Systematic review of economic evaluations of children's social care interventions

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Abstract

Background: Children's social care/child welfare services, are under pressure to maximize the value of resource expenditure in meeting the needs of children and young people exposed to risk factors for care entry or residing in care. Economic evaluations can support the decision to adopt, routinize or discontinue an intervention, informing the allocation of limited resources. There is a paucity of economic evaluations in children's social care, partly because this is an emerging area, hence topic-specific methods are lacking. Prior to the development and recommendation of methods, it is important to systematically synthesize those adopted to highlight challenges that have arisen and guide future research.

Objective: To assess the methods applied and the cost-effectiveness evidence generated by economic evaluations of children's social care interventions.

Methods: Searches of electronic databases and websites were carried out to identify full economic evaluations of children's social care interventions in journal articles and the grey literature. A narrative synthesis of methods adopted and cost-effectiveness results is presented.

Results: Twenty studies were eligible for inclusion. These covered parenting programs (n=8), in addition to a diverse range of other interventions. Cost-effectiveness analysis was the most common approach taken (n=17) and a large number of studies concluded that the intervention was cost-effective (n=14).

Conclusion: The number of published economic evaluations of children's social care interventions is limited. The available evidence supports the adoption of several of the interventions evaluated, however, the review highlighted a number of challenges in the use of standard economic evaluations methods in this area.

Keywords: Economic evaluation; cost-effectiveness analysis; child welfare; systematic review

1. Introduction

There has been an increase in the number of children and young people coming into contact with statutory children's welfare services internationally. Across the UK, the numbers of children who are subject to child protection plans has risen steadily between 2005 and 2014 (Bunting et al., 2017). Meanwhile, Australia experienced a 25% increase in children receiving child protection services between 2012 and 2017 (Nguyen, Kilo, & Raithel, 2018), whilst in the USA there was a 12% rise in referrals to child welfare services over a similar time period (Children's Bureau, 2019).

Governments are under increased pressure to safeguard and promote the welfare of children exposed to risk factors for care entry or already residing in statutory care, thus decisions have to be made about the allocation of finite resources. Whilst increased spending is expected where there is increased demand, decision makers must ensure that spending is allocated appropriately to interventions and processes that improve the lives and preserve the rights of children in need and their families. Decision makers may be required to adopt interventions that are cost saving, however, this does not necessarily translate into cost-effectiveness. Savings are not always realizable and where they are it is important, first, to ensure that the intervention is effective. Economic evaluations involve the measurement, valuation and comparison of both the costs and effects of at least two interventions; one being the intervention of interest and the other(s) representing suitable comparator(s). A good quality economic evaluation, can be used by policy makers to inform regulatory and reimbursement decisions. These include decision makers at government ministerial level developing policy

regarding the management of social care services or senior social worker managers and commissioners trying to decide where to prioritize resources.

Despite the acute political and policy context, the cost and cost-effectiveness of interventions has often been neglected within evaluation research in this area. Previous research into the costs and effectiveness of services for children in need has been commissioned by the Department of Health for England and reported in *Costs and outcomes in children's social care: messages for research* (Beecham & Sinclair, 2006). However, none of the studies carried out as part of this research initiative considered cost-effectiveness in its complete sense but simply had an economic component included as part of the study evaluation.

The present systematic review aims to address this oversight by assessing the international evidence to determine the range of interventions in children's social care where cost-effectiveness evidence has been generated. In addition, the review aims to critically appraise the methodological conduct of economic evaluations of children's social care interventions in order to put forward recommendations and advise on future methodological research.

2. Methods

This systematic review was registered on PROSPERO, the International Prospective Register of Systematic Reviews (CRD42018115787). The review is reported in accordance with PRISMA guidelines (Moher et al., 2015).

2.1. Definitions

The interventions considered had to encompass children's social care; however, the boundaries of this are not self-evident and there is international variation in approaches (Gilbert et al., 2012). The term 'social care' is almost exclusively used in the UK, but there is variation between the UK nations, with the use of 'social work services' preferred in Scotland for example. More familiar terms internationally include 'child welfare' and 'social work' for

children and families. ‘Child welfare’ involves support or services to prevent child abuse and neglect (Child Welfare Information Gateway, 2012) whilst ‘social work’ can be defined as the ‘community-based response to social need’ (Holland & Scourfield, 2015, p. 2). Although different governments might promote a wider or narrower population focus for children’s social care (Parton & Williams, 2017), the terrain tends to be families with the highest level of need and risk. The term ‘children’s social care’ will be employed throughout the review. The term helpfully emphasizes that the scope of the review extends beyond the role of the social worker, which will in many countries be quite specifically defined by statute, to also encompass help provided by other professionals and indeed less formal social assistance offered by local community members.

2.2. Eligibility criteria

To be included in the review, studies had to meet the following criteria: (1) the target population was children and young adults identified as ‘in need’, as defined by the (UK) Children Act 1989; that is, their health and development are likely to be significantly impaired without the provision of services, or they are disabled. This includes children on a child protection plan, children placed in out-of-home care and those leaving care. There was no lower age but an upper age limit of 25 years to capture care-leavers was set. In addition, studies that targeted adults responsible for the safeguarding and promotion of the welfare of eligible children and young adults were included. (2) Interventions could be any attempt to modify or replace current practice that had a social care element as a single component intervention or as a multi-component intervention that crossed social care in addition to other public sectors. (3) There was no restriction on the types of comparators that could be included; and (4) no restriction on the outcomes used to measure effects, as long as they were child related. (5) Full economic evaluations, carried out alongside randomized controlled trials (RCTs) and quasi-experimental studies or that used decision-analytic modelling

techniques were included. Common methods of economic evaluation include, cost-utility analyses (CUAs) that measure the benefits of interventions in 'utility-based' or preference-based units such as the quality-adjusted life year (QALY) (Robinson, 1993b), cost-effectiveness analyses (CEAs) that measure the benefits of interventions in natural or physical units that are specific to the interventions (Robinson, 1993a), cost-benefit analyses (CBAs) that measure benefits in monetary terms (Palmer, Byford, & Raftery, 1999), cost-consequence analyses (CCAs) that present a range of outcomes that are measured using a range of units or a cost-minimization analyses (CMAs), where there is statistical confidence that the benefits of all interventions compared are equivalent so that it is only necessary to compare costs (Drummond, Sculpher, Claxton, Stoddart, & Torrance, 2015). (6) Studies had to be published in the English language; and (7) no restrictions were placed on the publication year. (See Appendix A in the supplementary materials for a full list of the eligibility criteria).

2.3. Searches

A comprehensive search of 14 bibliographic databases was carried out: Applied Social Sciences Index and Abstracts (PROQUEST), CINAHL (EBSCO), Child Development and Adolescent Studies (EBSCO), Education Research Complete (EBSCO), Embase (OVID), International Bibliography of Social Sciences (PROQUEST), MEDLINE (OVID), PreMEDLINE (OVID), PsycInfo (OVID), RePEc (IDEAS), Scopus (Elsevier), Social Policy and Practice (OVID), Sociological Abstracts (PROQUEST), NHSEED and EconLit (EBSCO). Key word searches were carried out across the following websites: Action for Children, Barnardo's, Campbell Collaboration Library, Care Leaver's Association, Children's Society, Child Welfare Information Gateway, Children's Commissioner's offices, Cochrane Library, Early Intervention Foundation, Joseph Rowntree Foundation, NICE, OpenGrey, REES Foundation, UK Departments for Education, UK Departments for Health

and Social Care, Samaritans, Social Care Online and the Thomas Coram Foundation. A few key word searches were also carried out in Google (and Google Scholar). Forensic searching was conducted by forward and backward citation tracking of all eligible articles. The search strategy was developed in the Social Policy and Practice database before being adapted to the functionality of each database. The strategy combined three concepts, comprising synonym text-words and subject headings that described children/young people, their 'in-need' status including broad intervention terms, and economic evaluations (see Appendix B in the supplementary material for full details of the search strategy). Searches were conducted in January 2019.

2.4. Study selection and data extraction

Two reviewers (AE/SW) screened titles and abstracts, then full papers, independently and in duplicate. Reasons for exclusion were recorded. Disagreements on study eligibility were resolved through discussion or recourse to a third reviewer (SP/DF).

A data extraction pro-forma was developed and calibrated by two reviewers (AE/SP). Data was extracted into Microsoft Excel by two reviewers independently (AE/HY) and disagreements resolved by discussion or arbitration (SP). Data on the target population, intervention, economic evaluation design, costs, outcomes and the cost-effectiveness results with consequent recommendations made by the study authors were extracted from each study.

2.5. Quality assessment

Quality assessment was carried out at two levels: (1) the economic evaluation; and (2) the underlying study on which the economic evaluation was based. The quality of each economic evaluation was assessed by two reviewers (AE/HY) independently and in duplicate using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) (Husereau et al.,

2013). Disagreements on quality assessment were resolved by discussion and, where necessary, arbitration (SP). Each economic evaluation was scored from 0 to 24 against the CHEERS checklist criteria. For the purpose of this review, studies that scored below 50% of the maximum applicable score were considered poor quality studies, studies that adhered to greater than 50% and below 75% of the criteria were considered adequate quality studies, and studies that met 75% or greater of the criteria were considered good quality economic evaluations.

