Multi-Systemic Therapy

Toolkit technical report

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This report is produced in collaboration with staff from the Campbell Collaboration Secretariat. It is a derivative product, which summarises information from Campbell systematic reviews, and other reviews, to support evidence-informed decision making'.

Multi-Systemic Therapy: YEF Technical Report

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Summary

The objective of this technical report is to review the evidence on the effect of multi-systemic therapy (MST) on youth crime and violence, based on two systematic reviews and meta-analyses by van der Stouwe et al. (2014) and Littell et al. (2021).

Multi-systemic therapy (MST) is one of the most well-evidenced 'family' based interventions for problem behaviour in children and adolescents. MST has been implemented empirically by more than 500 teams across 16 countries worldwide (Markham, 2018). Van der Stouwe et al. (2014, p. 469) describe MST as a "multi-faceted, short term, home and community-based evidence-based intervention for juvenile delinquents and juveniles with social, emotional, and behavioural problems". Criminal courts, or youth justice bodies, will often assign young offenders and their families to MST as a mandated treatment programme (Weisman & Montgomery, 2019). Therapists deliver MST through home visits or meetings with families and youth demonstrating risk behaviours or engaging in delinquent behaviours

MST aims to reduce the risk factors, and to develop behavioural responses to them.

This is an updated technical report and includes additional information about MST interventions reported by a review by Littell et al. (2021). The headline impact estimate is informed by van der Stouwe et al. (2014) and indicates that MST has a desirable impact on violent juvenile delinquency, but the evidence rating is 2. Van der Stouwe et al. (2014) found that MST had a 16% relative reduction in violent delinquency.

Overall however, MST programmes have an unclear impact on children and young people's involvement in crime and violence based on finding by Littell et al. (2021). The mean effect sizes are summarised in Table 1 and range from 9-17% reduction in offending, with two of these effects not being statistically significant. The evidence rating is 3 for all three effect estimates.

However, the overall effects are from the United States, with these effects not being replicated in other countries, including the UK.

For example, START trial (Systemic Therapy for At Risk Teens) is a randomised controlled trial evaluating the effectiveness of MST compared to management as usual. In total, 684 families took part in the trial and were randomly allocated to either the intervention or control group. The findings suggested that there were no statistically significant differences between the MST and control groups on criminal convictions at 60-month follow-up; 55% of the MST group were convicted, compared with 53% of the management as usual group (OR = 1.13, 95% CI 0.82 – 1.56, p = .44). Therefore, MST did not seem to be any more effective than management as usual in preventing offending.

The findings from this study suggest that further evidence is required from settings in England and Wales, especially for at risk groups, as it appears that the evidence from the reviews – which is mostly from the United States – may not be transferable.

Objective and approach

The objective of this technical report is to review the evidence on the effect multi-systemic therapy (MST) on youth crime and violence. There are a wide range of different 'family' based interventions for problem behaviour in children and adolescents, but most of this evidence is available for MST and 'functional family therapy' (FFT) interventions. FFT is the focus of another toolkit strand, and so the current technical report is concerned only with the impact MST interventions.

This technical report is an updated report to include more recent reviews of multisystemic therapy. A previous technical report was based on systematic reviews published by Markham (2018) and the impact estimate in van der Stouwe et al. (2014) on MST.

The following inclusion and exclusion criteria were used to inform the selection of systematic reviews.

Inclusion criteria

Included in this technical report were systematic reviews of the effects of MST on youth antisocial behaviour, juvenile delinquency, and offending.

Exclusion criteria

Reviews were excluded for the following reasons:

- If the review was published more than 10 years ago, or an earlier review has subsequently been updated (e.g., the review by Littell et al., 2021 was an update of Littell et al., 2005). More recent reviews were favoured to provide the most relevant and current evidence on the effectiveness of family therapies.
- If the review evaluated other forms of family therapies, for example, family functional therapy (FFT; Hartnett et al., 2017).

Outcomes

Van der Stouwe et al. (2014) examined the effectiveness of MST on juvenile delinquency and several secondary outcomes, including psychopathology (e.g., mental health issues, depression, anxiety etc), skills and cognitions, substance use, family factors, out-of-home

placements (i.e., when a child or young person is removed from their family residence), and peer factors. Markham (2018) reviewed the effect of MST on antisocial behaviour in adolescents, as well as substance use, adolescent functioning, family functioning and peer and school factors, but did not compute a meta-analysis.

