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Citation for final published version:

Schroeder, Elizabeth-Ann, Westlake, David , Daher, Shahd, Adara, Linda , Ayayo, Sharon, Bennett, Verity, Kim, Sungwook, Lugg-Widger, Fiona , Meindl, Melissa , Meister, Lena, Munnery, Kim, Pallmann, Philip , Roberts, Louisa , Rawlinson, Sarah, White, James and Petrou, Stavros 2024. The cost-effectiveness and cost-consequences of a school-based social worker intervention: a within-trial economic evaluation. Children and Youth Services Review 166 , 107928. 10.1016/j.chilyouth.2024.107928

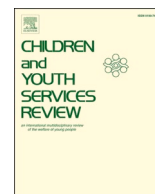
Publishers page: <https://doi.org/10.1016/j.chilyouth.2024.107928>

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The cost-effectiveness and cost-consequences of a school-based social worker intervention: A within-trial economic evaluation

Elizabeth-Ann Schroeder^{a,*}, David Westlake^b, Shahd Daher^a, Linda Adara^c, Sharon Ayayo^{c,d}, Verity Bennett^b, Sungwook Kim^a, Fiona Lugg-Widger^c, Melissa Meindl^b, Lena Meister^c, Kim Munnery^c, Philip Pallmann^c, Louisa Roberts^b, Sarah Rawlinson^c, James White^{c,e}, Stavros Petrou^a

^a Nuffield Department of Primary Care Health Sciences, Radcliffe Observatory Quarter, University of Oxford, Woodstock Road, Oxford OX2 6GG, England, United Kingdom

^b Children's Social Care Research and Development Centre (CASCADE), Cardiff University, Spark, Maindy Road, Cardiff CF24 4HQ, Wales, United Kingdom

^c Centre for Trials Research, Cardiff University, Neuadd Meirionnydd, Heath Park Way, Cardiff CF14 4YS, Wales, United Kingdom

^d School of Health Sciences, University of Manchester, Williamson Building, Oxford Road, Manchester M13 9PL, England, United Kingdom

^e Centre for Development, Evaluation, Complexity and Implementation in Public Health Improvement (DECIPHER), Cardiff University, Spark, Maindy Road, Cardiff CF24 4HQ, Wales, United Kingdom

ARTICLE INFO

Keywords:
Schools
Social workers
Child protection
Economic evaluation

ABSTRACT

Schools are a significant source of referrals to Children's Social Care (CSC) services. A within-trial economic evaluation estimated the cost-effectiveness of embedding social workers in schools (SWIS) in England compared to usual practice. Two hundred and sixty-eight schools comprising 277,888 students were randomised. The primary outcome of the trial was section 47 enquiries (i.e. child protection referrals to CSC services). The economic evaluation estimated the incremental cost-effectiveness of SWIS in reducing section 47 enquiries. Micro-costing approaches assessed the cost of the social worker intervention and addressed variability in key unit costs. Mean differences in costs and outcomes were estimated, with bootstrap 95% confidence intervals and scaling to incidence rate ratios per 1000 students per year. No statistically significant differences between trial arms were identified for any outcomes, costs or cost-effectiveness over a 23-month follow-up. The probability that SWIS is cost-effective was estimated for a range of willingness to pay values. At threshold values of £1000, £10,000 and £20,000, the probabilities for cost-effectiveness were estimated as 1.3%, 1.1% and 6.1%, respectively. This means SWIS had a low probability of being cost-effective.

1. Introduction

There have been rising numbers of children referred to Children's Social Care (CSC) across the past two decades. Many of these 'referrals' lead to child protection investigations, which are actions that are undertaken to protect specific children from concerns of risk or harm. Increases in referrals range from between 10 % and 25 % across the UK, Australia and the USA (Nguyen et al., 2018; Bunting et al., 2017). Independent Commissions have been established and a recent review

(Haves and House, 2022) highlighted the increasing numbers of children being removed from birth families into care, with another noting that the system had reached a point of "crisis" requiring a "reset" (MacAlister, 2022). There is a paucity of evidence to support the effectiveness and cost-effectiveness of interventions to reduce referrals, and more so of evaluations of complex interventions (El-Banna et al., 2021). This research area is still emerging and has suffered a lack of consistent terminology, variation in methodological approaches, in social service configurations and in international policy contexts (Gilbert et al., 2012;

* Corresponding author.

E-mail addresses: elizabeth-ann.schroeder@phc.ox.ac.uk (E.-A. Schroeder), WestlakeD@cardiff.ac.uk (D. Westlake), shahd.daher@phc.ox.ac.uk (S. Daher), AdaraL@cardiff.ac.uk (L. Adara), sharon.ayayo@postgrad.manchester.ac.uk (S. Ayayo), BennettCV@cardiff.ac.uk (V. Bennett), sungwook.kim@phc.ox.ac.uk (S. Kim), luggfv@cardiff.ac.uk (F. Lugg-Widger), MeindlM@cardiff.ac.uk (M. Meindl), MeisterL@cardiff.ac.uk (L. Meister), MunneryK1@cardiff.ac.uk (K. Munnery), PallmannP@cardiff.ac.uk (P. Pallmann), roberts132@cardiff.ac.uk (L. Roberts), RawlinsonS@cardiff.ac.uk (S. Rawlinson), WhiteJ11@cardiff.ac.uk (J. White), stavros.petrou@phc.ox.ac.uk (S. Petrou).

