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Essential Title Page Information

1) Title of the article;

The Cost-Effectiveness and Cost-Consequences of a School-Based Social Worker Intervention: A Within-Trial Economic Evaluation

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5) Declarations: Conflict of Interest

The authors declare that no competing or conflicts of interests exist.

6) Highlights

- The SWIS trial compared a social worker assigned to schools (intervention) versus usual practice
- The mean total cost of the SWIS intervention per school was £106,771.3
- Variations in staff recruitment to SWIS teams led to differences in costs for local authorities
- Costs were re-estimated to account for staff time and quality of implementation
- The probability of SWIS being cost-effective for averting a s47 enquiry at WTP thresholds was low

Abstract

Title: The Cost-Effectiveness and Cost-Consequences of a placing Social Workers in Schools: The SWIS trial: A within-Trial 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 in England (SWIS) 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 were probabilities for cost-effectiveness were estimated as 1.3%, 1.1% and 6.1%. This means SWIS had a low probability of being cost-effective.

6) up to six key words as they should appear if they were to be published.

Economic evaluation

Cost-effectiveness

Children's social care

1. Introduction

There have been rising numbers of children referred to Children's Social Care (CSC) across the past two decades. Increases in referrals range from between 10% and 25% across the UK, Australia and the USA (Nguyen, 2018, Bunting, 2017). There is a paucity of evidence to support the effectiveness and cost-effectiveness of interventions to reduce referrals, and more so in evaluations of complex interventions (El-Banna, 2021). The 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, 2012, El-Banna, 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.

Social workers in the UK CSC have the lead responsibility for safeguarding children. One systematic review evaluated the cost-effectiveness of social worker-led early interventions in CSC, presenting mixed findings (El-Banna, 2021). The interventions tended to be located in local communities and were context specific; one involved engaging social workers to support home visitations for children who had intentionally self-poisoned with no statistically significant differences between trial arms (Byford, 1999). Another provided additional caring support by social workers to families with children suffering asthma (Sullivan, 2002), and this intervention was found to be cost-effective.

An approach identified in the UK for improving school responses to safeguarding concerns is placing social workers in schools. 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). A pilot study identified that social worker presence in schools, helped social workers build good relationships between staff, students and families. 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 LAs in England ($n=21$) to deliver SWIS as part of a trial (Westlake et al, 2020, Westlake et al, 2022). Two hundred and sixty-eight mainstream schools comprising 277,888 students were randomised (n intervention = 136; control = 132), making it the largest trial in CSC in the UK, and to our knowledge the largest social work RCT in the world. A commensurate embedded economic evaluation evaluated the cost-effectiveness of the intervention.

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 intervention physically located social workers within schools with the aim to build better working relationships with school staff, students and families. The social worker was embedded in the school rather than working with students and families from a Local Authority office base, where they would otherwise be liaising with and providing advice to education professionals remotely (Westlake et al, 2023).

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 team. The research was designed with appropriate rigour to fulfil health economic evaluation reporting standards guidance of CHEERS 2022 (Husereau, 2022). The primary economic analysis was conducted from a health and social services 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 with 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 separated 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, 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. 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 £15K, £30k and £100k, 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 a UK grade seven or eight, though there were also senior social workers (managing teams) who were employed at bands nine and ten (Jones, 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 uprated 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 uprated 2021 prices (Jones, 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' which 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, 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, 2021).

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

All study data was quality assured. This included conducting face 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 difference (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.

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

	Unstandardised				Estimates per year per 1000 students			
Cost category per school (£)	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

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 (pension, national insurance and travel) 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 LA, others were recruited externally (from outside of the authority), and in other cases agency staff were recruited. Additionally, some social workers were seconded temporarily within the LA 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.

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

Unstandardised					Estimates per year per 1000 students			
Costs of Placements and Procedures (£, 2021)	Intervention Mean (SE)	Control Mean (SE)	p-value	Mean Difference (Bootstrap 95% CI)	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

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 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.

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												
Total Costs (£)			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

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, 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.

Table 5: Sensitivity analysis with social worker time revised to 25%, 50% and 75% full time equivalent (FTE) (£, 2021) *

	Total Costs (£)			s47 (child protection) enquiries			ICER
Revised proportion of social worker time	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

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

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, 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 significantly limited by the policy-relevant but short time horizon of 23 months follow-up. 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. 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.

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