The quality of the underpinning study design to measure costs and outcomes was assessed by two reviewers (AE/SD) using the Cochrane risk-of-bias tool where a trial-based economic evaluation was carried out (Higgins et al., 2011), and the Philips et al. (2004) guideline checklist for the underpinning models developed for model-based economic evaluations. Quality appraisal was not used to determine study inclusion.

2.6. Data synthesis

Eligible studies were grouped according to the intervention evaluated, to assess whether economic evaluations were more prevalent in certain areas of children's social care. A narrative synthesis of the methods applied was undertaken and the common strengths and weaknesses across the studies were identified. This provided an opportunity to discuss the economic evaluation methods in use and identify challenges with their implementation. In light of the review findings, we have put together a list of recommendations for economic evaluations of children's social care interventions and identified research priorities implied by the methods gaps identified.

The results of studies were reported in a summary table and narrative synthesis to compare the cost-effectiveness evidence reported by authors. As the studies had been carried out in different settings and across more than one year, the cost data extracted from each study was

summarized in a single currency (pound sterling) and valued at the same price date (2017-2018) to aid across-study comparisons. Cost data were therefore inflated to 2017-2018 prices using the relevant country-specific Gross Domestic Product deflator index, and where a study did not report the price date for resource values it was assumed to be one year previous to the year of publication. For non-UK studies, costs were converted from their local currency to pound sterling using purchasing power parities (OECD, 2019).

3. Results

3.1. Study selection

The study selection process with reasons for exclusion is given in the PRISMA flow diagram, figure 1. A total of 14,744 reports (including journal articles, books, book chapters, unpublished reports; hereafter articles for brevity) were identified. Following de-duplication, 9,324 remained. Titles and abstracts of all articles were screened against the eligibility criteria, a further 9,258 were excluded. The full reports of the remaining 66 articles were retrieved and screened again. Twenty-one were included, of these, Atherton (2007) and Edwards, Céilleachair, Bywater, Hughes, and Hutchings (2007) report results from the same study; henceforth, this study will be referred to as the latter publication.

3.2. Study characteristics

The included studies were carried out in the UK (n=8), USA (n=5), Netherlands (n=3), Australia (n=1), Canada (n=1), Ireland (n=1) and Sweden (n=1). Sixteen studies carried out economic evaluations alongside RCTs, whilst one study, Cottrell et al. (2018), was a trial-based economic evaluation but also extrapolated results beyond the trial through use of a Markov analytical model. One study, Thanh et al. (2015), used a decision tree analytical model to estimate cost-effectiveness. The final two studies (DePanfilis, Dubowitz, & Kunz, 2008; Foster & Jones, 2007) were pilot studies. The populations recruited in each study were

matched to the corresponding UK government's Department for Education (2018) 'in need' category, these are listed in table 1.

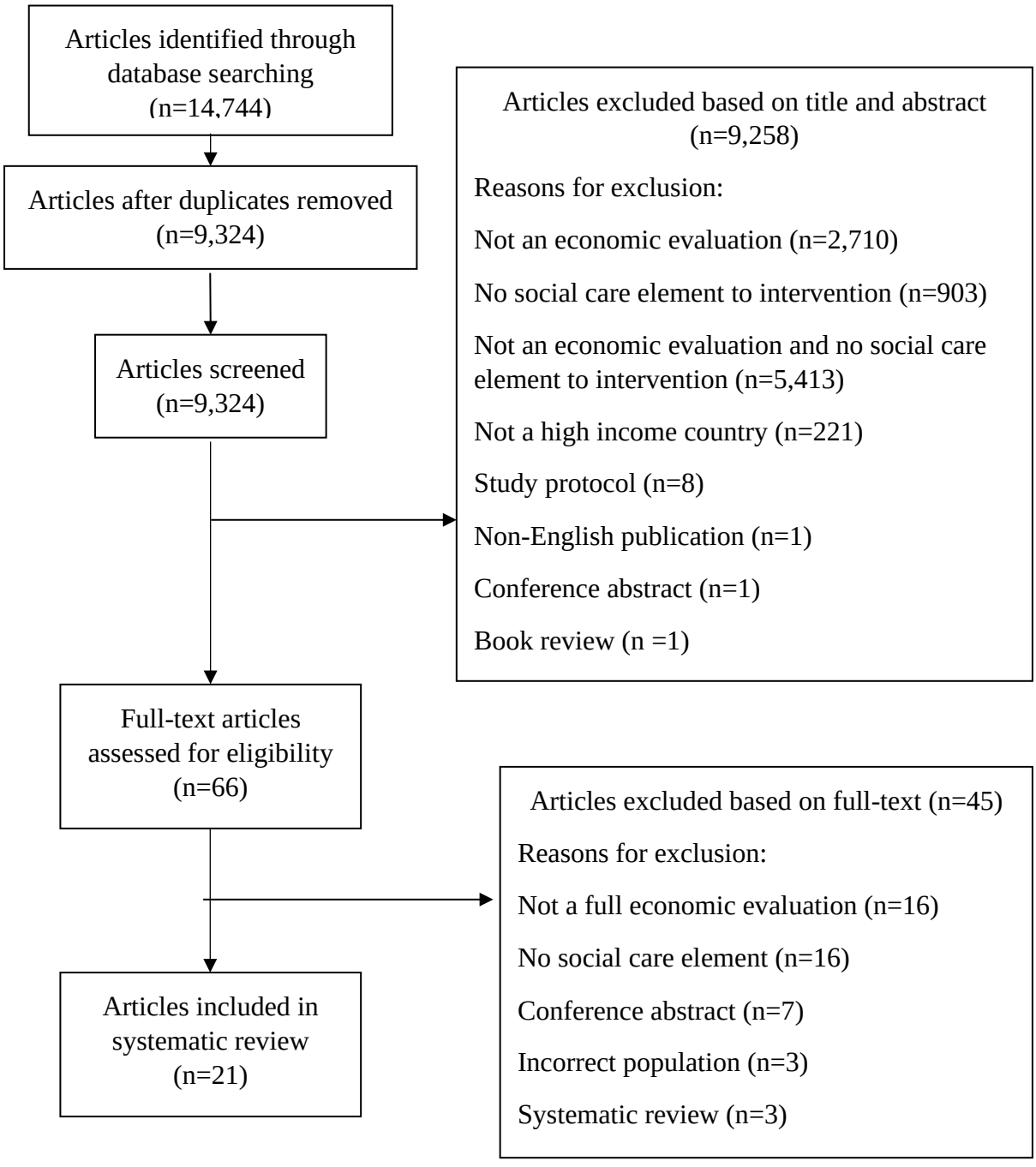

Figure 1. PRISMA flow diagram

3.3. Interventions evaluated

3.3.1. Intervention description

Table 1 lists the interventions evaluated by the twenty eligible studies. Eight studies evaluated parenting programs, these specifically targeted higher need families, likely to be involved with children's social care teams. Four studies evaluated parenting programs as behavioral interventions (Edwards et al., 2007; Edwards et al., 2016; O'Neill, McGilloway, Donnelly, Bywater, & Kelly, 2013; Sampaio, Enebrink, Mihalopoulos, & Feldman, 2016), one for children with disability or illness (Sonuga-Barke et al., 2018), two as an intervention for parents with disability or illness (Barlow et al., 2019; Dalziel, Dawe, Harnett, & Segal, 2015) and one for children 'looked after' (i.e. in out-of-home care) (Sharac, McCrone, Rushton, & Monck, 2011).

The remaining twelve economic evaluations evaluated; multisystemic therapy (n=3) (Fonagy et al., 2018; Sheidow, Jayawardhana, Bradford, Henggeler, & Shapiro, 2012; Vermeulen, Jansen, Knorth, Buskens, & Reijneveld, 2017); social worker led interventions (n=2), either working with children and adolescents who had deliberately poisoned themselves (Byford et al., 1999) or acting as asthma counsellors for children in inner city areas (Sullivan et al., 2002); the Fast Track project (n=1), a multi-component behavioral intervention for children with conduct problems (Foster & Jones, 2007); family therapy (n=1), for children that had self-harmed (Cottrell et al., 2018); Parent-Child Assistance Program (n=1), a home based mentorship program to prevent fetal alcohol syndrome in women that abused alcohol during pregnancy (Thanh et al., 2015); preventative base care management (n=1) targeting children of parents with mental illness (Wansink et al., 2016); Family Connections (n=1), a program for preventing child neglect (DePanfilis et al., 2008); Family Group Conferencing (n=1) for children referred to youth care protection services (Dijkstra et al., 2018); and Multidimensional Treatment Foster Care (n=1) (Lynch, Dickerson, Saldana, & Fisher, 2014). (see Appendix C for a detailed description of the interventions evaluated in the eligible studies).

3.3.2. Intervention context

The interventions evaluated were all community based government funded interventions. However, differences existed in their target groups, the social care focus of the intervention and intervention complexity. For example, the target population groups ranged from children in need to children in out-of-home care, some interventions were designed to receive referrals from multiple public sector agencies whilst others were specifically for families involved with social care services and finally, interventions were either single component social care interventions or were multi-faceted and included a social care strand. On this basis, the studies can be divided into four groups, according to their setting:

(1) Social care interventions that only target children in statutory care or at risk of going into care – Three interventions were included in this group, Family Group Conferencing (Dijkstra et al., 2018), the Family Connections child neglect prevention program (DePanfilis, Dubowitz, & Kunz, 2008) and Sharac, McCrone, Rushton, and Monck (2011)'s home-based parenting program. Family Group Conferences were used in the child welfare context and were delivered by child protection workers and Family Group Conferencing coordinators (Dijkstra et al., 2018), Family Connections was a community based home visitation program delivered by social workers (DePanfilis et al., 2008) and the parenting intervention was delivered by child and family social workers to families with children placed for adoption (Sharac et al., 2011).