Littell et al. (2021) included a comprehensive set of outcomes in their review of MST. The primary outcomes were: (1) out-of-home placements (due to incarceration, detention, hospitalisation, residential treatment or community foster care); (2) antisocial behaviour (arrest, conviction, and self-reported delinquency); (3) drug and alcohol use; (4) internalising and externalising symptoms; (5) qualities of parenting (e.g., discipline, supervision, communication); and (6) family functioning (e.g., adaptability, cohesion, conflict-hostility).

Description of interventions

The current technical report reviews a widely used evidence-based family therapy, Multisystemic Therapy (MST). MST interventions are implemented with children and adolescents aged 10-17 years old and aim to address a range of behaviours, including, antisocial behaviour and crime and violence. Littell et al. (2021, p. 5) describe MST as a "multifaceted, short-term, home- and community-based intervention for families of youth with severe psychosocial and behavioural problems". Whilst MST has mainly been implemented to address conduct disorder and/or disruptive behaviours, Littell et al. (2021) describe that there are also specialised MST programmes. For example: MST-CAN for child abuse and neglect; MST-JDC for young people involved in drug courts; MST-PSB for young people with problem sexual behaviours; MST-psych for children and young people with psychiatric needs; and MST-ASD for children and young people with autism spectrum disorder and related disruptive behaviours.

MST is a widespread family therapy programme that has been implemented and empirically evaluated by more than 500 teams across 16 countries worldwide (Markham, 2018). This approach was developed specifically as an intervention for 'hard-to-reach' families. Criminal courts, or youth justice bodies, will often assign young offenders and their families to MST as a mandated treatment programme (Weisman & Montgomery, 2019), and the

intervention was designed to help families of children with complex psychosocial problems and, in particular, avoid 'out-of-home' placements (Littell et al., 2021).

Based on the assumption that juvenile delinquency is associated with an accumulation of criminogenic risk factors in a socio-ecological framework, MST programmes are flexible and designed to address individual risk factors (van der Stouwe et al., 2014). Littell et al. (2021, p. 6)[1] outline the nine principles on which MST interventions are based:

1. Understand the "fit" between a child or young person's problem behaviours and the wider systemic context.
2. Place emphasis on positivity and use strengths rather than limitations as a lever of change.
3. Promote responsible behaviours of all family members, and thus, reduce irresponsible behaviours.
4. Utilise an action-orientated approach that is "present-focussed" (i.e., concerned with the here and now, and not past events) to target specific problems in each family.
5. Recognise that problem behaviours occur within and between multiple systems and these interactions can help maintain the behaviours.
6. Implement interventions that are appropriate for the developmental age of a child or young person.
7. Require daily or weekly effort from family members.
8. Expect therapists to continuously evaluate intervention strategies from multiple perspectives and take responsibility for overcoming barriers to success.
9. Promote long-term behavioural change by encouraging family members to address the needs of the family across multiple systemic contexts.

MST is a structural multimodal intervention approach to reduce problem behaviours in adolescents (Markham, 2018). This approach uses the 'Risk-Need-Responsivity' model (Andrews & Bonta, 2010) in that the intervention takes account of the young person's risk of reoffending, and focuses on addressing the criminogenic needs, learning style, and

[1] We are using Littell et al. (2021)'s paraphrasing of the nine principles of MST interventions.

capabilities of the individual (van der Stouwe et al., 2014). This tailored approach should ensure that the intervention is suitable for the young person and will address not only their risk, but also their specific needs while also reflecting on how the young person responds to the intervention.

A range of overarching treatment strategies derived from other intervention approaches such as strategic family therapy, structural family therapy, and cognitive-behavioural therapy, are used in MST programmes (Littell et al., 2021). Thus, specific treatment activities will vary between families and may target behavioural and/or cognitive change, family communication skills, parenting skills, family and/or peer relations, school performance and/or social networks (Littell et al., 2021). One evaluation of 176 young offenders included by Littell et al. (2021) (i.e., Borduin et al., 1995) reported that 83% received family therapy, 60% received school intervention, 57% received peer intervention, 28% received individual therapy and 26% of families received martial therapy.

