was the basis on which comparisons between those exposed (ongoing group) and not exposed (comparison group) to the therapeutic community were made. All those in the ongoing and comparison cohorts left Glebe House between 2004 and 2012.

Results of the Evaluation

Overall, seven of the 43 ongoing cohort members (16%) had offended at the end of the study, committing a total of 21 offences, compared with 19 of the 43 (44%) in the comparison group, committing a total of 95 offences. Only one member of the ongoing cohort had a conviction for a sex offence compared with five of the comparison group. Only one member of the ongoing cohort had a conviction for a violent (non-sex) offence, compared with five in the comparison group. Statistical tests for differences between groups were not reported.

9 Conclusions

The results of the effectiveness and cost-effectiveness literature review identified two published randomized trials which estimated the effectiveness of interventions for preventing offending in children and young people with harmful sexual behaviours. One study observed the effectiveness of MST-PSB compared with CBT (Borduin & Dopp, 2015) and the other study evaluated CBT vs PT (Carpentier et al., 2006).

The results of the economic analysis carried out for the two studies are summarised in Table 17. As far as is practically possible, intervention costs and criminal justice system costs have been adapted to the UK context. The analysis of MST is particularly worthy of mention because it has been studied previously in the UK (but with sex offenders excluded) and is currently the subject of a large randomized trial. The START trial is due to report on the effectiveness and cost-effectiveness of MST, although enrolment is not restricted to young people with HSB.

Both the analysis based directly on the randomized controlled trial (Borduin and Dopp, 2015) and the adapted analysis reported here find substantial CJS cost savings resulting from the lower re-offending rate and reduced number of crimes per person in the MST group, despite the higher intervention costs for MST. However, caution should be taken in general when attempting to translate any findings of a single small study beyond its immediate setting and perhaps more so in this example than in others. The sensitivity analysis conducted on the results reported here showed that, for some levels of effectiveness and intervention cost, MST may not be cost-effective. Without (at the time of writing) results from a UK trial of this intervention in young people with HSB being available, it is difficult to judge whether it will prove to be cost-effective in England and Wales.

Table 17: Summary results

Intervention	Source	Time horizon	Comparator	Cost savings	QALY gains	Net benefit
MST-PSB	Borduin & Dopp (2015)	9 years	CBT	£.40.2m	255	£45.3m
CBT	Carpentier et al (2006)	10 years	PT	£20.4m	149	£23.4m

Limitations which should be borne in mind when interpreting the results for both studies on which decision analytic models were based are as follows:

- Sentencing policy between the UK and the US is different and thus the effectiveness estimates from the studies may not be generalizable to the UK context.
- For MST-PSB, the comparator was a form of CBT, which other studies have shown is an effective intervention for children and young people displaying HSB and is currently a treatment which is offered in the UK to juvenile sexual offenders. As advised by the PHAC, MST-PSB is usually delivered to children and young people who may have already received CBT, but for which the treatment was not effective or for the more severe cases of HSB in order to avoid residential intervention. Therefore the relevance of the estimates at a local level will depend on the current local authority provision of services and prevalence of varying severity levels of HSB.
- There are wider benefits to both interventions which are not captured by the economic analysis, but which we have been advised by the PHAC committee could be generated. These benefits include improved educational and employment outcomes as well as improved confidence and relationships. Moreover this cohort are usually victims of abuse themselves (Hackett et al., 2013) and therefore intervention may help improve their mental health and overall quality of life.

Due to the absence of UK based interventions targeted at reducing or preventing offending for children and young people with HSB, the economic modelling conducted in this analysis can be used as a framework for considering the expected costs and estimating the corresponding benefits of specific interventions which may be more relevant to the UK. However, without data relevant specifically to children and young people who exhibit in a UK-relevant setting, their cost-effectiveness must be considered extremely uncertain.

Lastly, the results of an evaluation of a therapeutic community (Glebe House) suggest that this approach (a form of strength-based intervention) may generate benefits in the form of reduced offending. However, it is likely to be appropriate only for the most serious cases who are not deemed capable of being managed in the community (perhaps 10% of all HSB cases). The intervention costs are also uncertain, although broad brush estimates have indicated that they could be as high as £500 per day.