<https://doi.org/10.1016/j.chilyouth.2024.107928>

Received 22 March 2024; Received in revised form 28 June 2024; Accepted 16 September 2024

Available online 19 September 2024

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El-Banna et al., 2021). Irrespective, economic evaluations can provide important guidance to decision-makers regarding the value for money that potential interventions in CSC may offer, or the trade-offs between different interventions. This guidance is critical in view of the rising numbers of children being referred and downward pressure on public funding budgets.

In the UK, social workers in CSC have the lead responsibility for safeguarding children. Child safeguarding is a broad term that refers to a set of policies, procedures and practices implemented to make an environment safe for children. One systematic review evaluated the cost-effectiveness of social worker-led early interventions in CSC, presenting mixed findings (El-Banna et al., 2021). The interventions tended to be located in local communities and were context specific; one involved engaging social workers to support home visits for children who had intentionally self-poisoned with no statistically significant differences between trial arms (Byford et al., 1999). Another provided additional caring support by social workers to families with children suffering asthma (Sullivan et al., 2002), and this intervention was found to be cost-effective.

Given the rising rates in referrals to CSC however, there is a need for preventative interventions that can safely reduce the need for children to receive CSC services. An approach identified in the UK for improving school responses to safeguarding concerns is placing social workers in schools. This is because schools are a significant source of referrals to CSC, contributing the second highest proportion of all referrals, behind the police (Department for Education, 2022). Since 2014, they have also been associated with the highest increase in referrals to CSC of any service (Department for Education, 2022). Longstanding challenges have existed in how schools and CSC work together. An Independent Review into Children's Social Care commissioned by the UK Government (Haves and House, 2022) recommended that schools became more engaged with CSC to strengthen how agencies jointly worked to protect children, and to ensure their contribution and perspective was supported in partnership arrangements. One of its key recommendations was for schools to become a fourth statutory safeguarding partner, joining the local authority, clinical commissioning group, and police (Haves and House, 2022; MacAlister, 2022). A pilot study identified that social worker presence in schools, helped social workers build good relationships between staff, students and families (Westlake et al., 2020). They created a broader understanding and acceptance of the school-based social work role; and showed that the interventions could be tailored to local community needs. Building on this evidence, in 2019 the Department for Education funded approximately 15 % of local authorities (LAs) ($n = 21$) in England to deliver SWIS as part of a trial (Westlake et al., 2020; Westlake et al., 2022). A local authority is a geographical district demarcated for the purposes of local government. Two hundred and sixty-eight mainstream schools within these LAs, comprising 277,888 students, were randomised (intervention $n = 136$; control $n = 132$), making it the largest trial in CSC in the UK, and to our knowledge the largest social work randomised controlled trial in the world.

Social Workers in Schools (SWIS) is an example of a preventative intervention implemented at scale, and designed to reduce risk through the creation of intensive supports within the school community. SWIS aimed to embed social workers within secondary schools to undertake statutory social work with children and families, increasing opportunities for lower-level preventative work, and improving inter-agency collaboration. A commensurate embedded economic evaluation evaluated the cost-effectiveness of the intervention, with the main outcome of interest to be a reduction in the rate of Section 47 Enquiries A Section 47 Enquiry might also be referred to as a Child Protection enquiry, a Child Protection Investigation, or an s47. The term refers to section 47 of the Children Act 1989. These investigations are carried out to assess if a child (or children) has experienced or is at risk of experiencing significant harm.

2. Study design

2.1. Design and setting

The Social Workers in Schools (SWIS) trial was a pragmatic cluster-randomised controlled trial (schools clustered within LAs) that compared a social worker assigned to schools (intervention) versus usual practice (control) in mainstream secondary schools in England (UK) between September 2020 and July 2022. Usual practice in the UK is for social workers to be based in council offices, from where they visit schools periodically to work with children to whom they are assigned. Outcomes were reported independently by LAs using standardised protocols. All students in year 7 and upwards attending the schools were eligible for the trial.

An implementation and process evaluation (IPE) explored how SWIS operated. This included how it was perceived and experienced by those involved. An impact evaluation examined how schools with SWIS fared in comparison with non-SWIS schools in relation to rates of children receiving child protection measures or being taken into care. The findings of these aspects of the study are available elsewhere (Westlake et al., 2023).

2.2. The intervention

The SWIS intervention located social workers within schools with the aim of building better working relationships with school staff, students, and families. Rather than working with students and families from a local authority office base, the school became the primary base for the social worker, to aid integration and face to face working.

Social workers were required to have at least two years' experience and were ideally recruited from and employed within the LA. Their responsibilities were to engage with statutory social work (e.g., Child in Need processes) and to accommodate early intervention and preventative work (e.g., advice to staff, students and families not meeting CSC thresholds). Caseloads were to be kept in line with local authority averages for numbers and complexity.

Formal and informal work with school students and families was to be undertaken to foster good relationships. Both the forming and improving of relationships were key factors in a logic model describing the proposed theory of change. Transformed relationships were intertwined in most of the causal pathways through which SWIS is purported to produce outcomes. This is because the improved collaboration is anticipated to result in an improved quality of school referrals for safeguarding. Frequent interactions with a social worker could enable young people to feel understood and supported, resulting in improved school participation, and better management of a young person's risks and outcomes. These are theorised to lead to reductions in the number of children referred into care by schools.