As part of this approach the MST therapist is also an advocate for the family unit when dealing with the external agencies who provide these interventions (van der Stouwe et al., 2014). Littell et al. (2021) outline that MST is designed to be delivered in a "do loop"; therapists, families and external agencies create measurable goals at the beginning of the intervention and then clearly explain the reasons for certain referrals in relation to these goals and the family/child-specific risk factors being targeted. MST therapists are then encouraged to test and reassess the effectiveness and relevance of these solutions throughout the intervention process (Littell et al., 2021). This is not an approach unique to MST, Littell et al. (2021) highlight that the process of consistently assessing and re-evaluating solutions to problems is considered best practice in social work and many other interventions for children and young people with disruptive behaviours.

Implementation setting and personnel

MST is an intervention that is implemented by trained personnel, and treatment teams that work with children and their families may include professional therapists, psychiatrists, and clinical psychologists. Littell et al. (2021) describes that MST is delivered by mental health

professionals, usually those with masters or doctoral degrees and who are supervised by clinical psychologists or psychiatrists.

Van der Stouwe et al. (2014) report that therapists deliver MST through home visits or meetings with families and youth demonstrating risky behaviours or engaging in crime and violence. Meeting with families in either their homes or community centres is said to reduce drop-out rates, so that treatment is implemented exactly 'where and when' it is needed and increases the generalisability of new skills.

Duration and scale

Littell et al. (2021) outlines that MST is a "time-limited" intervention, and typically takes place over 4 to 6 months. The intervention programme is highly individualised and specific to the needs of the participating children and their families. As such, the treatment intensity is likely to vary between families. Littell et al. (2021) outlines that MST sessions delivered by therapists to families should "occur at least once a week, sometimes daily". However, only eight of the primary evaluations included in Littell et al. (2021)'s review provided information on the number of hours of direct contact between MST professionals and participating families. This review found that the number of hours of direct contact varied from 21 hours to 92 hours per family.

Theory of change/presumed causal mechanisms

MST interventions is an approach that assumes that youth who engage in crime and violence have a range of risk factors that interact to explain why the problem behaviour occurs. Grounded in social ecological theories of human development (Bronfenbrenner, 1979; Littell et al., 2021), MST assumes that these risk factors occur across the individual, family, peer, school, neighbourhood, and community levels. Thus, an intervention to address behavioural and social problems must also be multifaceted (Littell et al., 2021).

According to the reviews that inform the current technical report, MST is "based on the assumption that the life course trajectories of adolescents can be changed by actively reducing those risk factors associated with antisocial behaviour and building on the strengths and protective factors that support desistance" (van der Stouwe et al., p. 68).

MST is an ecological intervention and aims to make changes across all levels of a young person's social environment. MST was designed specifically for conduct disorder and involves the family to help effectively change the child or young person's behaviours. MST incorporates multiple different evidence-based intervention approaches and so can address numerous different possible causal mechanisms. The "do-loop" in MST is also an important facet of the theory of change. This outlines how MST professionals are expected to evaluate the suitability and effectiveness of intervention activities and/or referrals to external services throughout the process of the intervention (Littell et al., 2021). Thus, MST is a dynamic and adaptable intervention that can be flexible to each families' needs.

Evidence base

Descriptive overview

Van der Stouwe et al. (2014) report the effect of MST on juvenile delinquency based on 22 primary evaluations, representing data from 4,066 young people. Of the studies that reported the age of participants, 8 studies included participants under 15 years old, and 11 studies included those over 15 years old. Most evaluations were published (*n* = 15) and conducted in the USA (*n* = 16).

Littell et al. (2021) report the effect of MST on juvenile delinquency and family and parent outcomes from 23 studies which include data from 3,987 families. Of these 23 studies 13 were from the USA, three from the UK, and one each in Canada, the Netherlands, Norway, and Sweden.

Assessment of the evidence rating

We have confidence that, at the time of writing, the review by Littell et al. (2021) and van der Stouwe et al. (2014) represent the best available evidence on the effectiveness of MST interventions on our outcomes of interest. Our decision rule for determining the evidence rating is summarised in the technical guide.