10 References

Borduin, C. M., & Dopp, A. R. (2015, June 15). Economic Impact of Multisystemic Therapy with Juvenile Sexual Offenders. Journal of Family Psychology. Advance online publication. http://dx.doi.org/10.1037/fam0000113

Boswell G, Wedge P, Moseley A, Dominey J, Poland F (2014). Treating sexually harmful teenage males: a longitudinal evaluation of a therapeutic community. Norwich: University of East Anglia.

Carpentier M Y, Silovsky J F, Chaffin M (2006). Randomized trial of treatment for children with sexual behavior problems: ten-year follow-up. Journal of Consulting and Clinical Psychology 74(3):482-488.

Cary, M., Butler, S., Baruch, G., Hickey, N. & Byford, S. (2013) Economic evaluation of multisystemic therapy for young people at risk for continuing criminal activity in the UK, PLos One 8(4):e61070, doi:10.1371/journal.pone.0061070. http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0061070 [accessed 1 September 2015].

Curtis L (2014). Unit costs of health and social care 2014. Kent: Personal Social Services Research Unit.

Hackett, S. & Masson, H. (2003). Mapping and exploring services for young people who have sexually abused others: Findings from a two year research programme into policy, practice and services delivery across the UK and ROI.

Hackett et al. (2013) Individual, Family and Abuse Characteristics of 700 British Child and Adolescent Sexual Abusers. Child Abuse Review, 22(4).

Hackett, S. (2014) Children and young people with harmful sexual behaviours: Research Review. Dartington: Research in Practice

Hall, S. C. (2010) Exploring Implications and Benefits of holistic Working with Young People who have Sexually Harmed Others. Unpublished PhD Thesis: De Montfort University. Available at: https://www.dora.dmu.ac.uk/handle/2086/4977

Home Office (2005). The economic and social costs of crime against individuals and households. London: Home Office.

McCartan et al. (2011). Child and adolescent females who present with sexually abusive behaviours: a 10-year UK prevalence study. Journal of Sexual Aggression, 17(1): 4-14.

McCrory, E. (2011) A Treatment Manual for Adolescents Displaying Harmful Sexual Behaviour: Change for Good. London: Jessica Kingsley Publishers.

National Audit Office (2011). The cost of a cohort of young offenders to the criminal justice system. London: National Audit Office.

NSPCC (2013). Provision for young people who have displayed harmful sexual behaviour. London: NSPCC

NSPCC (2014). Turn the Page Learning from a manualised approach to treating harmful sexual behaviour. London: NSPCC

PSSRU (2013). Unit costs in Criminal Justice. Canterbury: PSSRU. http://www.pssru.ac.uk/project-pages/unit-costs-in-criminal-justice/

Ward, T. & Gannon, T.A. (2005). Rehabilitation, etiology, and self-regulation: The comprehensive good lives model of treatment for sexual offenders. *Aggression and Violent Behaviour.*

11 Appendix A: Database searches

Database: NHS EEDs
Host: The Cochrane Library: Wiley Interface
Date Searched: 30/03/2015
Data Parameters: Issue 1 of 4, January 2015
Hits: 71
Search Strategy:

ID Search Hits
#1 (sex* near/2 (harm* or risk* or abus* or agress* or unacceptable or offen* or force* or impos* or overly or coer* or inappropriate* or manipulat* or stigma* or shame or victim* or danger* or threat* or assault* or pressure* or violent or violence)) 3346
#2 (problem* near/2 sex* adj2 (behavio*r* or conduct*)) 10
#3 MeSH descriptor: [Sex Offenses] this term only 105
#4 MeSH descriptor: [Rape] this term only 88
#5 (rape or rapist) 240
#6 MeSH descriptor: [Unsafe Sex] this term only 184
#7 unsafe near/2 sex 251
#8 #1 or #2 or #3 or #4 or #5 or #6 or #7 3565
#9 (harm* or risk* or abus* or agress* or unacceptable or offen* or force* or impos* or overly or coer* or inappropriate* or manipulat* or stigma* or shame or victim* or danger* or threat* or assault* or pressure* or violent or violence) 218212
#10 MeSH descriptor: [Sexual Behavior] this term only 1420
#11 (coitus or sexual intercourse) 1515
#12 (penetrat* near/2 sex) 6
#13 MeSH descriptor: [Coitus] this term only289
#14 (masturbat* or self stimulat*) 2406
#15 MeSH descriptor: [Masturbation] this term only 15
#16 (sexual interaction or sexual exploration) 550
#17 #10 or #11 or #12 or #13 or #14 or #15 or #16 5277
#18 #9 and #17 3007
#19 inappropriate touching 30
#20 (harm* or unacceptable or inappropriate* or over* use* or frequent* use*) 153349
#21 ((sexual* near/3 (swear* or word* or phrase* or slang or jargon)) or sexual* explicit) 301
#22 #20 and #21 249
#23 sexting 0
#24 ((sex* or nud*) near/2 (message* or image* or picture* or photo*)) 98
#25 #23 or #24 98
#26 #8 or #18 or #19 or #22 or #25 5790
#27 MeSH descriptor: [Child] this term only 138
#28 (child* or girl* or boy*) 101244
#29 (young people or young person* or young wom*n or young m*n or young female* or young male* or young adult* or youth*) 53725
#30 MeSH descriptor: [Young Adult] this term only 231
#31 MeSH descriptor: [Adolescent] this term only 77091