(2) Social care interventions that target a broader range of children, including children referred by social care services as well children in need identified by a range of other public sector agencies - Seven studies were included in this group, two studies evaluated multisystemic therapy (Fonagy et al., 2018; Vermeulen, Jansen, Knorth, Buskens, & Reijneveld, 2017) and five evaluated an array of parenting interventions (Barlow et al., 2019;

Edwards, Céilleachair, Bywater, Hughes, & Hutchings, 2007; Edwards et al., 2016; O'Neill, McGilloway, Donnelly, Bywater, & Kelly, 2013; Sampaio, Enebrink, Mihalopoulos, & Feldman, 2016; Sonuga-Barke et al., 2018).

For multisystemic therapy, children were referred from the juvenile justice system and child welfare services in one study (Vermeulen et al., 2017) and in the second, children were referred by social care services, youth offending teams, schools, child and adolescent mental health services and voluntary services (Fonagy et al., 2018) with social care services accounting for 43% of all referrals. Across both studies, multisystemic therapy is used to support children, beyond those at risk of going into care, but also youth offenders, children who have been permanently excluded from school, and children with severe conduct problems (Fonagy et al., 2013).

The five parenting interventions were all community based programs that targeted a broad group of children and their families, for example Sampaio et al. (2016) trial was carried out at child and adolescent psychiatry units, social care sites and at schools and Edwards et al. (2007), Edwards et al. (2016) and O'Neill et al. (2013) parenting interventions were delivered in areas that were socioeconomically disadvantaged.

(3) Social care interventions that target vulnerable children that are not involved with statutory social services but are classed as 'in need' as specified by the inclusion criteria in appendix A – Six studies were included here. Two interventions were for children referred by child mental health teams (Byford et al., 1999; Cottrell et al., 2018), three interventions were for parents with a substance misuse problem (Barlow et al., 2019; Dalziel, Dawe, Harnett, & Segal, 2015; Thanh et al., 2015), one intervention was for parents with a mental illness (Wansink et al., 2016) and the final intervention was for vulnerable children with asthma (Sullivan et al., 2002). All studies reference the experience of dealing with individuals and

families with complex needs as a motivating factor in implementing interventions in a social care context.

(4) Complex interventions with a social care element – three of the interventions evaluated can be considered complex interventions. The first, Multidimensional Treatment Foster Care (Lynch, Dickerson, Saldana, & Fisher, 2014) targeted children in out-of-home care. It involved social workers working with foster parents, behavioral specialists working with children and family therapists working with birth/adoptive parents (Fisher, Kim, & Pears, 2009). The second included elements of multisystemic therapy and community based services delivered by social workers (Henggeler et al., 2006) when comparing juvenile drug courts to family courts (Sheidow, Jayawardhana, Bradford, Henggeler, & Shapiro, 2012). The final intervention, the Fast Track project was a complex multi-competent intervention that was delivered over ten years and included, parent training, home visitation, academic tutoring and social skill training (Foster & Jones, 2007).

3.4. Outcomes

A range of outcomes were measured across the studies including; child maltreatment, risk of child abuse, child mental health, child behavior and rates of out-of-home placement. A list of outcomes and methods of their measurement and valuation are given in Appendix D. Thirteen studies focused on one outcome only (Dalziel et al., 2015; DePanfilis et al., 2008; Edwards et al., 2007; Fonagy et al., 2018; Lynch et al., 2014; O'Neill et al., 2013; Sampaio et al., 2016; Sharac et al., 2011; Sonuga-Barke et al., 2018; Sullivan et al., 2002; Thanh et al., 2015; Vermeulen et al., 2017; Wansink et al., 2016), four studies measured two outcomes (Barlow et al., 2019; Cottrell et al., 2018; Edwards et al., 2016; Sheidow et al., 2012) and three studies measured three outcomes (Byford et al., 1999; Dijkstra et al., 2018; Foster & Jones, 2007).

Study	Setting	Study Design	Intervention	Comparator	Population	DfE in need category
Barlow et al. (2019)	UK	RCT	Parents Under Pressure parenting program	Treatment as usual: a range of established services across the study sites	Parents receiving treatment for a drug or alcohol problem	Parental disability or illness
Byford et al. (1999)	UK	RCT	Home-based social work in addition to routine care	Routine care: out-patient clinic visits with psychiatrists and psychiatric nurses	Children and adolescents referred to CAMHS with a diagnosis of deliberate self-poisoning	Child's disability
Cottrell et al. (2018)	UK	RCT and Markov model	Family therapy	Usual care offered by local CAMHS teams	Young people presenting to CAMHS who have self-harmed at least twice	Child's disability
Dalziel et al. (2015)	Australia	RCT	Parents Under Pressure parenting program	Usual care provided by methadone clinic staff +/- two parenting sessions	Families with parental substance misuse	Parental disability or illness

DePanfilis et al. (2008)	USA	Pilot study	Family Connections: child neglect prevention program (duration=3 months)	Family Connections: child neglect prevention program (duration=9 months)	Families living in high poverty/ violence/crime areas with two risk factors of child neglect	Abuse or neglect
Dijkstra et al. (2018)	Netherlands	RCT	Family Group Conferencing in addition to intensive family case management	Intensive family case management only	Families referred to child-youth care protection services	Multiple categories
Edwards et al. (2007)	Wales	RCT	Incredible Years parenting program	Six-month wait list	Parents of children at risk of developing conduct disorders	Socially unacceptable behavior
Edwards et al. (2016)	UK	RCT	Incredible Years parenting program	Six-month wait list	Parents of children at risk of social, emotional or behavioral disorder	Socially unacceptable behavior
Fonagy et al. (2018)	England	RCT	Multisystemic therapy: an intense family and	A range of standard care services as offered by each of the trial sites	Young people with moderate to severe antisocial behavior	Socially unacceptable behavior

			community based intervention			
Foster and Jones (2007)	USA	Pilot study	Fast Track project: multi-component intervention to reduce violence in at risk children	No intervention	Families with children at risk of conduct disorder	Socially unacceptable behavior
Lynch et al. (2014)	USA	RCT	Multidimensional Treatment Foster Care	Regular foster care	Foster children entering new foster placements	Looked after children
O'Neill et al. (2013)	Ireland	RCT	Incredible Years parenting program	Six-month wait list	Families of children with conduct problems	Socially unacceptable behavior
Sampaio et al. (2016)	Sweden	RCT	Four parenting programs; Comet, Incredible Years, Cope and Connect	Bibliotherapy OR a four-month wait list	Families of children with conduct problems	Socially unacceptable behavior
Sharac et al. (2011)	UK	RCT	Two home based parenting interventions	Routine local authority support services	Families with children placed for non-relative adoption	Looked after children

Sheidow et al. (2012)	USA	RCT	Juvenile drug court	Family court	Juvenile offenders with alcohol or drug abuse or dependence	Socially unacceptable behavior
Sonuga-Barke et al. (2018)	UK	RCT	New Forest: Individually delivered parenting program	Incredible Years: Group based parenting program OR standard preschool ADHD care	Children with ADHD	Child's disability
Sullivan et al. (2002)	USA	RCT	Social workers as asthma counsellors	Usual asthma care	Children with physician diagnosed asthma	Child's disability
Thanh et al. (2015)	Canada	Decision model	Parent-Child Assistance Program	Parent-Child Assistance Program not available	Women who use alcohol during pregnancy or 6 months post-partum	Parental disability or illness
Vermeulen et al. (2017)	Netherlands	RCT	Multisystemic therapy: an intense family and community based intervention	Functional family therapy: a family and community based program	Chronically antisocial and seriously violent adolescents	Socially unacceptable behavior

Wansink et al. (2016)	Netherlands	RCT	Preventive basic care management: preventive service coordination	Access to information and support groups	Families with parents with a mental illness	Parental disability or illness

Table 1: Summary study characteristics

In 10 studies (Barlow et al., 2019; Dalziel et al., 2015; Dijkstra et al., 2018; Edwards et al., 2007; Edwards et al., 2016; O'Neill et al., 2013; Sampaio et al., 2016; Sonuga-Barke et al., 2018; Sullivan et al., 2002) outcomes were reported by an adult; in the majority of cases a parent/caregiver but also by teachers and social workers. In three studies (Byford et al., 1999; Foster & Jones, 2007; Wansink et al., 2016) outcomes were reported by both young people and parents, whilst in three studies (Cottrell et al., 2018; Sheidow et al., 2012; Vermeulen et al., 2017) only young people's reports of outcomes were considered.

3.5. Economic evaluation methods

Seventeen studies carried out a CEA (Barlow et al., 2019; Cottrell et al., 2018; Dalziel et al., 2015; DePanfilis et al., 2008; Dijkstra et al., 2018; Edwards et al., 2007; Edwards et al., 2016; Fonagy et al., 2018; Foster & Jones, 2007; Lynch et al., 2014; O'Neill et al., 2013; Sampaio et al., 2016; Sharac et al., 2011; Sheidow et al., 2012; Sullivan et al., 2002; Thanh et al., 2015; Wansink et al., 2016). Two of these (Barlow et al., 2019; Cottrell et al., 2018) also carried out a CUA alongside the CEA. One study carried out a CUA only (Vermeulen et al., 2017). The three studies that incorporated or relied on a CUA for the economic evaluation used the EQ-5D instrument to measure health utilities. Two studies (Byford et al., 1999; Sonuga-Barke et al., 2018) carried out a CMA.