The intervention manual is a significant source of reference, and can be found elsewhere (ref Westlake et al., 2022; Westlake et al., 2020; Appendix 1.).

The IPE evaluated how and to what extent different aspects of SWIS were operationalised by schools when compared to the user manual. This evaluation then fed into an aggregate rating of implementation quality for each school and local authority, which was calculated by the IPE using a gold, silver, bronze approach.

3. Overview of economic evaluation

A health economic analysis plan (HEAP) was prepared in advance of the database lock and analyses were conducted blind to the results of the impact and IPE analyses, which were undertaken by separate teams within the research consortium. The research was designed with appropriate rigour to fulfil health economic evaluation reporting standards guidance of CHEERS 2022 (Husereau et al., 2022). The primary economic analysis was conducted from a public sector perspective

within the UK comparing the costs and consequences of each arm, and included a follow-up period of twenty-three months after social workers were embedded within the study schools. All other aspects of the research design can be viewed in the trial protocol (Westlake et al., 2022).

4. Methods

4.1. Data collection

4.1.1. Measurement of resource use data

The data to estimate the cost to a LA of delivering SWIS was collected directly from data leads or service managers of participating LAs. The data was disaggregated at school level, collated by LAs into a survey proforma and sent for checks. The economic data collation was completed on a termly basis, and aggregated to five data returns in total per LA. Managerial and administrative data accruing to LAs was collected from August 2020. Survey responses were sent directly to the Trial's Co-ordinating Team who provided follow up with LAs for timely completions and data quality review.

Questionnaires completed by data leads or service managers included reporting on staff time for SWIS social workers, team managers and other SWIS staff inclusive of business or service managers, administrative assistants and team leads or directors associated with the delivery of the SWIS intervention. They documented salaries, and employer national insurance and pension contributions. All staff costs and salaries were anonymised, and data was collected from the time SWIS social workers commenced working in their respective schools until 31 July 2022. Data for all staff involved in implementing the intervention was included. Start and end dates were captured, and shared roles between social workers or changes in allocations of social workers to schools were also noted. A second proforma was completed by LAs describing recruitment, training, and consumable costs.

The data returns were comprehensive and detailed. Within the dataset however, a variable describing the proportion of time spent by social workers and managers dedicated solely to SWIS was incomplete, with less than five percent of these data rows completed. This variable was intended to identify the proportion of time that social workers delivered the intervention in schools with greater precision, to provide more sensitive estimates of the intervention's cost. To address this missingness, data from survey responses were cross-referenced to free-text provided by social workers as part of the IPE (Westlake et al., 2023). The IPE data included reports of the time commitment by social workers to SWIS, with more detail regarding their working constraints (e.g. a pre-existing case-load or difficulties in recruitment) and changes in delivering the intervention (e.g. temporal effects in workload or service configuration). These two sources informed an estimation of the proportional commitment of SWIS social worker time for the baseline analysis, estimated to be 0.89 full-time equivalent (FTE) for social workers in SWIS schools and 0.51 FTE for SWIS management and administration. These estimates were reviewed again, through a validity check with the funder, who provided confidential access to records of their reimbursement to LAs for SWIS under the auspices of a data sharing agreement. The total costs for SWIS estimated using bottom-up approaches closely aligned to the total expenditure recorded by the funders, with an estimated difference in mean cost estimates of approximately six percent. The three-way cross-referencing for staffing costs aligned to produce a baseline estimate, and the estimated proportion of social worker time (FTE) was tested for robustness in a sensitivity analysis revised to twenty-five, fifty, and seventy-five percent to inform the potential impact on cost-effectiveness.

Cost uncertainty was also identified for the coding of agency workers. LA social workers tend to be in-post and to hold permanent employment whereas an agency social worker usually holds a short temporary contract of up to three months, though these can be extended. Codes for agency staff time were frequently presented in terms of hourly

rates, which for the purposes of SWIS were converted to annual reimbursement rates, and these emerged as markedly higher than average annual social worker salaries. This is consistent with the typically higher costs to LAs of employing agency social workers (<https://www.communitycare.co.uk/2023/02/03/agency-social-worker-pay-to-be-capped-to-that-of-permanent-staff/>). Management staff located in each LA, overheads costs and consumables were treated as a SWIS 'tariff', and their cost was summed and allocated proportionately to all social workers within the same LA, to account for the variety of activity and engagement across social workers and between schools. In ten of the 21 LAs, no costs were reported for recruitment and consumables compared to six LAs that reported costs in excess of £15,000, £30,000 and £100,000, respectively. This data was mapped to the different recruitment approaches by LAs and considered plausible. When averaged across all cost categories this contributed less than five percent of the SWIS overheads cost.

4.1.2. Valuation of resource use data – unit costs

Unit costs were obtained from a variety of sources, to derive the most accurate estimates of cost data. These included primary accounting from LAs, costs extracted directly from published reports and inflated to current prices, and also unit costs derived from routine sources such as the Compendium of the Unit Costs of Health and Social Care 2021, from the Personal Social Services Resource Unit (PSSRU) (Jones, 2021). These can be viewed in Table 1.