#32 (adolescen* or teenage*) 97950
#33 MeSH descriptor: [Juvenile Delinquency] this term only 199
#34 delinquen* 587
#35 MeSH descriptor: [Minors] this term only 8
#36 (minor or minors) 12676
#37 MeSH descriptor: [Schools] this term only 1011
#38 school* 74045
#39 MeSH descriptor: [Latency Period (Psychology)] this term only 2
#40 MeSH descriptor: [Child, Preschool] this term only 58
#41 (preschool* or pre-school*) 29223
#42 (infant* or toddler* or youngster* or early adult* or kid or kids or underage or under age or teen* or offspring* or juvenile* or student*) 93207
#43 #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38 or #39 or #40 or #41 or #42 281506
#44 #26 and #43 3954

Notes: The search was not limited by date as the last returned record was from 1994. The review date limits are 1990-Current.

Database: Econlit
Host: EBSCO Host
Data Parameters: 1886-Current
Date Searched: 30/03/2015
Hits: 166
Search Strategy:

1. (sex* N1 (harm* or risk* or abus* or agress* or unacceptable or offen* or force* or impos* or overly or coer* or inappropriate* or manipulat* or stigma* or shame or victim* or danger* or threat* or assault* or pressure* or violent or violence))
2. (problem* N1 sex* N1 (behavio#r* or conduct*))
3. (rape or rapist)
4. (unsafe N1 sex)
5. S1 or S2 or S3 or S4
6. (harm* or risk* or abus* or agress* or unacceptable or offen* or force* or impos* or overly or coer* or inappropriate* or manipulat* or stigma* or shame or victim* or danger* or threat* or assault* or pressure* or violent or violence)
7. (coitus or sexual intercourse)
8. (penetrat* N1 sex)
9. (masturbat* or self stimulat*)
10. (sexual interaction or sexual exploration)
11. S7 or S8 or S9 or S10
12. S6 and S11
13. inappropriate touching
14. (harm* or unacceptable or inappropriate* or over* use* or frequent* use*)
15. ((sexual* N2 (swear* or word* or phrase* or slang or jargon)) or sexual* explicit)
16. S14 and S15
17. sexting
18. ((sex* or nud*) N1 (message* or image* or picture* or photo*))
19. S17 or S18

20. S5 or S12 or S13 or S16 or S19
21. (child* or girl* or boy* or young people or young person* or young wom?n or young m?n or young female* or young male* or young adult* or youth* or adolescen* or teenage* or delinquen* or minor or minors or school* or latency period or preschool* or pre-school* or infant* or toddler* or youngster* or early adult* or kid or kids or underage or under age or teen* or offspring* or juvenile* or student*)
22. S20 and S21

Notes: These searches were run on title and abstract

Results: Hits N=237, included at title/abstract screening stage: N=0

12 Appendix B: Additional searches based on ScHARR's results

Primary Study: A Randomized Clinical Trial of Multisystemic Therapy With Juvenile Sexual Offenders: Effects on Youth Social Ecology and Criminal Activity

Search Method	Results
1. Forwards chasing	N=48
2. Backwards chasing	Optimity (n=0)
3. Author contact	Optimity (borduinc@missouri.edu) total n=3 (see Appendix C)
4. Related article searching	371
5. Lateral searching	(References to Borduin n=53; Schaeffer n=11; Heiblum n=7) total = 71
Total	**494**
Duplicates removed	=17
Unique records to screen	**n=477**
Included at title/abstract screening	**N=0**

Notes:
These searches were conducted using Web of Science (Thompson Reuters). No limits were applied to the searches.