A modified version of the AMSTAR2 critical appraisal tool was used to appraise the review by van der Stouwe et al. (2014) and Littell et al. (2021). According to this tool, the review by Littell et al. (2021) was rated 'high' and the review by van der Stouwe et al. (2014) was rated

'low'. The results of this assessment are summarised in Annex 3. The review by Markham (2018) did not compute a meta-analysis and therefore does not inform our impact estimate. As such, it was not assessed using the AMSTAR2 critical appraisal tool.

Both reviews adequately specified the research questions and the inclusion/exclusion criteria. The inclusion criteria included components relating to the population, intervention, comparison group and outcome of interest. Littell et al. (2021, pp. 10-12) provide a detailed overview of the inclusion criteria. This review only included randomised experimental evaluations of MST with children aged 10 to 17 years (and their families) who demonstrated social, psychological and behavioural problems. Littell et al. (2021) did not restrict their inclusion criteria based on publication status or the language of identified reports and included evaluations which compared results to 'treatment as usual'. Similarly, van der Stouwe et al. (2014) included studies that evaluated the effects of MST on antisocial behaviour, conduct disorder and delinquency in adolescents. Van der Stouwe et al. (2014) did not restrict inclusion criteria to studies that used random assignment but stipulated that evaluations must include pre- and post-assessment measures.

Littell et al. (2021) was an updated review of Littell et al. (2005) and published a study protocol prior to conducting the research and included information about how the final review differed from this protocol. A protocol was not published, or referred to, in relation to the review by van der Stouwe et al. (2014).

Both reviews reported a comprehensive literature search strategy including a number of different databases, designated keywords and search strategies. Evaluations that met the inclusion criteria were coded by two authors in the reviews by van der Stouwe et al. (2014) and Littell et al. (2021).

The review by van der Stouwe et al. (2014) did not conduct any risk of bias analyses, beyond normal publication bias analysis. Littell et al. (2021) outline an extensive risk of bias assessment procedure and used an adapted version of the Cochrane risk of bias tool (Higgins et al., 2011). van der Stouwe et al. (2014) do not include information on any funding received. Littell et al. (2021) provide a detailed account of funding received.

The review conducted by van der Stouwe et al. (2014) computed a meta-analysis, reported detailed information on the synthesis and estimation of weighted effect sizes and adequately reported the heterogeneity between primary effects. This review reported separate weighted effect sizes for independent outcomes and assessed multiple moderators as possible explanations for heterogeneity among primary effect sizes. The review by Littell et al. (2021) also computed meta-analyses and provided a great amount of detail on their analytical plan.

Van der Stouwe et al. (2014) provide a direct estimate of the effectiveness of MST programmes on violent delinquency outcomes based on 7 studies and this is the effect size that informs our headline impact estimate. The results are significantly heterogeneous ($Z = 4.0$, $p < .001$)[2], the review was rated 'low' as per the AMSTAR tool, and a small number of evaluations were included, so the overall evidence rating is 2. Van der Stowe et al. (2014) also provide a direct estimate of the effectiveness of MST programmes on general juvenile delinquency based on 20 studies. The evidence rating for this estimate is 3, due to the 'low' AMSTAR rating and heterogeneity between primary evaluations.

Littell et al. (2021) provide a direct estimate of the effectiveness of MST programmes on several outcomes related to arrests or convictions for a criminal offence. We applied the decision rule for selecting between effect sizes from separate reviews for choosing an impact estimate reported by Littell et al. (2021). The chosen impact estimate is informed by the mean effect size for the number of arrests/convictions outcomes based on 8 studies. There was heterogeneity between effect sizes ($I^2 = 64\%$) and the review was rated 'high' as per the AMSTAR tool. Therefore, the overall evidence rating was 3 for the impact estimate from Littell et al. (2021).

Impact

Summary impact measure

Based on the meta-analysis that informs the current technical report, the findings suggest that MST programmes have an unclear impact on children and young people's involvement

[2] The scale of heterogeneity is not known.

in crime and violence. The mean effect sizes are summarised in Table 1. As shown in Table 1, the effects range from 5-17% reduction in offending, with two of these effects not being statistically significant. Our preferred effect size is the 16% reduction in violent juvenile delinquency reported by van der Stouwe et al. (2014). The evidence rating is 2 for the headline impact estimate, and 3 for all other effect estimates.