For the intervention, staff and management costs were based on the completed proformas by LAs on staff annual grade and salary of staff adjusted by their proportional time commitment. The pay scales for social workers differed by role and seniority. Most social workers were employed at UK grades seven or eight, although there were also senior social workers (managing teams) who were employed at grades nine and ten (Jones and Burns, 2021). Costs of recruitment, training, consumables, advertising and travel were obtained directly from the cost proformas.

Trial outcomes (CSC interventions) were also costed. Placement costs were estimated for the categories of foster and kinship care, residential care, secure accommodation and 'other' care. A variety of sources for cost data were obtained and compared across publications, LA reports and government documents. Following team consensus, the updated per diem costs from the Unit Costs of Health and Social Care 2021 were deemed the most appropriate for baseline unit costs, and sensitivity analyses extended lower and upper cost boundaries identified from the literature in updated 2021 prices (Jones and Burns, 2021).

'Process and procedures' identified costs accruing to CSC for activities such as referrals, child protection procedures and child in need assessments. Specifically, procedure costs were applied across the spectrum of care to ensure that costs accruing to social care were captured in addition to placement costs. For example, a 'process 1' (initial assessment and referral) value was used as a tariff accruing to control schools, to reflect the costs to social workers and multi-disciplinary teams engaged in responding to a child protection order (i.e. a CSC 'tariff'). This cost represents a 'respond and manage' approach, which is considered to be current 'care-as-usual'. This is contrasted to the SWIS approach, which aims to proactively engage with referrals through co-located social workers. Additionally, all 'referrals' that comprised the trial's secondary outcomes were attributed a 'process 2' cost, for a full initial assessment. Child in need (section 17 of the Children Act 1989), child protection enquiries (section 47 of the Children Act 1989) and days in care were all attributed a tariff cost for CSC time. Process and procedural tariff estimates were derived primarily from a report called 'Extension of the cost calculator to include cost calculations for all children in need' (Holmes et al., 2010). All costs were inflated to current prices, revised to a per event or per diem basis where required, and expressed in British Pound Sterling (£), for a base cost year 2020/2021 (Jones and Burns, 2021).

All study data was quality assured. This included conducting face

Table 1
Unit costs associated with resource use.

Resource use	Unit Cost (£,2021)	Unit of measure	Original price year	Source of unit costs	Range (£)	Notes
SWIS intervention						
Social worker staffing	72,888	Per annum	2021	Costs were obtained directly from data leads from local authorities for each social worker in the trial. These ranged from a Grade 7 to a Grade 10 social worker. Pension, national insurance and travel costs were also collected.	56,735 93,859	In the 'Unit Costs of Health and Social Care Compendium', a salary of £35,710 equates to a total staffing cost of £79,163 when all other costs are taken into consideration. https://www.pssru.ac.uk/pub/uc/uc2021/communityscstaff.pdf page 123A
Administrative	42,470	Per annum	2021	Costs were obtained directly from data leads from local authorities for each social worker assistant and/or other related administrative or support roles that included titles such as administrative assistant, administrator, data and analytics support or other similar titles.	28,992 51,703	In the 'Unit Costs of Health and Social Care Compendium', a salary of £52,987 is provided for social workers assistant when all other costs are taken into consideration. Unit Costs of Health and Social Care compendium https://www.pssru.ac.uk/pub/uc/uc2021/communityscstaff.pdf page 123
Management	106,218	Per annum	2021	Costs were obtained directly from data leads from local authorities for each social worker in the trial. These ranged from a Grade 15 to a Grade 17 social worker. Pension, national insurance and travel costs were also collected.	52,561 142,195	
Control						
Initial assessment: Process 1	309.40	Per event	2010	Extension of the cost calculator to include cost calculations for all children in need (CCFR), Loughborough University https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/182479/DFE-RB056.pdf		Inflated to current prices
Process and placements in Children's Social Care s47 child protection enquiries	1190.53	Per s47	2010	Extension of the cost calculator to include cost calculations for all children in need Centre for Child and Family Research (CCFR), Loughborough University https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/182479/DFE-RB056.pdf		Inflated to current prices
Referral assessment: Process 2	478.69	Per referral	2010	As above		Inflated to current prices
s17 child in need assessments	478.65	Per s17	2010	As above		Inflated to current prices
Management of placement by social worker and multi-disciplinary team: child in care	16.18	Per diem	2010	As above		Inflated to current prices
Foster and kinship care	94.43	Per diem	2020/21	Unit Costs of Health and Social Care compendium https://www.pssru.ac.uk/pub/uc/uc2021/services.pdf page 73	(89, 120)	Inflated to current prices
Residential care	722	Per diem	2020/21	Unit Costs of Health and Social Care compendium 2020/2021 https://www.pssru.ac.uk/pub/uc/uc2021/services.pdf page 71	(527, 938)	Inflated to current prices
Secure accommodation	730	Per diem	2013	Unit Costs of Health and Social Care compendium PSSRU 2013 from 2008 – 2013 https://www.pssru.ac.uk/pub/dp2855.pdf page 64	(617.8, 837.1)	Inflated to current prices
Other care	589	Per diem	2013	Unit Costs of Health and Social Care compendium PSSRU 2013 https://www.pssru.ac.uk/pub/uc/uc2013/fullwith-covers.pdf	(89, 938)	Inflated to current prices

validity checks for all data rows of staffing, management, recruitment and consumables entered in the proformas, calculating descriptive statistics for each value and investigating outliers. Data was also cross-checked by the trial team for clarification of numbers or dates where required. Data management decision rules were signed off by the research team prior to the final analysis, with corrections documented in the statistical code.