4. Related article searching
12,680 studies were returned as related articles. The following search strings were used to sensitively focus specificity:

Database: Web of Science
Host: ISI Thompson Reuters
Data Parameters: 1900-Current
Date Searched: Sunday, June 21st 2015
N= 371

1. Title: (A Randomized Clinical Trial of Multisystemic Therapy With Juvenile Sexual Offenders: Effects on Youth Social Ecology and Criminal Activity)
2. Related article search
3. Topic: (child* or girl* or boy* or young people or young person* or young wom?n or young m?n or young female* or young male* or young adult* or youth* or adolescen* or teenage* or delinquen* or minor or minors or school* or preschool* or pre-school* or infant* or toddler* or youngster* or early adult* or kid or kids or underage or under age or teen* or offspring* or juvenile* or student*)
4. Topic: (economic* or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic*)
5. 2 AND 3 AND 4

NB:

1. The population search string was written by Fiona Campbell, Simon Hackett, Andrew Booth, Evgenia Stepanova, Anthea Sutton (ScHARR, 2015).
2. The study design search string is NHS EEDs economic and costs study design filter written by the Centre for Reviews and Dissemination at the University of York.

13 Appendix C: Studies identified through other sources

Study	Source
Borduin, C.M., Schaeffer, C.M., Heiblum, N., 2009. A randomized clinical trial of multisystemic therapy with juvenile sexual offenders: effects on youth social ecology and criminal activity. J Consult Clin Psychol 77, 26–37. doi:10.1037/a0013035	ScHARR (effectiveness review team)
Klietz, S.J., Borduin, C.M., Schaeffer, C.M., 2010. Cost-benefit analysis of multisystemic therapy with serious and violent juvenile offenders. J Fam Psychol 24, 657–666. doi:10.1037/a0020838	Prof. Charles Borduin
Dopp, A.R., Borduin, C.M., Wagner, D.V., Sawyer, A.M., 2014. The economic impact of multisystemic therapy through midlife: a cost-benefit analysis with serious juvenile offenders and their siblings. J Consult Clin Psychol 82, 694–705. doi:10.1037/a0036415	Prof. Charles Borduin
Borduin, C.M., Dopp, A.R., 2015. Economic Impact of Multisystemic Therapy with Juvenile Sexual Offenders. J Fam Psychol. doi:10.1037/fam0000113	Prof. Charles Borduin
Finkelhor, D., Ormrod, R., Chaffin, M., 2009. Juveniles Who Commit Sex Offenses Against Minors. Office of Juvenile Justice and Delinquency Prevention	NICE
Donato, R., Shanahan, M., Higgins, R., 1999. A cost-benefit analysis of child sex-offender treatment programs for male offenders in correctional services. Child Protection Research Group. University of South Australia	NICE
Hackett, S., Phillips, J., Masson, H., Balfe, M., 2013. Individual, Family and Abuse Characteristics of 700 British Child and Adolescent Sexual Abusers. Child Abuse Review, 22 (4). pp. 232-245. ISSN 0952-9136	NICE
Prentky, R., Burgess, A.W., 1990. Rehabilitation of child molesters: a cost-benefit analysis. Am J Orthopsychiatry 60, 108–117.	NICE

Results: N=8; included at full-text screening: n=1

14 Appendix D: Sources searched for grey literature

Organisation/Resource	Web-link
National Society for the Prevention of Cruelty to Children (NSPCC)	http://www.nspcc.org.uk
Barnardos	http://www.barnardos.org.uk
National institute for Health Care Excellence (NICE)	https://www.nice.org.uk;
The Children's society	http://www.childrenssociety.org.uk
Action for children	http://www.actionforchildren.org.uk
Save the children	http://www.savethechildren.org.uk
Oxfam	http://www.oxfam.org.uk
Great Ormond Street	http://www.gosh.org/gen/
University of Huddersfield, Repository of Child protection, vulnerable children and families research	https://www.hud.ac.uk/research/researchcentres/cahs/researchareas/child-protection-vulnerable-children-and-families/
National Children's Bureau	http://www.ncb.org.uk
NICCY	http://www.niccy.org
Who cares trust	http://www.thewhocarestrust.org.uk
Children's commissioner	http://www.childrenscommissioner.gov.uk
ACDS	http://www.adcs.org.uk
British association for adoption and fostering	http://www.baaf.org.uk
CORAM	http://www.coram.org.uk
Home Start	http://www.home-start.org.uk
Children in Scotland	http://www.childreninscotland.org.uk
Child Abuse Prevention, Child Abuse and Neglect: BASPCAN	http://www.baspcan.org.uk
Family rights group	http://www.frg.org.uk
CAFCASS	http://www.cafcass.gov.uk
Children England	http://www.childrenengland.org.uk
Buttle UK	http://www.buttleuk.org
C4EO	http://www.c4eo.org.uk
Kidscape	https://www.kidscape.org.uk/
Office of Adolescent Health TPP Resource Centre	http://www.hhs.gov/ash/oah/oah-initiatives/teen_pregnancy/db/tpp-searchable.html
Department of Health	https://www.gov.uk/government/organisations/department-of-health
Department for Education	https://www.gov.uk/government/organisations/department-for-education
Ministry of Justice	http://www.justice.gov.uk/