Study perspective: Two studies reported cost-effectiveness results from more than one perspective; Barlow et al. (2019) adopted a UK NHS and social services perspective and a wider societal perspective, whilst Wansink et al. (2016) adopted a healthcare perspective, a social care perspective and a societal perspective. Fourteen studies carried out evaluations from one perspective only: four studies adopted a societal perspective (Cottrell et al., 2018; Dalziel et al., 2015; Dijkstra et al., 2018; Vermeulen et al., 2017); three took a public sector perspective including health, social and educational costs (Edwards et al., 2007; Edwards et

al., 2016; Fonagy et al., 2018); four studies adopted a payer perspective e.g. NHS or Medicaid (Cottrell et al., 2018; Foster & Jones, 2007; Sheidow et al., 2012; Sullivan et al., 2002); one study adopted a combined societal/NHS perspective (Sonuga-Barke et al., 2018); and one study adopted a limited healthcare perspective for their cost-effectiveness evaluation (Sampaio et al., 2016). The final four studies (Byford et al., 1999; DePanfilis et al., 2008; O'Neill et al., 2013; Sharac et al., 2011) did not explicitly state the perspective adopted.

For one study, there was a clear discrepancy between the perspective and the categories of cost data collected. Dalziel et al. (2015) planned to adopt a broad societal perspective, but only included the direct costs of the program in their CEA. The authors considered the additional benefit of the lifetime costs of avoided maltreatment; however, this was not part of the main cost-effectiveness estimation and was estimated as an adjunct cost saving. For the remaining studies, the study perspective aligned with the costs considered.

Time horizon: This was relatively short across the majority of the studies. The shortest was four months for one study (Sampaio et al., 2016); followed by six months for nine studies (Byford et al., 1999; Dalziel et al., 2015; DePanfilis et al., 2008; Edwards et al., 2007; Edwards et al., 2016; O'Neill et al., 2013; Sharac et al., 2011; Sonuga-Barke et al., 2018; Vermeulen et al., 2017); one year for three studies (Barlow et al., 2019; Dijkstra et al., 2018; Sheidow et al., 2012); 18 months for three studies (Cottrell et al., 2018; Fonagy et al., 2018; Wansink et al., 2016); two years for two studies (Lynch et al., 2014; Sullivan et al., 2002); three years for one study (Thanh et al., 2015); and a 10 year horizon for one study (Foster & Jones, 2007). In addition, one of the studies, Cottrell et al. (2018), which presented results over an 18 month time horizon, extrapolated this to a longer five-year time horizon using a Markov decision analytical model.

Prices: All the studies clearly stated the currency and price date used except for two (DePanfilis et al., 2008; O'Neill et al., 2013). Discounting was not necessary in the majority of studies as costs were only collected over a one-year time horizon or less. However, where it was necessary due to a longer time horizon adopted by seven of the eligible studies, only five (Cottrell et al., 2018; Fonagy et al., 2018; Foster & Jones, 2007; Sullivan et al., 2002; Thanh et al., 2015) applied a discount rate. Cottrell et al. (2018) and Fonagy et al. (2018) applied a discount rate of 3.5% per annum and referenced the National Institute of Health and Care Excellence guidelines (NICE, 2013). Thanh et al. (2015) applied an annual discount rate of 5%, referencing the Canadian Agency for Drugs and Technologies in Health guidelines (CADTH, 2006). Sullivan et al. (2002) and Foster and Jones (2007) used discount rates of 3% and 5%, respectively, however they did not reference any guidelines to justify their choice. Two studies with a time horizon greater than one year did not indicate that they had applied a discount rate (Lynch et al., 2014; Wansink et al., 2016); the cost-effectiveness results reported may therefore be inaccurate for both studies.

Sensitivity analysis: At least one form of sensitivity analysis was carried out in 15 of the eligible studies. Complete case analysis was incorporated into the sensitivity analyses of three studies (Barlow et al., 2019; Fonagy et al., 2018; Wansink et al., 2016). Univariate sensitivity analysis was carried out by six studies (Barlow et al., 2019; Byford et al., 1999; Dalziel et al., 2015; Edwards et al., 2016; Sullivan et al., 2002; Thanh et al., 2015), one study (Edwards et al., 2007) carried out a multivariate sensitivity analysis, whilst probabilistic sensitivity analysis (PSA) was carried out by 10 studies (Barlow et al., 2019; Cottrell et al., 2018; Dalziel et al., 2015; Dijkstra et al., 2018; Fonagy et al., 2018; Foster & Jones, 2007; O'Neill et al., 2013; Sampaio et al., 2016; Sullivan et al., 2002; Vermeulen et al., 2017). Five studies did not carry out any sensitivity analysis to explore uncertainty around their cost-

effectiveness results (DePanfilis et al., 2008; Lynch et al., 2014; Sharac et al., 2011; Sheidow et al., 2012; Sonuga-Barke et al., 2018).

Sub-group analysis: Five studies carried out a sub-group analysis (Dijkstra et al., 2018; Edwards et al., 2007; Edwards et al., 2016; Foster & Jones, 2007; Wansink et al., 2016). The sub-groups were not specified a priori in any of the five studies so their findings should be considered with caution. Edwards et al. (2007) and Edwards et al. (2016) clearly state that the results of their sub-group analyses should be considered indicative due to small sample sizes. Nonetheless, this type of analysis should be avoided all together where a trial has limited statistical power (Pocock, Hughes, & Lee, 1987). The remaining three studies (Dijkstra et al., 2018; Foster & Jones, 2007; Wansink et al., 2016) do not discuss the limitations of their sub-group analyses.

3.6. Cost-effectiveness results

Table 2 summarizes the economic evaluation results, including incremental cost effectiveness ratios (ICERs) and the cost-effectiveness recommendation made by the authors with the decision rule used. In order to make comparisons of cost-effectiveness across the different interventions, where ICERs were reported they were inflated to 2018 price dates and converted where necessary to pounds (£). The majority of studies report an ICER value; however, Sheidow et al. (2012) estimate an average rather than an incremental cost-effectiveness ratio (ACER) defined as the cost per one-point change in outcome estimated for each intervention independently. Interventions with a positive value were considered cost-effective, these are listed for each outcome measured in table 2. DePanfilis et al. (2008) also adopt a similar approach to Sheidow et al. (2012), they do not estimate an ICER but report the unit cost per unit change in outcome for each intervention in the study. The use of an average rather than an incremental analysis makes it difficult for decision makers to judge the

value for money of an experimental intervention relative to existing or other interventions (Barnsbee, Barnett, Halton, & Nghiem, 2018). Lynch et al. (2014) do not report an ICER, but instead estimate incremental net benefit (INB) values across a range of cost-effectiveness thresholds.

Study	**Cost-effectiveness result (Pound £, 2018 prices)**	**Authors recommendation (decision rule)**
Parenting Programs		
Barlow et al. (2019)	£1,045/unit improvement in Brief Child Abuse Potential score	Cost-effective (none stated)
	£35,507/QALY gained	
Dalziel et al. (2015)	£26,545/ per case of maltreatment avoided	Cost-effective (threshold of AU$100,000)
Edwards et al. (2007)	£98/one point improvement in the Eyberg intensity scale	Cost-effective (low ICER)
Edwards et al. (2016)	£1,505/one point improvement in SDQ score	Cost-effective: the intervention was rolled out as a consequence of this analysis (none stated)
	£275/one point improvement in ECBI	
	£11,016/one point improvement in APS	
O'Neill et al. (2013)	£83 (95% CI: €41 - €152)/one point improvement in ECBI score	Cost-effective (low ICER)
Sampaio et al. (2016)	£6,141/recovered case of conduct problem	An explicit statement on cost-effectiveness is not made
Sharac et al. (2011)	The intervention is dominated by routine care	Not cost-effective
Sonuga-Barke et al. (2018)	£556 cost-saving	Cost-saving
Multisystemic therapy		
Fonagy et al. (2018)	Not reported	Not cost-effective (none)
	Days of marijuana use: Family courts	

Sheidow et al. (2012)	Days of poly-drug use: Juvenile drug court with multisystemic therapy and contingency management	Cost-effectiveness improved with interventions that had greater intensity (positive ACER)
	Days of alcohol use: Juvenile drug court with multisystemic therapy and contingency management	
	Days of heavy alcohol use: Juvenile drug court with multisystemic therapy and contingency management	
	Offenses: Juvenile drug court with multisystemic therapy	
	Theft: Family court	
	Crimes against persons: Juvenile drug court with multisystemic therapy	
Vermeulen et al. (2017)	£361,420/QALY gain	Cost-effective (none stated)
Social worker led intervention		
Byford et al. (1999)	No statistically significant difference in costs	As cost-effective as routine care
Sullivan et al. (2002)	£8 (95%CI:-£10.92 to £49.09)/symptom free day gain	Cost-effective (low ICER)
Fast Track project		
Foster and Jones (2007)	Not reported	Cost-effective for high risk individuals (none stated)
Family therapy		
Cottrell et al. (2018)	18 month time horizon: £39,296/QALY gain	Not cost-effective (NICE £20,000 to £30,000 cost-effectiveness threshold)
	5 year time horizon: £20,802/QALY gain	Cost-effective (NICE £20,000 to £30,000 cost-effectiveness threshold)
Parent-Child Assistance Program		