Table 1

Mean effect sizes for adolescent problem behaviour and juvenile delinquency outcomes.

Review	*n* studies	ES (*d* and OR)	*p*	% reduction	Evidence rating on crime and violence
Littell et al. (2021); rate of arrest/conviction after 1 year	6	*d* = 0.096 OR = 1.191	0.15	9%	3
Littell et al. (2021); number of arrests/convictions after 1 year	8	*d* = 0.19 OR = 1.411	0.04	17%	3
Littell et al. (2021); self-reported delinquency after 1 year	5	*d* = 0.05 OR = 1.095	0.44	4.5%	3
van der Stouwe et al. (2014). MST on total juvenile delinquency	20	*d* = 0.201 OR = 1.44	<.001	25%	3

van der Stouwe et al. (2014). MST on violent juvenile delinquency**	7	*d* = 0.115 OR = 1.23	ns	16%	2

Note: ES = the weighted mean effect size; *p* = the statistical significance of the mean ES; OR = odds ratio; *d* = Cohen's d; *n* = number of studies; ns = not significant; ** = headline impact estimate.

In order to convert the *d* measures to a percentage reduction, we first used the equation: Ln(OR) = *d* / 0.5513 (Lipsey & Wilson, 2001). Then we assumed that there were equal numbers (*n* = 100) in the experimental and control conditions, and that 50% of persons in the control condition were arrested or convicted. We assumed this was in relation to reoffending as the review included samples of children and young people who had offended already.

With these assumptions, the mean effect sizes for each review and each outcome were transformed into a relative reduction. These numbers are not greatly affected by different assumptions about the prevalence of delinquency or externalising behaviour. This is explained further in Annex 1.

Moderators and mediators

Van der Stouwe et al. (2014) included several different moderator variables to investigate possible reasons for heterogeneity between primary evaluations of MST. The results are summarised as follows:

- How delinquency was measured or when follow-up occurred did not moderate the effect size.
- The mean effect size for studies where participants were younger than 15 years old were statistically significant (*d* = 0.421, *p* < .001, *n* = 8 studies) but the mean effect size for studies with participants over 15 was not (*d* = 0.105, *n* = 11).

- Studies with higher proportions of Caucasian and "indigenous"[3] participants, and studies with higher proportions of youth who had been previously arrested, were associated with greater reductions in delinquency.

Littell et al. (2021) conducted numerous meta-analyses and included several moderator variables. The results are far too extensive for this brief technical report, so a summary of the main relevant findings are summarised as follows:

The majority of evaluations of MST were rated as high risk on a critical appraisal tool. Littell et al. (2021) identified a number of issues with evaluations such as inadequate randomisation, differences in variables between experimental groups before the intervention, and differences between groups in relation to the gender and ethnicity of participants.

Littell et al. (2021) evaluated the effectiveness of MST on out-of-home placements which referred to a child or young person being removed from their family home due to incarceration, hospitalisation, or placement in foster care. One-year post-randomisation, MST had a desirable effect (OR = 1.493, 95% CI 1.01, 2.22) on out-of-home placements. Littell et al. (2021) found that this effect was larger for evaluations conducted in the US where the developer was involved (OR = 1.923, 95% CI 1.19, 3.12, *n* = 8) in comparison to independent evaluations conducted outside of the US (OR = 0.877, 95% CI 0.65, 1.19, *n* = 4) where the result showed an undesirable impact on out-of-home placements. After 2.5 years post-randomisation there was also a slight difference between US developer-involved evaluations (OR = 1.429, 95% CI 0.57, 3.58, *n* = 2) and non-US independent evaluations (OR = 1.149, 95% CI 0.71, 1.85, *n* = 4). Overall, MST had a lesser effect on out-of-home placements after 2.5 years, but it was still a desirable effect (OR = 1.235, 95% CI 0.83, 1.82, *n* = 6).

[3] van der Stouwe et al. (2014) do not specify what they mean when they refer to indigenous populations. This could refer to non-immigrant groups or Indigenous groups such as Aboriginal Australians, First Peoples in Canada or Native American in the United States of America.