Organisation/Resource	**Web-link**
Council of Europe	http://www.coe.int/en/
UNICEF UK	http://www.unicef.org.uk/
OpenGrey	http://www.opengrey.eu/

Results: N=0

15 Appendix E: draft inclusion/exclusion checklist

Table 185: Screening checklist draft

	CRITERIA	CODE	NOTES
Q1	**Date:** Is the study published after 1st January 1995?	If NO – exclude **1_EX Date**	
Q2	**Language:** Is the study report published in English?	If NO – exclude **2_EX Language**	
Q3	**Country:** Was the study conducted in an OECD country?	If NO – exclude **3_EX Country**	**OECD countries**: Australia; Austria; Belgium; Canada; Chile; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Iceland; Ireland; Israel; Italy; Japan; Korea; Luxembourg; Mexico; Netherlands, Norway; New Zealand; Poland; Portugal; Slovak Republic; Slovenia; Spain; Sweden; Switzerland; Turkey; United Kingdom, United States.
Q4	**Population:** Is the study relevant for population groups?	If NO – exclude **4_EX Population**	• Children under the age of 10 and young people aged between 10 and 18 who display harmful sexual behavior. The population includes those serving community sentences, those on remand and those serving custodial sentences. • Children and young people up to the age of 25 who display harmful sexual behaviour and have special education needs or a disability.
Q5	**Topic:** Is the study relevant to sexual harmful behaviour?	If NO – exclude **5_EX Topic**	
Q6	**Intervention:** Does the study report SHB interventions?	NO – exclude **6_EX Intervention**	• Commissioning and partnership work (among statutory, voluntary and independent sectors) to identify, assess and help children and young people who display harmful sexual behaviour. • Models or tools, including checklists that can distinguish between: normal behaviour, behaviour that needs to be assessed and monitored, and behaviour that needs a legal response and treatment. • Programmes that help parents, carers and families to challenge negative behaviours before they reach a need for formal interventions such as 'early help'

			projects and support from family nurse partnerships or telephone helplines. • Assessment tools to identify the specific level of risk posed by children and young people who display harmful sexual behaviour and to identify how to address their needs. • Interventions with children, young people and their families and carers to address harmful sexual behaviour. This includes behavioural or cognitive behavioural approaches and clinical treatments such as the 'Turn the page' or 'Good lives' models.
Q7	**Outcomes:** Does the study report relevant outcomes?	NO – exclude **7_EX Outcomes**	• Question 1: Identified thresholds for action, improved notification and referral procedures, better information sharing and consultation, less reliance on exception reporting or serious incidents to highlight concerns. Improved professional support and working arrangements. Reduced victimisation and stigmatisation of parents and families with children and young people who display harmful sexual behaviour. • Question 2: Improved identification of potentially harmful sexual behaviour and prevention activities to stop it becoming an entrenched pattern of behaviour. Improved behavioural, developmental, educational, emotional, sexual and mental health outcomes for children and young people. • Question 3: Improved assessment to help inform subsequent decisions about treatment, public safety and the safety of children and young people displaying harmful sexual behaviour. • Question 4: Stopping harmful sexual behaviour.
Q8	**Economic**: Does the study report economic analysis or costs?	NO – exclude **8_EX Economic**	Exclude papers that report only effectiveness data.
Q9	**Study design:** • cost-benefit analysis; • cost-	Studies that are an economic evaluation:	

	effectiveness study; • cost-utility analysis; • cost analysis (including CCA); • primary research study including relevant economic information (e.g. unit costs) • Systematic reviews any of the above studies	**9_IN.ECON** Studies that report useful cost and resource data include as: **10_IN.COST** Systematic reviews that include any of the study types: **11_IN.SYSTREV**	

For cases where inclusion is unclear, code as **9_QUERY** and save to discuss with screening team.