4.2. Methods for data analysis

All cost and outcome variables for mainstream schools were included

in the full analysis, in accordance with 'intention to treat' principle. A total of 268 schools (136 randomised to intervention, 132 to control) comprising 277,888 students were included in the analysis. Resource use values were analysed by trial allocation group and differences between groups were analysed using t-tests for continuous variables. Mean differences in costs and outcomes were estimated and bootstrap 95 % confidence intervals based on 1,000 (or more) replications were computed as is appropriate for cost data (Briggs et al., 1997). Costs and outcomes were scaled to incidence rate ratios per 1000 students per year to match the main impact analysis, and cluster robust standard errors took account of schools within LAs. The differences in costs were

estimated as incidence rate ratios in keeping with the primary analysis for the economic evaluation, and with cluster robust standard errors to take account of the 21 local authority clusters. They were also adjusted for estimates of the primary outcome at baseline and for the percentage of students eligible for free school meals. Eligibility for free schools' meals is an indicator of social deprivation, as it is based primarily on a child's family being in receipt of certain welfare benefits. In this study it is a balancing variable used in randomisation. Measures of uncertainty (standard errors and confidence intervals) were reported for the mean estimates, with the data combined to calculate incremental cost-effectiveness ratios (ICERs) and net monetary benefit (NMB) statistics from a public sector perspective. Additional sensitivity analyses explored variability in key cost drivers on cost-effectiveness, specifically for the proportional time of social worker and management time for SWIS. Subgroup analyses explored temporal effects with 'per-term' outcomes data for each of the six terms covered by the trial period, and the hypothesised intervention mediators by fitting an interaction term between allocation and category of SWIS implementation (a gold, silver, bronze categorisation designed to measure the standard to which SWIS was implemented) developed in the IPE (Westlake et al., 2023). Mean aggregate costs with standard errors were estimated for the intervention and comparator, with the bootstrap mean differences (incidence rate ratios for secondary outcomes) with 95 % confidence intervals. All analyses were carried out using Microsoft Excel 2019 and Stata version 17 (StataCorp LLC, 2021).

5. Results

5.1. Resource use and costs

Table 2 presents the mean costs per school by cost category for the intervention schools compared to control schools in natural units (unstandardised), and additionally with standardised estimates per 1000 students per year.

The cost categories are estimated for resources allocated to social worker staffing, management and administration, and consumables. The table also presents a resource use comparator 'tariff', allocated to the control schools for an initial CSC assessment and referral. There was a statistically significant difference in the mean costs between the intervention and control arms per school and with estimates standardised to per 1000 students per year ($p < 0.001$). The mean total cost of the SWIS intervention per school was £106,771.3, of which social worker time inclusive of on-costs (employer national insurance and pension contributions and travel costs) represented two thirds (67 %). Management and administrative support contributed on average £29,033.7 per school. Consumables, including training, contributed £5,477.5 of the total mean cost per school. The mean cost per control school for initial

CSC referrals totalled £28,038.2, estimated as approximately 25 % of the cost of SWIS. When standardised estimates were used, the mean cost of SWIS reduced from £106,771.3 to £60,529.2, a cost reduction of approximately 42 percent. The standardised average cost to control schools was estimated as £14,826 per school, consistent at 24 % of the intervention cost.

There were differing approaches to filling positions for SWIS social workers across LAs. Some social workers were recruited internally within the LAs, others were recruited externally (from outside of the authorities), and in other cases agency staff were recruited. Additionally, some social workers were seconded temporarily within the LAs to fill new SWIS positions, and then agency staff were employed to fill their previous role. The wide variation in how staff were recruited to SWIS teams is due largely to employment market forces that were somewhat outside LA control, but these contributed to differences in management, administrative and recruitment costs for LAs.

5.1.1. Placements and procedures

Table 3 presents the mean costs per school in both unstandardised and standardised (per 1000 students per year) formats for procedures and placements.

The mean costs per school for the primary outcome of s47 (child protection) enquiries was £37,361.6 for the intervention arm. This compares to £35,742.9 in the control arm. The mean cost difference was £1,618.7 (95 % CI, -£4,783.6, £8,020.9). When standardised (to per 1000 students per year), the average difference in costs was -£324.3 (95 % CI, -£3,344.8, £2,696.2), i.e., costs were slightly higher in the control arm, though the difference is not statistically significant. The mean costs per school for placements, i.e., the numbers of days in care were consistently higher in the intervention arm. The average costs per school for residential care were consistently higher in the control arm for both standardised and unstandardised estimates, presenting a mean difference of £15,782.4 between trial arms. This estimate was an outlier and impacted on the standardised total mean costs per schools for all placements. The cost for placements and procedures for the intervention was higher by £17,912.7 (-£63,658, 99,475.3). No differences in mean categories of placement costs were statistically significant.

5.2. Cost-effectiveness analysis

Table 4 presents the results of the cost-effectiveness analysis. It estimated the mean differences in costs divided by the mean differences in effects, here reported as per child s47 enquiries prevented, and presented as an ICER.