One-year post-randomisation, the mean effect size for US evaluations where the developer was involved was the largest and showed a desirable impact on arrests/convictions (*d* = 0.19, 95% CI 0.00, 0.38, *n* = 4) in comparison to non-US independent evaluations (*d* = 0.05, 95% CI -0.13, 0.22, *n* = 3). After 2.5 years post-randomisation, the overall mean effect for the number of arrests/convictions decreased slightly (*d* = 0.17, 95% CI 0.00, 0.34, *n* = 7). There was also a greater difference between the mean effect sizes for US developer-involved evaluations (*d* = 0.29, 95% CI -0.41, 0.99, *n* = 2) and non-US independent evaluations (*d* = 0.07, 95% CI -0.05, 0.20, *n* = 4).

Littell et al. (2021) also include self-reported delinquency as an outcome, and found that one- year post-randomisation, independent evaluations conducted outside of the US had a desirable impact on delinquency (*d* = 0.10, 95% CI -0.1, 0.3, *n* = 2) but evaluations conducted in the US where the developer was involved found an undesirable impact on delinquency (*d* = -0.11, 95% CI -0.41, 0.19, *n* = 2). Littell et al. (2021) do conduct similar analyses for 2.5-year follow-up, however, this analysis compared multiple non-US evaluations with just one US evaluation and so we do not report the results here.

Four years post-randomisation Littell et al. (2021) found a null effect on the number of arrests/convictions (*d* = 0.00, 95% CI -0.18, 017, *n* = 3). There was a desirable effect on self-reported delinquency 4 years post-randomisation based on only two studies (*d* = 0.11, 95% CI -0.37, 0.59, *n* = 2).

Littell et al. (2021) report mean effects for a wide range of outcomes, the results of which are summarised in Table 2. We have excluded parent-level outcomes and analyses where the result is based on only one effect size (e.g., school attendance and school grades).

Outcome	Timepoint	Effect size	95% CI	*n*	Direction
Substance use	1 year	*d* = 0.08	-0.23, 0.38	5	Desirable
Substance use	2.5 years	*d* = -0.13	-0.27, 0.00	2	Undesirable

Substance use	4 years	*d* = -0.08	-0.22, 0.06	2	Undesirable
Externalising behaviour	1 year	*d* = 0.09	-0.38, 0.56	3	Desirable
Externalising behaviour	2.5 years	*d* = 0.13	0.00, 0.26	3	Desirable
Externalising behaviour	4 years	*d* = 0.04	-0.1, 0.18	2	Desirable
Internalising behaviour	1 year	*d* = -0.06	-0.96, 0.84	2	Undesirable
Internalising behaviour	2.5 years	*d* = 0.27	-0.03, 0.57	3	Desirable
Internalising behaviour	4 years	*d* = -0.02	-0.17, 0.12	2	Undesirable

Implementation and Cost analysis

In a qualitative evaluation of MST in the United Kingdom, Fonagy et al. (2020) found that there were multiple common themes underlying participants' reported experiences of the intervention. The following is a brief summary of some of these themes:

- Participants reported different trajectories of change following participation in the programme, with some continuing to improve, and others finding it difficult to maintain desirable changes or not seeing any change at all.
- There were different factors that families reported were responsible for initial changes due to the intervention. Factors that encouraged an initial effect included the young person's motivation to change, therapeutic alliance, learning better communication and seeing initial results.
- Factors that influenced the sustainability of behavioural changes included the continued use of MST techniques and skills, generalising skills to wider contexts, improved family relationships and recovering progress after setbacks.

- There were also changes on the individual and environmental levels that were not attributed to the MST programme.

Fonagy et al. (2020) also conducted an economic evaluation of the intervention, and found that overall, MST was not considered to be more cost-effective than treatment as usual (since, as reported below, the study was not found to have an effect compared to treatment as usual).

Findings from the UK

As indicated in the discussion of moderators, MST reduced arrests in the USA but not in other countries. Moreover, MST appears to have increased substance use in both the UK and Sweden.

For example, an RCT conducted in the UK called the START trial (Systemic Therapy for At Risk Teens) analysed the effectiveness of MST on outcomes of reoffending (Fonagy et al., 2020) and antisocial behaviour (Fonagy et al., 2018). In total, 684 families took part in the trial and were randomly allocated to either the intervention or control group. The effectiveness of MST was evaluated in comparison to a management as usual (MAU) control group on criminal convictions up to 60 months after baseline (Fonagy et al., 2020) and various outcomes related to juvenile delinquency and conduct disorder (Fonagy et al., 2018).