16 Appendix F: Appraisal checklist (economic evaluations)

Study identification Include author, title, reference, year of publication	Borduin and Dopp, 2015	
Guidance topic	HSB	**Question no:**
Checklist completed by:	CP	
Section 1: Applicability (relevance to specific review questions and the NICE reference case as described in section 7.5) This checklist should be used first to filter out irrelevant studies	**Yes/partly/no/unclear/ NA**	**Comments**
1.1 Is the study population appropriate for the review question?	Yes	Study population is defined by the trial entry criteria
1.2 Are the interventions appropriate for the review question?	Yes	
1.3 Is the system in which the study was conducted sufficiently similar to the current UK context?	Unclear	
1.4 Are the perspectives clearly stated and are they appropriate for the review question?	Yes, partly	Limited to the payer (of the intervention) and the criminal justice study
1.5 Are all direct effects on individuals included, and are all other effects included where they are material?	Partly Partly	Impact on study participants limited to crime effects. Victim impacts not included
1.6 Are all future costs and outcomes discounted appropriately?	Yes	As far as one can tell - it is stated that a 3% discount rate has been used
1.7 Is QALY used as an outcome, and was it derived using NICE's preferred methods? If not, describe rationale and outcomes used in line with analytical perspectives taken (item 1.4 above).	No	Intervention impacts limited to crime
1.8 Are costs and outcomes from other sectors fully and appropriately measured and valued?	No	Costs are limited to intervention and crime costs
1.9 **Overall judgement:** Directly applicable/partially applicable/not applicable There is no need to use section 2 of the checklist if the study is considered 'not applicable'.	Partly applicable	

Other comments:	The first author is a board member of MST Advocates, which provides training in MST for youths with problem sexual behaviour.	
Section 2: Study limitations (the level of methodological quality) This checklist should be used once it has been decided that the study is sufficiently applicable to the context of the guideline	**Yes/partly/no/unclear/ NA**	**Comments**
2.1 Does the model structure adequately reflect the nature of the topic under evaluation?	NA	
2.2 Is the time horizon sufficiently long to reflect all important differences in costs and outcomes?	Partly	8.9 years follow-up
2.3 Are all important and relevant outcomes included?	No	No health/wellbeing outcomes are included
2.4 Are the estimates of baseline outcomes from the best available source?	NA	No health/wellbeing outcomes are included
2.5 Are the estimates of relative intervention effects from the best available source?	Yes	Lack of trial evidence is noted but query applicability of study findings to UK context
2.6 Are all important and relevant costs included?	Partly	Only criminal justice costs are included but may be most important
2.7 Are the estimates of resource use from the best available source?	Yes	But query transferability
2.8 Are the unit costs of resources from the best available source?	Yes	As far as one could establish from the study report
2.9 Is an appropriate incremental analysis presented or can it be calculated from the data?	NA	One intervention was dominant therefore an incremental analysis was not relevant
2.10 Are all important parameters whose values are uncertain subjected to appropriate sensitivity analysis?	Partly	Sensitivity analysis was conducted on crime victim intangible benefits, discount rates and posttreatment arrest rates.
2.11 Is there any potential conflict of interest?	Yes	First author on board of MST Advocates
2.12 Overall assessment: Minor limitations/potentially serious limitations/very serious limitations	Potentially serious limitations	
Other comments:		

If the economic evaluation is **a cost-benefit analysis**, the following questions should also be addressed:

Question	Comment
1. Are money-costs and 'benefits' which are savings of future money-costs evaluated?	Yes
2. Have all important and relevant costs and outcomes for each alternative been quantified in money terms? If not, state which items were not quantified, and the likely extent of their importance in terms of influencing the benefit/cost ratio.	Non-criminal justice system costs have been excluded but unlikely to have a material effect on the results given the magnitude of crime savings.
3. Has at least 1 of net present value, benefit/cost ratio and payback period been estimated?	Yes
4. Were any assumptions of materiality made? That is, were any items where costs and/or benefits were sufficiently small that their addition to the analysis would not have changed any recommendations in the guidelines?	No, costs were so far outweighed by cost savings that additional benefits are probably irrelevant.