Thanh et al. (2015)	£56,806 per pregnancy prevented fetal alcohol syndrome case	Cost-effective (cost-effectiveness threshold of $800,000)
Preventive basic care management		
Wansink et al. (2016)	Healthcare perspective: £427/unit improvement in HOME-T score	No explicit decision on cost-effectiveness is made
	Social care perspective: £199/unit improvement in HOME-T score	
	Societal perspective: £162/unit improvement in HOME-T score	
Family Connections		
DePanfilis et al. (2008)	9 months: £227/unit change in outcome	9 month intervention more cost-effective than 3 month intervention (lower cost)
	3 months: £277/unit change in outcome	
Family Group Conferencing		
Dijkstra et al. (2018)	£72,788/family without an indication of maltreatment	Not cost-effective (cost-effectiveness threshold of €10,000)
	£5,198/one point improvement in empowerment	
	£11,198/one point improvement in social support	
Multidimensional Treatment Foster Care		
Lynch et al. (2014)	Not reported The p,ce is not estimated but incremental net benefit. If WTP is $10,000, INB is $4,591	Cost-effective (INB for cost-effectiveness thresholds up to $30,000)

Table 2: Cost-effectiveness results

3.7. Cost-effectiveness decision

Of the eight parenting interventions, five were cost-effective; the Parents Under Pressure program was reported as cost-effective in two studies (Barlow et al., 2019; Dalziel et al., 2015) and the Incredible Years parenting program was cost-effective across three studies (Edwards et al., 2007; Edwards et al., 2016; O'Neill et al., 2013). The New Forest parenting

program was equivalent to Incredible Years in terms of outcomes but it was cost-saving (Sonuga-Barke et al., 2018). Home based parenting interventions for the adoptive parents of children looked after (Sharac et al., 2011) was dominated, i.e. less effective and more costly than its comparator, and one study did not make a cost-effectiveness recommendation (Sampaio et al., 2016).

The results were mixed for multisystemic therapy. One Dutch study (Vermeulen et al., 2017), targeting chronically antisocial and seriously violent adolescents, showed multisystemic therapy to be cost-effective. Unlike the evaluation by Vermeulen et al. (2017), the economic evaluation by Fonagy et al. (2018) showed multisystemic therapy as not cost-effective. The target population, duration of treatment and quality of study conduct and reporting were similar for both studies. However, Vermeulen et al. (2017) measured outcomes in terms of impact on adolescent quality of life whilst Fonagy et al. (2018) measured outcomes in the form of out-of-home placements. The final study (Sheidow et al., 2012), measuring cost-effectiveness of multisystemic therapy for alcohol and drug abusing juvenile offenders in the USA, found the intervention to be cost-effective as part of a high intensity program of activities. The three studies indicate that multisystemic therapy could be cost-effective for young people with more serious behavioral issues.

For the two studies evaluating social worker-led interventions, the authors concluded that the service was cost-effective where social workers acted as asthma counsellors (Sullivan et al., 2002) and equivalent to routine care where home-based social workers supported young people who had self-poisoned (Byford et al., 1999). The remaining interventions were each evaluated by one study. The Parent-Child Assistance Program (Thanh et al., 2015) and Multidimensional Treatment Foster Care (Lynch et al., 2014) were both cost-effective. The Fast Track project (Foster & Jones, 2007) was cost-effective for high risk individuals, Family Connections (DePanfilis et al., 2008) was cost-effective for the longer treatment duration of

nine months compared to three months, and family therapy (Cottrell et al., 2018) was cost-effective when costs and outcomes were measured over a 5-year time horizon. Wansink et al. (2016) did not make a cost-effectiveness recommendation for preventive basic care management due to lack of known cost-effectiveness thresholds; however, the ICERs estimated for the three outcomes measured were relatively low. The final study, evaluating Family Group Conferencing (Dijkstra et al., 2018), concluded that the intervention was not cost-effective. However, the authors applied a threshold of €10,000 for cost-effectiveness without justification.

3.8. Quality of eligible studies

Seventeen studies carried out a trial based economic evaluation as listed in table 2. Of these, eight studies had a low risk of overall bias (Barlow et al., 2019; Byford et al., 1999; Dalziel et al., 2015; Fonagy et al., 2018; Lynch et al., 2014; O'Neill et al., 2013; Sharac et al., 2011; Sonuga-Barke et al., 2018). There were some concerns around the overall risk of bias for six studies (Cottrell et al., 2018; Edwards et al., 2007; Edwards et al., 2016; Sampaio et al., 2016; Sheidow et al., 2012; Vermeulen et al., 2017).

Two studies used decision analytical modelling in their economic evaluations; the model developed by Thanh et al. (2015) met 13 out of the 20 checklist items listed in the guidance by Philips et al. (2004), indicating an adequate quality model whilst the model by Cottrell et al. (2018) met 16 of the checklist items, suggesting a good quality model.

No studies were considered poor quality economic evaluations as determined by the CHEERS checklist. Two studies were judged of adequate quality (Dalziel et al., 2015; O'Neill et al., 2013) and eighteen studies were considered good quality economic evaluations (Barlow et al., 2019; Byford et al., 1999; Cottrell et al., 2018; DePanfilis et al., 2008; Dijkstra et al., 2018; Edwards et al., 2007; Edwards et al., 2016; Fonagy et al., 2018; Foster & Jones,

2007; Lynch et al., 2014; Sampaio et al., 2016; Sharac et al., 2011; Sheidow et al., 2012; Sonuga-Barke et al., 2018; Sullivan et al., 2002; Thanh et al., 2015; Vermeulen et al., 2017; Wansink et al., 2016).

4. Discussion

4.1. Main findings

The present review identified economic evaluations of children's social care interventions and synthesized evidence of the methods adopted, and the cost-effectiveness reported. Twenty studies were identified that carried out full economic evaluations. Almost half of these were evaluated in the UK context covering; parenting interventions, home-based social workers (for young people who had self-poisoned), family therapy and multisystemic therapy. A few interventions were evaluated in the US context; Family Connections, the Fast Track project, Multidimensional Treatment Foster Care, multisystemic therapy and social workers as asthma counsellors. In addition, a range of other interventions were evaluated across the remaining studies including; Family Group Conferencing and preventive basic care management.

The review highlights the evidence gaps in the field, with many types of interventions that are mainstream in children's social care practice not represented. Studies tended to evaluate interventions that social workers might refer to, rather than provide directly, such as parenting programs. There have not been full economic evaluations of interventions that social workers themselves routinely use, for example, child protection plans. Nor are there studies of the cost-effectiveness of routinely used mainstream interventions such as foster care placements compared to kinship care placements. There are also no full economic evaluations of whole-system changes, such as Signs of Safety, or of widely-used interventions to prevent children coming into care, such as Family Drug and Alcohol Courts.

The most common method for economic evaluation was a CEA (n=17). However, two further studies that carried out a CMA can be grouped with these as their initial objective was to carry out a CEA, except that there was no statistical difference in effectiveness. There is debate around the suitability of a CMA for economic evaluation, recent research is inclined towards the continued use of CEA, even where there is no statistically significant difference in effect (Briggs & O'Brien, 2001; Dakin & Wordsworth, 2013).

A number of challenges with the conduct of economic evaluations of children's social care interventions were highlighted, potentially contributing to the limited evidence. The first being the lack of an established standardized outcome measure to measure effects in evaluations of children's social care and thus a cost-effectiveness threshold to make cost-effectiveness recommendations. In addition, time horizons were often too short to capture all meaningful effects and costs, especially for interventions where prior research had suggested that there were longer term benefits. Other study challenges related to high staff turnover rates and staff changes that necessitated additional training, small sample sizes due to issues with study recruitment and attrition, poor recall accuracy of families' self-reporting and unreliable completion of data questionnaires, complexity of interventions evaluated, issues of generalizability when implementing an intervention across more than one setting and limited availability of routinely collected data.

In 12 studies, the authors concluded that the intervention evaluated was cost-effective. The use of a wide range of outcomes and the absence of a standard cost-effectiveness threshold across disparate outcomes makes it challenging to compare results across the studies. However, the cost-effectiveness results revealed by this review appear promising for many interventions, and a small increase in spending may lead to improvements in measurable outcomes. It must be highlighted that spending decisions should not be informed solely by cost-effectiveness evidence, but rather should be based on several factors, including cost-

effectiveness, the preservation of the rights of children and their families, ethical issues when working with vulnerable groups and the immediate needs of the community.

4.2. Recommendations for evaluators

It is important to plan for more rigorous economic evaluations, involving economists at the study design stage. This ensures that the systems and instruments are in place to collect all the economic evaluation data needed and any issues are highlighted and addressed early in the study. Pilot studies are particularly useful to implement prior to definitive studies; they allow an opportunity to test the methods of data collection and evaluation.