The MST intervention was delivered in families' homes by a specialist MST therapist three times per week over 3-5 months. The therapist was also available 'on-call' to families throughout the trial. The control group received management as usual and were offered services to match their needs through Child and Adolescent Mental Health (CAMHS) services. The services included help with substance misuse or engaging in education. At baseline, the mean age of participants in the MST condition was 13.7 years (13.9 years in MAU condition). Participants were mostly White (76% MST; 80% MAU) and male (63% MST; 64% MAU). Relatively few participants were categorised as a 'non-offender' when referred to the intervention (36% MST; 32% MAU), but 80% met the clinical cut-off for conduct disorder and 65% reported violent and aggressive interpersonal behaviour.

Fonagy et al. (2018) found that, after 12 months, participants in the MST condition reported less conduct disorder behaviours (d = 0.90, 95% CI 0.62 – 1.30, p = 0.12) in comparison to the MAU participants, but the difference was not statistically significant.

In relation to offending behaviour, Fonagy et al. (2018) found that, at the 18-month follow-up point, more participants in the MST condition had committed offences (20%) than participants in the MAU condition. Moreover, the difference in the mean number of crimes was statistically significant (d = 0.65, 95% CI 0.28 – 1.02, p < .001). More of the MST participants had also committed violent offences (8%) and non-violent crimes (10%) in comparison to the MAU condition (violent: 6%; non-violent: 8%).

Fonagy et al., (2020) suggested that there were no statistically significant differences between the MST and control groups on criminal convictions at the 60-month follow-up; 55% of the MST group were convicted, compared with 53% of the management as usual group (OR = 1.13, 95% CI 0.82 – 1.56, p = .44). Therefore, MST did not seem to be any more effective than management as usual in preventing offending.

What do we need to know? What don't we know?

The three studies from the United Kingdom suggest that further evidence is required from settings in England and Wales, especially for at-risk groups, as it appears that the evidence from the reviews – which is mostly from the United States – may not be readily transferable. The differences in effectiveness may be explained by the nature of the comparison group, but also by differences in the experience of therapists and implementation fidelity.

There is also a lack of process evaluation evidence (see Annex 2) which would help to better understand the different trajectories identified by Fonagy et al. (2020), and what implementation challenges exist in our national settings.

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Annex 1: Effect size calculation: Multi-Systemic Therapy

This annex shows the calculation based on the results and assumptions given in the text. We assume 200 youth, evenly divided between treatment and control groups. That means there are 100 youth in the control group and 100 youth in the treatment group. Assuming that 50% of youth in the control group were arrested or convicted, the mean effect sizes for both reviews can be easily transformed to a percentage reduction in violent delinquency and arrests/convictions.

If the odds ratio for the number of arrests/convictions after 1 year is OR = 1.411 (Littell et al., 2021), then using the table below and the formula for an OR, we can estimate the value of X. The odds ratio is estimated as: A*D/B*C, where A is the number of participants not arrested/convicted in the treatment group, B is the number of participants who were arrested/convicted in the treatment group, C is the number of participants not arrested/convicted in the control group, and D is the number of participants who were arrested/convicted in the control group. Therefore, the value of X is 41.477 in the case of Littell et al. (2021).

	Not arrested/convicted	Were arrested/convicted	Total
Treatment	100-x	x	100
Control	50	50	100

Therefore, the relative reduction in arrests/convictions is (50 – 41.477)/50 = 17.05%. In relation to the other outcomes reported by Littell et al. (2021), the value of X is 45.61 and 47.73 for the rate of arrests/convictions and self-reported delinquency respectively. Thus, the relative reduction in the rate of arrests/convictions is 8.78% and 4.53% for self-reported delinquency.

The rate of arrest or conviction is likely to vary between studies and can be influenced by a number of different factors. If we were to adjust our assumption that 50% of the control group were arrested or convicted, the relative reduction in the intervention group is not greatly affected.