The mean total costs per school in the intervention arm were higher when compared to the control arm, and mean s47 enquiries per school were also higher in the intervention arm compared to the control arm,

Table 2
Mean costs by cost category per school for the intervention (£, 2021) *.

Cost category per school (£)	Unstandardised				Estimates per year per 1000 students			
	Intervention Mean (SE)	Comparator Mean (SE)	p-value	Mean Difference (Bootstrap 95 % CI)	Intervention Mean (SE)	Comparator Mean (SE)	p-value	Mean Difference (Bootstrap 95 % CI)
SWIS social worker time	72260.1 (3733.4)	0.0	-	-	40901.7 (2435.7)	0.0	-	-
SWIS management and administration	29033.7 (1753.2)	0.0	-	-	16674.3 (1195.9)	0.0	-	-
SWIS consumables	5477.5 (413.1)	0.0	-	-	2953.3 (203.4)	0.0	-	-
Control schools: Process 1 referral and assessment	0.0	28038.2 (1872.1)	-	-	0.0	14826.5 (822.3)	-	-
Total costs	106771.3 (4347.3)	28038.2 (1872.1)	p < 0.001	78733.1 (69316.1, 88150.1)	60529.2 (3036.2)	14826.5 (822.3)	p < 0.001	45702.7 (39419.8, 51985.7)

* Mainstream schools (n = 268), main analysis.

Table 3
Mean costs of procedures and placements (£, 2021)*.

Unstandardised Costs of Placements and Procedures (£, 2021)	Intervention Mean (SE)	Control Mean (SE)	p- value	Mean Difference (Bootstrap 95 % CI)	Estimates per year per 1000 students			
					Intervention Mean (SE)	Control Mean (SE)	p- value	Mean Difference (Bootstrap 95 % CI)
Primary Outcome								
Cost of s47 enquiries (child protection enquiries)	37361.6 (2427.6)	35742.9 (2285.8)	0.63	1618.7 (-4783.6, 8020.9)	19552.9 (1090.6)	19877.2 (1171.2)	0.84	-324.3 (-3344.8, 2696.2)
Secondary Outcome								
Cost of referrals to CSC	44078.2 (2783.9)	43354.1 (2898.8)	0.86	724.1 (-6994.9, 8443.2)	22640.3 (1212.9)	23241.8 (1281.8)	0.73	-601.6 (-3990.1, 2786.9)
Cost of s17 (child in need) assessments	41695.8 (2106.3)	41012.0 (2089.5)	0.82	683.7 (-5159.8, 6527.3)	22073.1 (985.8)	22426.5 (1105.9)	0.81	-353.5 (-3299.0, 2592.1)
Cost of days in care (CSC)	11061.1 (1256.5)	8613.3 (914.8)	0.12	2447.8 (-605.5, 5501.1)	5363.5 (560.3)	4456.1 (503.5)	0.23	907.5 (-491.2, 2305.9)
Cost of foster and kinship care	52305.2 (6046.9)	45985.3 (4145.9)	0.39	6319.9 (-8146.4, 20786.2)	26094.2 (2689.4)	25606.7 (2651.9)	0.89	487.5 (-6620.4, 7595.3)
Cost of residential care	116411.9 (15822.9)	120426.3 (19061.5)	0.87	-4014.4 (-52839.8, 44810.9)	60037.6 (8390.6)	75820.1 (13764.6)	0.32	-15782.4 (-47259.5, 15694.6)
Cost of secure accommodation	4616.2 (2264.9)	6608.7 (3713.8)	0.65	-1992.6 (-10436.7, 6451.6)	2400.6 (1123.8)	2828.6 (1618.6)	0.83	-427.9 (-4324.7, 3468.8)
Cost of 'other' placements	50905.2 (9480.4)	38780.3 (9008.4)	0.36	12124.9 (-13335.9, 37585.8)	26253.7 (4973.7)	21465.2 (4814.4)	0.49	4788.2 (-8854.3, 18430.7)
Total cost of all placements and procedures	358435.2 (27723.6)	340522.9 (28957.1)	0.66	17912.7 (-63658, 99475.3)	184415.6 (13647.2)	195722.2 (18800.6)	0.63	-11306.7 (-55017.0, 32403.7)

* Mainstream schools (n = 268), main analysis.

resulting in a 'dominated' cost-effectiveness outcome for SWIS. This can be interpreted by way of SWIS being both more expensive and also accruing more s47 enquiries than controls, on average, over the trial time horizon. When standardised to per 1000 students per year, the mean cost per school in the intervention arm was higher than the control arm. The standardised mean cost increment in s47 enquiries was also slightly higher, resulting in a negative value for the ICER. The negative value represents a decrease in s47 enquiries, i.e., a very small positive effect on s47 enquiries prevented. The probability that SWIS is cost-effective was estimated for a range of investment values. For the unstandardized estimates, cost-effectiveness for threshold values of £1000, £10,000 and £20,000, were estimated to be 1.3 %, 1.1 % and 6.1 %, respectively. The probabilities of SWIS being cost-effective for averting a s47 enquiry at the standardised threshold values were also low, and at £1000, £10,000 and £20,000 were estimated to be 7.4 %, 17.4 % and 26.8 %, respectively.