Currently there are two economic evaluation methods appropriate for use in children's social care, CEA and CCA. The wide use of CEA has been demonstrated by this review. A CCA is a simpler form of economic evaluation that lists all costs and outcomes in a disaggregated format. These are particularly useful in the early stages of economic evaluation design, when deciding on the most significant costs and consequences to measure, especially where a single measure of effectiveness will not capture all impacts of an intervention. Information from these can be used to inform subsequent CEA.

Recommendation 1: Develop economic measurement approaches and identify economic data sources within a pilot study to inform a cost-effectiveness analysis or a cost-consequences analysis alongside a definitive study.

Social care staff involved with vulnerable children and their families are vital to the success of any economic evaluation in this context. It is important to actively engage with staff early in the research process, they can be a valuable resource in the development of tools for cost data collection, guiding where best to access routine data and providing input on the feasibility of completing self-report questionnaires with families and children.

Recommendation 2: Researchers should closely involve and engage with social care staff at the protocol development stage and throughout the study

Strategies should be developed to overcome slow recruitment and to motivate families to remain in the study, for example, incentives for sign up, the use of gift vouchers and the reimbursement of costs where appropriate. It is important to ensure that methods for data collection do not deter families and children from accessing services.

Recommendation 3: (a) Explore different strategies to maintaining an appropriate level of recruitment and minimal loss to follow-up; (b) Pilot questionnaires with a small sample of families prior to rolling out to all families recruited

The study perspective should be defined and explicitly stated at the study design stage. It will influence the types of costs and benefits to be captured as well as the extent to which they have to be measured and valued for use in the evaluation (Byford & Raftery, 1998).

Recommendation 4: Define and justify the perspective at the study design stage and ensure that all costs and outcomes included in the evaluation appropriately align with the perspective

For some interventions, effects will be immediate and so a shorter time horizon is sufficient, whilst for others the time horizon may need to be longer to realize an intervention's full potential. The time horizon chosen should be long enough to capture all important changes in costs and outcomes.

Recommendation 5: Define and justify the time horizon at the study design stage and ensure that it is long enough to capture all costs and outcomes of the interventions evaluated

The range of resource use values and unit costs used in an economic evaluation are related to the study perspective. Each cost must be identified, measured and valued by assigning it a

price (Shiell, Donaldson, Mitton, & Currie, 2002) with clear statements of sources. In some countries, guides to unit costs exist. In the UK, for example, a detailed description of methods can be found in *Unit Costs not Exactly Child's Play. A guide to estimating unit costs for children's social care* (Beecham, 2000). Two further valuable resources exist for UK unit costs, the Personal Social Services Research Unit annual publication *Unit Costs of Health and Social Care* (Curtis & Burns, 2019) and the Greater Manchester combined authority unit cost database (GMCA, 2020).

Furthermore, analysts should emphasize adjustments made to ensure all costs are reflective of the year of evaluation.

Recommendation 6: Clearly identify all costs to be valued and put in place appropriate methods for the accurate measurement of these.

Children and their families may struggle to cooperate or engage with standard self-report questionnaires. Routinely available administrative data can provide an accurate and reliable source of information and should generally be considered the primary source of data to inform an economic evaluation. The purpose of self-report questionnaires should be to complete data gaps not available through routine data sources.

Recommendation 7: Researchers should identify routinely collected data that can be used as an alternative to self-report questionnaires

The existence of some levels of uncertainty around the cost and outcome parameters that are used to inform economic evaluation calculations is inevitable. Sensitivity analysis should be carried out to explore how changes to the values of input parameters will influence the cost-effectiveness outcomes of an intervention.

Recommendation 8: Carry out sensitivity analysis to determine the impact of uncertainty on cost-effectiveness results and thus the robustness of the recommendation made

Children and their families represent a diverse group of individuals. As noted through the review, some interventions generally target children 'in need' or children looked after without specification of the underlying cause of need. Cost-effectiveness results should be presented for sub-groups pre-determined at the study design with the results used to potentially target future research.

Recommendation 9: Carry out sub-group analysis to explore how differences in the baseline characteristics of the population influence cost-effectiveness decisions

There may be room for the utilization of decision analytical modelling where trials are difficult to implement. Decision models use mathematical techniques to map out care pathways and generally rely on existing literature, utilizing a wide range of sources to synthesize data on costs, outcomes and probabilities. Models developed can be viewed as tools for economic evaluation. They can be constantly refined and updated to reflect new knowledge, generating better estimates of cost-effectiveness. In addition, it is possible to adapt model pathways to reflect changes in guidelines and practice or to adjust model inputs to reflect different settings

Recommendation 10: Consider the use of economic models in addition to or as an alternative to carrying out a within-trial economic evaluation

4.3. Research priorities

It is important to identify child and adult preferences for different delivery approaches and to determine the best methods for carrying out research with vulnerable children and families involved in social care. This type of study can either be carried out in conjunction with RCTs or as a separate study made up of focus groups and interviews with the different stakeholders working with this population group. Where possible children and their families should be involved so that future research is designed to maximize their engagement. The output of

such a study would contribute to guidance on methods for economic evaluation and more broadly methods for the evaluation of interventions for this population group.

A diverse range of outcomes were measured and valued across the eligible studies. No standardized outcome exists that captures the full effects of social care interventions. The QALY measure used in healthcare does not fully capture the full scope of impacts of children's social care interventions beyond domains of health-related quality of life such as mobility, self-care, carrying out usual activities, pain/discomfort and anxiety/depression, and mortality effects (Whitehead & Ali, 2010). These are not necessarily all relevant to the field, outcome considerations for children's social care interventions are broad, having a range of far-reaching effects, for example on mental and emotional wellbeing; educational outcomes; criminal activity; behavior; feelings of safety and security; family relationships; social connectivity; stigma; and trust. In children's social care it is important to maintain the quality of the service, the rights of children and their families, the value of the intervention to children and families and finally the consequence of the intervention on the underlying problem that has originally caused the need for intervention (Forrester, 2017). Seven eligible studies recognized and attempted to address this by measuring intervention effects on more than one outcome. Whilst this can be considered suitable, issues arise when outcomes lead to disparate cost-effectiveness decisions.

'What Works for Children's Social Care' has developed an initial framework of outcomes (What Works CSC, 2018). It is divided between primary outcomes; the rights and outcomes of children and their families in addition to intermediate outcomes encompassing organizational factors. Figure 2 presents a summary of the outcomes framework as outlined by the What Works CSC (2018).

The What Works CSC (2018) lists cost-effectiveness as an outcome within organizational factors in children's social care. In reality, economic evaluation as an evaluative approach runs in parallel to assessments of effectiveness, including all primary and intermediate outcomes and does not simply focus on cost savings. The identification of child and family rights, child outcomes, parent, carer and family outcomes and organizational factors as the initial domains of an outcomes framework sets the direction of future research.

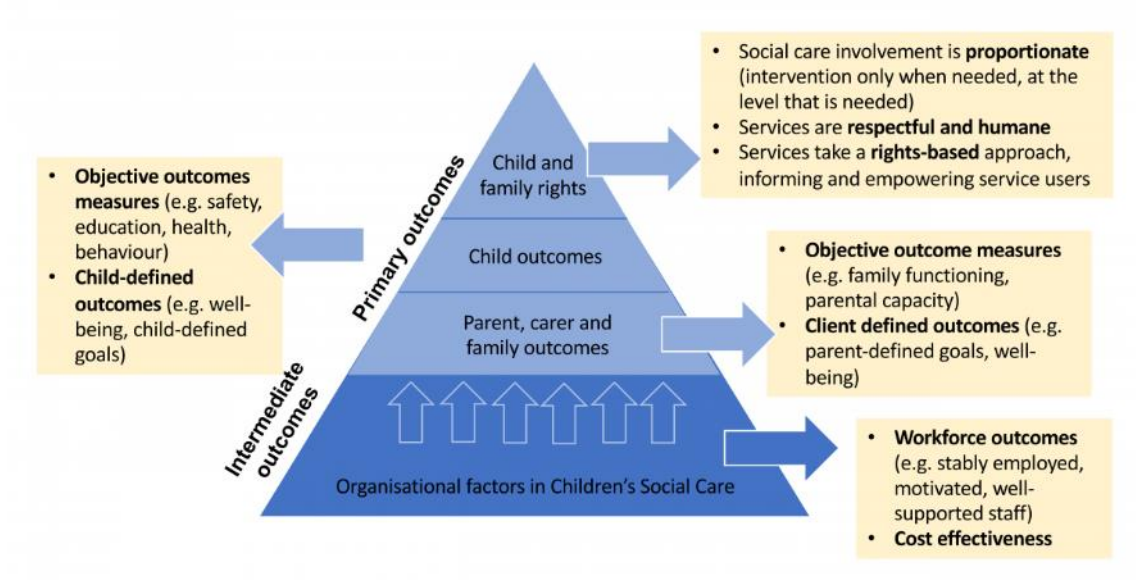

Figure 2: Outcomes framework developed by the What Works CSC (2018)

Similar work by Holder, Beecham, and Knapp (2011) proposes a preference based outcome measure for child outcomes, which should include the following domains: provision for physical needs, ability to go to school and do the best they can, receiving help and encouragement, being able to express themselves, have a say and challenge decisions, being listened to, able to make choices and have views taken into account, having enough time to take part in unstructured activities and being able to have relationships with family and friends (Holder, Beecham, and Knapp. 2011). La Valle, Hart, Holmes, and Pinto (2019) have also developed an outcomes framework. They list the following outcomes for each child; safe where they live, settled and happy where they live, achieve stability and permanence, make

good progress on behavioral, emotional and social development, have their mental health needs met, engage in education, have a stable and positive educational experience and make progress in education.

