Economic Evaluation of Treatments for Children with Severe Behavioural Problems

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Abstract

Background: Disruptive behaviour disorders, including conduct disorder, affect at least 10% of children and are the most common reasons for referral to children's mental health services. The long-term economic impact on society of unresolved conduct disorder can exceed £1 million for one individual over their lifetime.

Aims of the Study: The aim of this study was to estimate, from a multi-sectoral service perspective, the longer term cost-effectiveness of an intensive practice based parenting programme for children with severe behavioural problems as compared to a standard treatment, on a pilot basis.

Methods: A six-month pragmatic controlled trial was conducted involving forty-two families who had been referred to a Child and Adolescent Mental Health Service (CAMHS) because of severe child behavioural problems. The families were randomly allocated into either the standard or intensive, practice-based treatment arms of the trial. At baseline, children were aged 2 to 10 years. The externalising T-scale of the Child Behaviour Check List (CBCL) was used as the primary outcome measure. Follow-up studies were conducted at 6 months and four years post-intervention. At the four-year follow up point the two treatments were subjected to an incremental cost-effectiveness analysis. This analysis was enabled by the collection of cost data with respect to the provision of the intensive and standard treatments in terms of therapeutic contact time and also participants' use of health, special educational and social services usage by means of a Client Service Receipt Inventory.

Results: Both groups exhibited improved behaviour at six month follow-up, but only the practice based treatment group showed sustained improvement at the four-year follow-up. An independent t-test revealed a significant difference between group mean scores at four-year follow-up ($p = 0.027$). The research found a median bootstrap ICER estimate of $-£224$ From the cost-effectiveness acceptability curve (CEAC) it was found that 89.6% of the cost-effectiveness plane represented a cost saving over the control intervention while 99.9% represented an improvement in effect. Therefore the intensive intervention could not be said to differ significantly from the control intervention on the basis of costs or effects. However under certain circumstances requiring judgement the intensive intervention could be cost-effective.

Discussion: Training interventions for the parents of children with severe conduct disorders currently take the form of a number of behavioural strategies provided by a CAMHS team including the reinforcement of appropriate behaviours and parent record-keeping. An alternative treatment was then considered that included all the aspects provided by the standard treatment (with the exception of agreeing written goals) and also added five-hour sessions of unit-based treatment during which videotaped recording of parent-child interactions were used to give feedback to parents and to provide the opportunity for behavioural rehearsal. The findings of the current research indicate that this alternative treatment may be more cost-effective than the standard intervention under certain circumstances.

Conclusions: It can be concluded on a pilot basis that while the CEAC failed to show a significant difference between costs and effects for the intensive treatment, under circumstances of resource/effect trade offs the treatment could be said to be cost-effective.

Implications for Health Care Provision, Use and Policies: Health and social care policy and commissioning must be evidence based. Although the analysis in this paper should be considered a pilot due to the small sample size our results suggest that investment by health services and social services in practice-based parenting interventions may well be less costly and more effective in the longer-run than the standard practice involving giving management advice to parents.

Implications for Further Research: It would be of interest for further research to continue to follow up the work done in this study with a larger cohort of subjects to further establish the effective components of parenting programmes and their relative costs and benefits both at intervention and over time.

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Background

Conduct Disorder

Conduct disorders[1] or disruptive behaviour disorders[2] are the most common reason for referral to children's mental health services[3] and the most frequent problem domain in clinical practice.[4] The treatment of childhood conduct disorders is particularly challenging because of the size of the problem, its persistence, its implications for adult adjustment and the resource and financial costs to society.[5,6]

Up to 10% of children in Britain and the USA have disruptive behaviour problems[7] and numbers are frequently reported to be both higher than this and increasing.[8] Unresolved disruptive behaviours, particularly those of early onset, are relatively stable over time[9-11] and predict frequent and severe behaviour problems in adolescence and difficulties which persist into adulthood.[12,13]

Children experiencing conduct disorder develop into people at higher risk of experiencing serious problems in adult social functioning, impacting on their employment and income status, as well as their likelihood to suffer marriage breakdown.[14] Conduct disorder is also recognised as a predictor of subsequent alcohol and substance abuse, other self-harming behaviour or antisocial criminal behaviour such as stealing or vandalism.[15, 16]

Economic Implications of Severe Behavioural Problems in Childhood

In addition to the social costs to individuals, their families and society, conduct disorder has a substantial economic impact, manifesting in terms of utilisation of publicly resourced health and social services, special educational services, and also the judicial and penal systems. These services are often required on a long-term basis.[17,18]

Knapp[17] observes that studies of the economic costs of child and adolescent mental health disorders are relatively rare. Of those which do exist, only a few tackle the longer-term costs of antisocial behaviour and children with conduct problems. Scott et al.[18] found, in a longitudinal follow-up study of children in London with conduct problems, that by the age of 28 years the costs for those with conduct disorder were 10 times higher (£70,019) than for those with no behavioural problems (£7,423). These costs were 3.5 times higher than for those with conduct problems (£24,324) as compared with those with no problems. They suggested that the cost of unresolved conduct disorder can exceed £1 million over an individual's lifetime, with criminal justice costs alone averaging £42,000 for a child with conduct disorder.