For example, if we assume that 40% of the control group were arrested or convicted, the 2x2 table would be as follows for and the value of X is 32.09 (for Littell et al., 2021; number of arrests/convictions). Therefore, the relative reduction is 19.78% (i.e., (40 – 32.09)/40]*100).

	Non-delinquent	Delinquent	Total
Treatment	100-x	X	100
Control	60	40	100

Similarly, if we assume that 60% of the control group are arrested or convicted, the value of X is 51.529 (for Littell et al., 2021; number of arrests/convictions) and the relative reduction in the number of arrests/convictions is 14.12%. Given the dramatic difference in the assumed prevalence of delinquency, the percentage relative reduction does not vary in a similar fashion. Tables 3 and 4 show this further. For the review by van der Stouwe et al. (2014) we used the assumed prevalence of 10%, 25%, and 40% for general delinquency outcomes and 5%, 17%, and 33% for violent delinquency outcomes.

Table 3

Variation of the relative reduction in Littell et al. (2021)'s outcomes based on various assumptions.

	Littell et al. (2021) OR = 1.411 *number of arrests/convictions*	Littell et al. (2021) OR = 1.191 *rate of arrests/convictions*	Littell et al. (2021) OR = 1.095 *self-reported delinquency*
Assumed prevalence	Relative reduction		
40%	19.78%	10.28%	5.39%
50%	17.05%	8.78%	4.53%
60%	14.12%	7.098%	3.66%

Table 4

Variation of the relative reduction in delinquency outcomes reported by van der Stouwe et al. (2014) based on various assumptions.

general juvenile delinquency OR = 1.44		*violent juvenile delinquency* OR = 1.23	
Assumed prevalence	Relative reduction	Assumed prevalence	Relative reduction
10%	28.4%	5%	17.94%
25%	24.84%	17%	16.06%
40%	20.88%	33%	13.35%

Annex 2: Process evaluation evidence

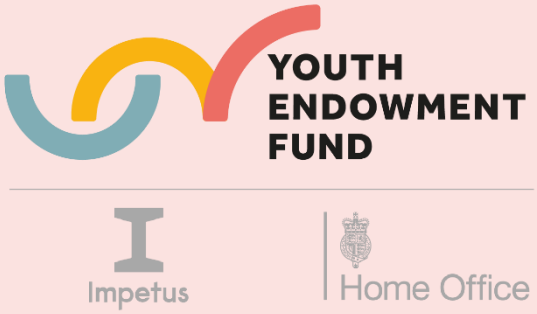
Note: No process evaluations of MST in UK and Ireland have been found. Fonagy et al. (2020) is a qualitative study as part of a trial. It is not a process evaluation, and so does not focus on implementation issues.

	Success factors	Challenges	What parents and children say
MST (Fonagy et al., 2020)	Non-judgemental role of therapist	Children believe therapist is taking children's side [whilst parents valued a mediator] Families follow different trajectories; for some there is a sustained difference and for others there is none.	Before, I didn't know that quite a lot of the things I was doing was making the situation worse; even though I was trying to stop it, I was making it 10 times worse. (parent)

Annex 3 – AMSTAR Quality Rating

Modified AMSTAR item		Scoring guide	Multisystemic therapy ®	
			van der Stouwe 2014	Littell et al. (2021)
1	Did the research questions and inclusion criteria for the review include the components of the PICOS?	To score 'Yes' appraisers should be confident that the 5 elements of PICO are described somewhere in the report	Yes	Yes
2	Did the review authors use a comprehensive literature search strategy?	At least two bibliographic databases should be searched (partial yes) plus at least one of website searches or snowballing (yes).	Yes	Yes
3	Did the review authors perform study selection in duplicate?	Score yes if double screening or single screening with independent check on at least 5-10%	Yes	Yes
4	Did the review authors perform data extraction in duplicate?	Score yes if double coding	Yes	Yes
5	Did the review authors describe the included studies in adequate detail?	Score yes if a tabular or narrative summary of included studies is provided.	Yes	Yes
6	Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	Score yes if there is any discussion of any source of bias such as attrition, and including publication bias.	Partial Yes	Yes

7	Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	Yes if the authors report heterogeneity statistic. Partial yes if there is some discussion of heterogeneity.	Yes	Yes
8	Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	Yes if authors report funding and mention any conflict of interest	No	Yes
	Overall		**Low**	**High**



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