5.3. Sensitivity analyses

Table 5 presents the results of the sensitivity analysis, where the costs of SWIS social worker time were varied to explore their impact on cost-effectiveness for the outcomes considered. Social worker time was the main input and key cost-driver for the intervention and in the baseline analysis was estimated to be 89 % FTE. Social worker time was revised to 25 % FTE, 50 % FTE and 75 % FTE. All three sensitivity analyses showed the cost of the intervention emerged as higher than control, thus once again cost-effectiveness is 'dominated', meaning the SWIS intervention is associated with a higher mean cost across all three scenarios, and the intervention resulted in more s47 enquiries, i.e. is more expensive and results in less desirable outcomes.

5.4. Subgroup analyses

Costs were re-estimated to account for quality of implementation categorised to bronze (the reference category), silver and gold levels of implementation quality. When compared to bronze, mean costs per school were higher in both the silver and gold categories (IRR 1.39 vs IRR 1.32). An additional subgroup analysis examined the temporal

effects of the intervention with mean costs per term. When compared to control schools (reference category), mean costs were still higher in the intervention arm (IRR 1.03).

6. Discussion

The IPE identified that there was variation between schools and local authorities in the nature of the work, and particularly in the balance between statutory social work, lower-level preventative work, and other activities such as inter-agency working. In most local authorities there was a general emphasis on statutory work, with protected caseloads that enabled workers to undertake these other activities, though workers were often under pressure due to high levels of demand and competing priorities. The overall percentage of weeks that social workers were in post in schools in each local authority exceeded 75 % in 16/21 authorities, and only one had a social worker in post for less than 50 % of the intervention period. The overall mean proportion of time social workers were in post for the duration of SWIS across the 21 local authorities was 78 %. Social workers found it challenging to balance the different aspects of the role, especially when the need for statutory work increased. Nonetheless, implementation was generally successful. Both social workers and school staff were enthusiastic about the lower-level preventative work and felt that this was a valuable aspect of the intervention. When SWIS was considered to be working well, it was implemented across key contexts; (1) compatibility between social worker and school, (2) physical presence, and (3) limited caseloads. Together, these contexts were thought to activate key mechanisms, including frequent informal interactions, increased opportunities for preventative work, and better relationship building. SWIS was mostly delivered in-line with the manual and was implemented relatively well, an element of flexibility in the manual permits a range of approaches. For the schools where data was available to calculate a quality rating, 69 % implemented SWIS to a 'gold' standard.

While there was substantial qualitative evidence of positive experiences and perceptions, SWIS did not affect any of the range of CSC outcomes measured. The secondary outcomes included a broad range of potential benefits such as reductions in the rate of Child in Need (s17) assessments over 23 months, the rates of children entering care over 23

Table 4
Incremental cost-effectiveness per s47 (child protection) enquiry prevented (£, 2021).*

Unstandardised Total Costs (£)			s47 (child protection) enquiries			ICER	Probability of cost-effectiveness	Probability of cost-effectiveness	Probability of cost-effectiveness	NMB SWIS > Control £1000	NMB SWIS > Control £10000	NMB SWIS > Control £20000
Intervention Mean (SE)	Control Mean (SE)	Mean Difference (Bootstrap 95% CI)	Intervention Mean (SE)	Control Mean (SE)	Mean Difference (Bootstrap 95% CI)		Threshold value: £1000	Threshold value: £10000	Threshold value: £20000	NMB Mean (95% CI)	NMB Mean (95% CI)	NMB Mean (95% CI)
465206.4 (27403.0)	368561.1 (29867.0)	96645.3 (19065.2, 174225.3)	31.4 (2.0)	30.0 (1.9)	1.3 ** (-4.2, 6.8)	Dominated***	0.013	0.011	0.061	-93786.77 (-171717.8, -11764.8)	-81861.62 (-149061.6, -15223.2)	-68611.46 (-158212.1, 16842.8)
Estimates per year per 1000 students, with cluster robust standard errors			s47 (child protection) enquiries			ICER (95% CI)	Probability of cost-effectiveness	Probability of cost-effectiveness	Probability of cost-effectiveness	NMB SWIS > Control £1000	NMB SWIS > Control £10000	NMB SWIS > Control £20000
Intervention Mean (SE)	Control Mean (SE)	Mean Difference (Bootstrap 95% CI)	Intervention Mean (SE)	Control Mean (SE)	Mean Difference (Bootstrap 95% CI)		Threshold value: £1000	Threshold value: £10000	Threshold value: £20000	NMB Mean (95% CI)	NMB Mean (95% CI)	NMB Mean (95% CI)
244944.8 (13445.2)	210548.7 (19147.7)	34396.1 (-14446.2, 83238.3)	16.4 (0.9)	16.7 (0.9)	-0.3** (-2.9, 2.4)	-126281.1*** (-678691.4, 426129.3)	0.074	0.174	0.268	-33812.51 (-79306.3, 8709.3)	-36121.94 (-73896.1, 2278.4)	-38687.99 (-86828.4, 8314.8)

* mainstream schools (n = 268), main analysis – unstandardised estimates.

**a positive value represents an increase in s47 (child protection) enquiries.

*** the intervention has a higher cost and also results in more s47 (child protection) enquiries.

Table 5

Sensitivity analysis with social worker time revised to 25%, 50% and 75% full time equivalent (FTE) (£, 2021) *.