The work by Holder, Beecham, and Knapp (2011) and La Valle et al. (2019) is not separate to but complements the outcomes framework in figure 2. They are the first steps in the development of a child outcome measure relevant to economic evaluations of children's social care interventions. The challenge now is to determine how the four outcomes of the framework can be standardized for use in economic evaluations. Perhaps this will involve the development of a measure for each of the primary and intermediate outcomes or all four layers of the outcomes framework will be incorporated with weighting into a single outcome measure for use in economic evaluations. This may be an idealistic endeavor due to the complexity of children's social care, nonetheless the idea should be explored or alternative methods for the incorporation of outcomes into economic evaluations of children's social care brainstormed and developed. Undoubtedly, this process will not result in immediate outputs and may take many years of further research.

Economic evaluations that show an intervention to be cost-saving with parallel increases in effectiveness are ideal but uncommon. For the majority of interventions, investment is needed, an intervention is considered cost-effective if the additional spend is equal to or below a pre-defined cost-effectiveness threshold, the value of a one-unit increase in outcome. Currently there is no agreed upon threshold level for children's social care outcomes, in part due to the lack of a standardized outcome measure. Studies have overcome this issue in one of three ways; (1) not specifying a particular threshold value but reporting the probabilities of cost-effectiveness over a range of cost-effectiveness thresholds for the decision maker to choose the appropriate value. (2) Where the ICER estimated was low, the intervention has generally been considered by authors as cost-effective. (3) Studies have looked to the broader

economic literature surrounding cost-effectiveness thresholds, for example using the lifetime cost of a case of fetal alcohol syndrome to inform the cost-effectiveness threshold for each case avoided. In order to standardize and improve cost-effectiveness decisions, threshold values need to be developed once outcome measures are agreed.

Based on the outcomes of this review, methods guidance for the conduct of economic evaluations in children's social care can start to be developed in consultation with experts in the field. Any guidance must take into account the requirements of a good quality, full economic evaluation whilst considering what is appropriate for this area and what is realistically feasible.

4.4. Review Strengths and limitations

This is the first review of full economic evaluations of children's social care interventions. A comprehensive list of information sources was searched to inform the review and all relevant literature was identified and included. This review can be considered the first step to developing guidance in the area and future research should build on this to put together a comprehensive framework of recommendations for the conduct of economic evaluations in the field of children's social care.

The primary challenge when conducting this review was identifying the social care focus of interventions when determining the eligibility of studies at the screening stage. This was not always obvious, especially for interventions that social workers refer to rather than being delivered by social workers themselves. A broad approach was taken when screening studies and all studies evaluating interventions that indicated that children's social care services maybe involved were included. However, this may raise some contention among readers around some of the studies included and the interventions evaluated.

5. Conclusion

The review highlights the gap in the evidence around the cost-effectiveness of children's social care interventions. In the majority of studies reviewed, cost-effectiveness analyses were carried out and the interventions judged as cost-effective. Future research should consider the development of appropriate outcome measures with suitable threshold values for their cost-effectiveness for use in economic evaluations of children's social care interventions.

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Appendices

Appendix A: Summary eligibility criteria

	Inclusion	Exclusion
Population	• All children identified as 'in need': o Abused and neglected children o Children with disability or illness o Parental disability or illness o Family going through a temporary crisis o Families with inadequate parenting capacity o Child with socially unacceptable behavior o Family on low income o Absent parents • Children looked after • Care-leavers • Adults involved in affecting outcomes for the children listed. For example: birth families, kinship carers, adoptive parents, foster carers, social workers or teachers.	Children that fall outside the remit of social care services. Adults not involved in the care and delivery of services to the eligible children
Intervention	Any intervention with a social care element that modifies or replaces current practice	Intervention with no social care element
Comparator	Any comparator	No comparator
Outcome	All measured outcomes were relevant. Outcomes had to be reported at the level of the child or young person.	Non-child outcomes
Study design	Full economic evaluation:	Partial economic evaluations:

	• Cost-effectiveness analysis • Cost-benefit analysis • Cost-utility analysis • Cost-consequence analysis • Cost-minimization analysis	• Outcomes description • Cost description • Outcomes analysis • Cost analysis • Cost-cost offset analysis
Country	High income countries as defined by the World Bank (2019)	Low and middle income countries
Language	English only	Non–English publications
Year of publication	No limit	
Publication type	Primary study	• Conference abstracts • Protocols • Systematic reviews

Appendix B: Search strategy in the Social Policy and Practice database

1	(child protection or social service or social care or childrens services or child protection services or family support services).de.
2	("substitute care" or "local authority care" or "state care" or "statutory care" or "public care" or "children* home" or orphan* or "support* living" or "supported lodging*" or "care leaver*" or care leaver* or "children in care" or "young people in care" or "young carer*1" or "secure accommodation").ti,ab.
3	("looked after" adj2 (kid* or child* or youngster or "young person" or "young people" or youth or adolescent* or teen* or girl* or boy* or juvenile*)).ti,ab.
4	((child or children) adj2 (protection or welfare or service* or advocacy)).ti,ab.
5	(social adj1 (care or carer* or caregiv* or welfare or work or worker* or service or support)).ti,ab.
6	(community adj2 (care or carer* or caregive* or welfare or work or worker* or welfare or service* or support)).ti,ab.
7	((family or youth or welfare) adj1 (service* or support)).ti,ab.
8	(leaving adj care).ti,ab.

9	(safeguarding or protective services or care system*1 or "edge of care" or reunification).ti,ab.
10	("children in need" or "children at risk").ti,ab.
11	(vulnerable adj1 (child or children or young people or youth or family or families)).ti,ab.
12	((neglect or neglected or abuse or abused or violence or exploit* or maltreatment) adj3 (child or children or adolescen* or teen* or youth)).ti,ab.
13	((disabled or disabilit* or handicap* or handi-cap* or "special needs" or mental* retard* or deaf or deafness or blind or blindness) adj5 (support* or care or welfare or protect* or service* or thrive or advocacy or safeguard*)).ti,ab.
14	(((cognitive or learning or mobility or sensory or visual* or vision or sight or hearing or physical* or mental* or intellectual or chronic*) adj2 impair*) and (support* or care or welfare or protect* or service* or thrive or advocacy or safeguard*)).ti,ab.
15	(((mental* or emotional* or psychiatric or neurological or neurologic or behaviour* or behavior* or chronic or conduct) adj2 (disorder* or illness* or condition*1)) and (support* or care or welfare or protect* or service* or thrive or advocacy or safeguard*)).ti,ab.
16	(parent* adj2 (capacity or problem* or disabilit* or disabl* or illness or absent* or absence or program*)).ti,ab.
17	(family adj2 (dysfunction or stress or preservation)).ti,ab.
18	((children or families or family) adj2 ("low income" or poverty or disadvantaged or destitute or deprived or impoverished or deprivation)).ti,ab.
19	((socially unacceptable or antisocial or challenging) adj2 (behaviour* or behavior*)).ti,ab.
20	(Refugee* or asylum or unaccompanied child* or unaccompanied minor*).ti,ab.
21	((adopted or adoption or foster or fostering or adoptive) adj2 (child* or family or families or parent or parents or mother*1 or father*1 or service* or placement* or care or carer or caregiv* or home* or kin or kinship)).ti,ab.
22	(residential adj2 (settings or school* or unit*1 or care or institution*1)).ti,ab.
23	(("in care" or custod*) adj3 (local authorit* or local government or council* or welfare or state or statutory or social)).ti,ab.

24	((custodial or custody) adj2 (grandparent* or grandmother* or grandfather* or kin or kinship or care or nonparent)).ti,ab.
25	(nonparent adj3 (care or custody)).tw.
26	or/1-25
27	children.de.
28	(adolescen* or preadolescen* or baby or babies or infan*2 or neonat* or newborn* or new-born* or toddler* or preschool* or pre-school* or child or children or childhood or girls or boys or kid or kids or juvenile or teen* or preteen* or youth or youngster*).ti,ab.
29	(young adj2 (adult or adults or people or women or men or males or females or persons)).ti,ab.
30	(pediatric*1 or paediatric*1).ti,ab.
31	or/27-30
32	((cost or costs or costing or economic) adj2 (apprais* or assess* or analysis* or analyses* or study or evaluat* or estimat* or decision or burden or expenditure)).ti,ab.
33	((cost or costs or costing or economic or value) adj2 (decision* or threshold)).ti,ab.
34	(value adj2 money).ti,ab.
35	(model* adj2 (economic or decision or decisionmaking)).ti,ab.
36	(costbenefit* or costeffect* or "return on investment").ti,ab.
37	((costs or cost) adj2 (effect* or utility or benefit)).ti,ab.
38	or/32-37
39	26 and 31 and 38

Appendix C: Description of the interventions evaluated in each study

Reference	Comparators	Description
Barlow et al. (2019)	Parents Under Pressure parenting program plus standard services for substance misusing parents	The program is an intensive home based intervention of 12 modules delivered over 20 weeks (Barlow et al., 2013). It is specifically aimed at substance misusing parents and is designed to improve parenting whilst taking into account the external influences on family functioning (Dawe & Harnett, 2007).
	Standard services for substance misusing parents	Not standardized across the study sites and included a mixture of family support, family counselling and group parenting programs.
Byford et al. (1999)	Home based social work plus routine care	Five home based sessions to work with the young children and their families to overcome family dysfunction(Harrington et al., 1998)
	Routine care only	Routine psychiatric care
Cottrell et al. (2018)	Family therapy	Family therapists met with families monthly over a 6-month period.
	Usual care	Care offered by local CAMHS to young people referred following self-harm.
Dalziel, Dawe, Harnett, and Segal (2015)	Parents Under Pressure parenting program	The program is specifically aimed at substance misusing parents and is designed to improve parenting whilst taking into account the external influences on family functioning (Dawe & Harnett, 2007)
	Usual care +/- brief parenting intervention	Management as usual as provided by the methadone clinic with or without a brief intervention of two parenting sessions.
	Family Connections (3 months)	

DePanfilis, Dubowitz, and Kunz (2008)	Family Connections (9 months)	Family Connections included (1) emergency assistance (2) home-visiting family intervention (3)advocacy and service coordination (4) multi-family supportive and recreational activities
Dijkstra et al. (2018)	Family Group Conferencing in addition to intensive family case management	A care plan is developed by the family and their extended network and approved by the child protection worker
	Intensive family case management only	A care plan is made and implemented under the responsibility of the child welfare worker
Edwards, Céilleachair, Bywater, Hughes, and Hutchings (2007)	Incredible Years parenting program	Program aims to strengthen parenting competencies and reduces the risk of children developing conduct problems
	Six-month wait list	Parents received usual care for 6 months followed by access to the intervention
Edwards et al. (2016)	Incredible Years parenting program	Program aims to strengthen parenting competencies and reduces the risk of children developing conduct problems
	Six-month wait list	Parents received usual care for 6 months followed by access to the intervention
Fonagy et al. (2018)	Multisystemic therapy	This is a short-term intensive family and community based intervention considered an alternative to out-of-home placement for young people at risk of going into care (Henggeler, 1999). Families have access to therapists for approximately 4-6 months, 24 hours a day and seven days a week (Henggeler, 1999).

	Standard care services	This was not standardized across the study sites and reflected standard community practice, including; treatment for substance misuse, family based interventions and anger management.
Foster and Jones (2007)	Fast Track project	This is a multi-component intervention for children with conduct problems at schools located in high crime and high poverty neighborhoods. It was implemented over 10 years at the school level (McMahon et al., 1999) and delivered by a range of professionals, including, home visitors, academic tutors, educational coordinators and family coordinators.
	No intervention	
Lynch, Dickerson, Saldana, and Fisher (2014)	Multidimensional Treatment Foster Care	Foster parents complete 12 hours of intensive training and have access to regular support from a consultant. Children receive services from a behavior specialist and attend socialization play group sessions. Family therapists work with birth or adoptive parents.
	Regular foster care	Routine services e.g. psychotherapy, social service support and mental health treatment
O'Neill, McGilloway, Donnelly, Bywater, and Kelly (2013)	Incredible Years parenting program	Program aims to strengthen parenting competencies and reduces the risk of children developing conduct problems
	Six-month wait list	Parents received usual care for 6 months followed by access to the intervention

Sampaio, Enebrink, Mihalopoulos, and Feldman (2016)	Comet parenting program	For parents of children aged 3-11 years, involves eleven 2.5hour meetings with a maximum of 6 families. Based on behavioral techniques.
	Connect parenting program	For parents of children aged 9-16 years, involves ten 1hour meetings with a maximum of 12 to 14 parents. Based on attachment theory.
	Cope parenting program	For parents of children aged 3-12 years, involves ten 2hour meetings with a maximum of 25 parents. Based on behavioral techniques.
	Incredible Years parenting program	For parents of children aged 3-8 years, involves twelve 2.5hour meetings with a maximum of 10 to 14 parents. Based on behavioral techniques.
	Bibliotherapy	Parents received a book for self-guided parent management
	Four-month wait list	Parents received usual care for 4 months followed by access to the intervention
Sharac, McCrone, Rushton, and Monck (2011)	Two home based parenting interventions	Two types of parenting interventions were developed and included, the first adopted a cognitive behavioral therapy approach and the second an educational approach. Both took place over 10 consecutive weeks for one hour sessions
	Routine local authority support services	Not described
Sheidow, Jayawardhana, Bradford, Henggeler,	Family court with community services	Young people appeared in front of family court judge once or twice per year and received outpatient alcohol and drug abuse services.
	Juvenile drug court plus community services	Young people appeared before the drug court judge once a week with their therapist for monitoring of drug use. The judges provided rewards or sanctions based on monitoring results, they also received outpatient alcohol and drug abuse service

and Shapiro (2012)	Juvenile drug court plus multisystemic therapy	Young people appeared before the drug court judge but received multisystemic therapy instead of community services. Multisystemic therapy identifies and specifies interventions that can be used to focus on the individual, family, peer, school and social networks variables that are linked to the identified problem.
	Juvenile drug court plus multisystemic therapy and contingency management	In addition to appearing in front of a drug court judge and receiving multisystemic therapy, young people had contingency management techniques incorporated in their treatment.
Sonuga-Barke et al. (2018)	New Forest parenting program	One-to-one parenting program
	Incredible Years parenting program	Group based parenting program
	Management as usual	Standard pre-school ADHD care available in the child's region
Sullivan et al. (2002)	Social workers as asthma counsellors	Social workers were trained to work with and support children and their families to adhere to clinician instructions on asthma management (Evans III et al., 1999)
	Usual asthma care	No social workers
Thanh et al. (2015)	Parent-Child Assistance Program	A home visitation/case management/ harm reduction mentorship intervention model for women who abuse substances and are pregnant or up to 6 months post-partum.
	Management as usual	No Parent-Child Assistance Program
Vermeulen, Jansen, Knorth, Buskens, and	Multisystemic therapy	A short-term intensive family and community based intervention as an alternative to out-of-home placements (Henggeler, 1999). Families have access to therapists for 4-6 months, 24 hours a day and seven days a week (Henggeler, 1999).
	Functional family therapy	A family focused intervention to improve the relationship between the adolescent and their family

Reijneveld (2017)		
Wansink et al. (2016)	Preventive basic care management	A preventive program targeting the threats to good parenting. The program addresses risk factors for poor parenting and addresses these.
	Access to information and support groups	Parents received a brochure about the impact of parental problems on their children and information about the available services they can access.

Appendix D: Description of the outcomes measured across the eligible studies

Reference	Outcome	Measure	Source
Parenting programs			
Barlow et al. (2019)	Risk of abuse	Brief Child Abuse Potential Inventory	Mother
	Parent quality of life	EQ-5D	Parents
Dalziel et al. (2015)	Child maltreatment	Child Abuse Potential Inventory	Parent
Edwards et al. (2007)	Child behavior	Eyberg Child Behavior Inventory	Parents
Edwards et al. (2016)	Child behavior	Strengths and Difficulties Questionnaire	Parents
		Eyberg Child Behavior Inventory	Parents
	Parenting competency	Arnold O'Leary parenting scale	Unclear
O'Neill et al. (2013)	Child behavior	Eyberg Child Behavior Inventory	Parent
Sampaio et al. (2016)	Child behavior	Eyberg Child Behavior Inventory	Parent
Sharac et al. (2011)	Child mental health	Strengths and Difficulties Questionnaire	Unclear
Sonuga-Barke et al. (2018)	ADHD symptoms	Swanson Nolan and Pelham Questionnaire	Parents and teachers

Multisystemic therapy			
Fonagy et al. (2018)	Out-of-home placement	n/a	Unclear
Sheidow et al. (2012)	Drug and alcohol use	Timeline Follow-Back form 90 interview	Young person
	Criminal activity	47 item self-report delinquency scale	Young person
Vermeulen et al. (2017)	Adolescent QOL	EQ-5D	Young person
Social worker led interventions			
Byford et al. (1999)	Suicide ideation	Suicide Ideation Questionnaire	Young person
	Negative attitude	Hopelessness Scale	Young person
	Family functioning	Family Assessment Device	Young person and parent
Sullivan et al. (2002)	Asthma symptom free days	Self-report	Care givers
Fast Track project			
Foster and Jones (2007)	Conduct disorder	Diagnostic Interview Schedule for Children	Primary caregiver
	Criminal offence	Self-report of delinquency	Young person
	Interpersonal violence	Self-report of delinquency	Young person
Family therapy			
Cottrell et al. (2018)	Young person's quality of life	EQ-5D	Young person
	Number of self-harm events	A&E and inpatient HES data	NHS Digital
Parent-Child Assistance Program			
Thanh et al. (2015)	Fetal alcohol syndrome cases	Decision analytical model	NA
Preventive basic care management			

Wansink et al. (2016)	Quality of parenting	Home Observation for Measurement of the Environment	Observation & interview with parent /focal child
Family Connections			
DePanfilis et al. (2008)	Child behavior	Child Behavior Checklist	Caregiver
Family Group Conferencing			
Dijkstra et al. (2018)	Child maltreatment	Actuarial Risk Assessment Instrument Youth Protection	Child welfare worker
	Parent empowerment	Family Empowerment Scale	Parent
	Parent social support	Interpersonal Support Evaluation List	Parent
Multidimensional Treatment Foster Care			
Lynch et al. (2014)	Permanent placement	n/a	Data from case records