Revised proportion of social worker time	Total Costs (£)			s47 (child protection) enquiries			ICER
	Intervention Mean (SE)	Control Mean (SE)	Mean Difference (Bootstrap 95 % CI)	Intervention Mean (SE)	Control Mean (SE)	Mean Difference (Bootstrap 95 % CI)	I
25 %	29991.9 (1221.2)	28038.2 (1872.1)	1953.7 (-2410.7, 6318.2)	31.4 (2.0)	30.0 (1.9)	1.3 ** (-4.2, 6.8)	Dominated ***
50 %	59983.9 (2442.3)	28038.2 (1872.1)	31945.7 (25908.5, 37982.8)	31.4 (2.0)	30.0 (1.9)	1.3 ** (-4.2, 6.8)	Dominated ***
75 %	89975.8 (3663.5)	28038.2 (1872.1)	61937.7 (53938.6, 69936.9)	31.4 (2.0)	30.0 (1.9)	1.3 ** (-4.2, 6.8)	Dominated ***

* mainstream schools (n = 268), main analysis.

**a positive value represents an increase in s47 (child protection) enquiries.

*** the intervention has a higher cost and also results in more s47 (child protection) enquiries.

months, the number of days in care over 23 months, and improvements in educational attendance and attainment. These outcomes were chosen for a number of reasons. They are important indicators of potential benefit and reduced risks to children, and they were of particular interest for the policymakers who commissioned the programme. The intervention was designed to reduce the need for statutory interventions, and any cost effectiveness arguments were based on such reductions. In addition, there was indicative evidence from the previous research pilots that SWIS may have a measurable effect these outcomes. It is possible to theorise that there could be effects in the other direction, through increased surveillance and observation. However, the aim of SWIS was to provide additional support in a community setting and therefore reduce the need for statutory interventions. Despite the reported positive experiences by staff and students, we found no evidence that SWIS had any significant effect on the CSC outcomes assessed. It is therefore unlikely that SWIS would subsequently impact medical, graduation and juvenile justice involvement for youth in care.

In the primary cost-effectiveness analysis, no statistically significant differences were identified for any estimates of cost, cost-consequences or cost-effectiveness between the SWIS intervention and control. The average total costs per school in the SWIS intervention arm were higher than in the control arm. The average number of s47 enquiries per school were also higher in the intervention arm, resulting in a dominated ICER. In the twenty-three months of follow-up, there were small and statistically insignificant increases in the average number of s47 enquiries in SWIS schools. This resulted in a low probability of SWIS being considered cost-effective.

The research benefitted from a large sample size, notable participation and engagement by LAs and schools, and comprehensive data returns. It fills a gap in current knowledge about the short-term implications of placing social workers in schools and suggests this investment does not result in immediate reductions in child protection enquiries or in cost savings. More broadly, the findings address a gap in the broader evidence base for the cost-effectiveness of interventions in CSC, where social worker interventions in CSC are without full economic evaluations and do not explore the full range of relevant outcomes (El-Banna et al., 2021). This study additionally contributes by providing an exemplar approach to study design and data sources to inform the economic evaluation.

The research findings are however limited by the policy-relevant but short time horizon of 23 months follow-up, as they mirrored the duration of the main study. Whilst policy makers working within policy cycles require feedback regarding the likely effectiveness and cost-effectiveness of a publicly funded intervention, their timelines don't necessarily match up with interventions that require a longer-term analysis. It is perhaps unlikely that educational attainment would be improved by an intervention such as SWIS over such a short period, especially as the population of children at risk may additionally have had special educational needs. However, policy makers felt there was a

potential for SWIS to affect these educational outcomes included in the study, and the data necessary to analyse these effects was relatively accessible through routinely collected data. We note that other benefits identified in this study were not measured, such as increased support for school staff in their safeguarding roles, that may have impacted student wellbeing or perhaps rates of exclusions. Complex interventions such as SWIS delivered into complex educational and social care settings need time to embed, and to allow for the intended and unintended consequences to emerge across the longer-term. They require a broader scope of implementation to support service reconfiguration and scale-up, notwithstanding identifying the multiple causal and interacting environmental factors that are associated with changes in child wellbeing.

7. Conclusion

Whilst SWIS was not found to be cost-effective, further research is required to identify the most appropriate outcomes and measures for assessing success in CSC. This should include measures of longer-term and potentially lifelong implications of early adverse childhood experiences, and the return on investment that accrues from interventions that aim to reduce or prevent them.

Funding

The Centre for Trials Research receives funding from Health and Care Research Wales and Cancer Research UK. The Children's Social Care Research and Development Centre (CASCADE) and Centre for Development, Evaluation, Complexity, and Implementation in Public Health Improvement (DECIPHer) receive funding from Health and Care Research Wales. This work was supported by the Department for Education, England, via What Works for Children's Social Care. SP received support as a National Institute for Health and Care Research (NIHR) Senior Investigator (award number NF-SI-0616-202402) and from the NIHR Applied Research Collaboration (ARC) Oxford and Thames Valley.

Key elements of the intervention are:

- Drop-in services for parents or staff.
- Informal work with young people and families, advice and signposting to services etc.
- Advice and discussions with staff.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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