Rutter et al.[19] and Kazdin[20] found that young people displaying conduct disorders are more likely to be unemployed than those who do not. From the point of view of the welfare state the economic costs of such unemployment are multifaceted. Firstly, the production of the unemployed person is lost to the economy. Secondly, not only is the taxation which that person might have contributed in both direct and indirect form foregone but also the state itself must provide for this person in the form of benefit payments. Godfrey et al.[21] estimated the present-value cost to public finances of a young person who is neither employed nor in education nor in training (NEET) to be in the region of £52,000 (using 2000/2001 prices) over the course of the person's lifetime. Furthermore, the cost of lifetime lost production and other resource costs was posited to be circa £45,000.

Parenting Practices: a Possible Solution

Research has repeatedly identified parenting variables as factors associated with early antisocial behaviour and later delinquency.[22,23] Parenting that displays little positive parental involvement with the child plays a significant role in the development and maintenance of child behaviour problems.[24] The evidence is clear that many children learn and establish problem behaviours because parents lack key parenting skills, use them inconsistently,[25,26] or fail to use them at appropriate times.[27] Observational studies show that parents who reward pro-social behaviour have children with fewer behaviour problems.[28]

The evidence that parents have a causal role in maintaining antisocial behaviour has led to the development of behaviourally-based training interventions for parents. Behavioural approaches have been extensively researched over the last 30 years and their therapeutic effectiveness is well established.[29,30]

Behavioural parent training is based on social learning theory.[31] Parents are encouraged to observe and record specific problem behaviours at home, to establish clear rules for the child to follow, to reinforce pro-social behaviours with praise and rewards and to apply discipline procedures, such as time out, as a consequence of inappropriate behaviour.

However there are few long-term studies of behavioural parent training interventions with Kazdin reporting a mean follow-up of five months post intervention and that many studies had no follow-up at all.

Another problem in this area is that the many interventions that have been developed and researched over recent years have very varied outcomes. Furthermore evidence suggests that although the parents of conduct problem children often report high levels of problem behaviour they are actually not good at identifying problematic behaviour in its early stages.[32] Recently we have come to understand what the essential components of effective interventions are.[33] These factors include training in parental observational skills, teaching relationship enhancement as well as discipline strategies, rehearsal of new skills and teaching principles of child management rather than just techniques. Sadly, few children and families who do receive interventions get evidence based interventions with these essential components.[36]

Economic Evaluations of Parent Training Programmes

Evidence-based policy has for a number of years been gaining importance as a tool of public decision-making.[35] Indeed with respect to the United Kingdom, White Paper

Modernising Government[36] provides a clear commitment on the part of Government to use evidence-based interventions as a matter of course. Cost-effectiveness analysis is an important tool in making the best of scarce public resources and providing an evidence base for policy.[37] Despite this at the present time only a few clinical studies have employed evidence-based methods.

Webster-Stratton *et al.*[38] compared several different techniques and found an individually administered videotape modelling treatment (IVM) to be the most cost-effective in terms of raw financial resources. Cunningham *et al.*[39] compared the cost-effectiveness of a large group community-based intervention versus a clinic-based one. The authors admit however that their analysis is incomplete and considers the comparison with respect to direct costs alone.

Harrington *et al.*[40] provide a randomised comparison of the effectiveness and costs of a community-based versus a hospital-based treatment for children with behavioural disorders. However the emphasis of this study was purely on the contrasting locations for the treatment, all children received the same intervention.

Romeo *et al.*[41] performed a search of a range of electronic databases to identify economic studies which focused on an array of different treatments for children and adolescents with a diagnosed mental health problem or identified as at risk of mental illness. The authors note that examples of such research are rare and indeed were only able to find a handful of papers (7 out of 1615 searched) that examined behavioural disorders or antisocial behaviour. Of these only two looked at the implications of differing behavioural treatments.

One of the only studies to examine the costs and effects of a parent-training intervention is the work of Thompson *et al.*[42] They investigated the costs and outcomes of a modified version of the Common Sense Parenting programme against a six-month waiting list control for a cohort of 66 parents and their children (thought this study cannot be viewed as a true cost-effectiveness analysis). They found that while the difference between clinical recovery rates for control and treatment children was non-significant parents reported a reduction in delinquent and aggressive behaviour. Costs, measured purely in terms of staff time were found to average $70 per family at 1996 prices. However, this study suffered from a number of limitations. Firstly, the sample size at 66 was quite small and thus the above results must be interpreted carefully. Secondly the follow-up period was very short at only three months post treatment and therefore the long-term effects of the programme could not be estimated. Finally, the waiting list control did not receive treatment of any kind and therefore it proved impossible to identify any placebo effect at work.

Methods

Following the success of previous parenting programmes, the second author obtained funds for a trial to compare the effectiveness of a training intervention for parents of children with severe behavioural problems in 1995.[43,44] This project sought to compare two treatments:

(i) A standard currently available treatment offered by CAMHS.

(ii) A parent training intervention with an intensive practice based component involving training parents in accurate observation of their child's behaviour and in effective management strategies.

In both treatments parents were given advice on how to respond to their child's behaviour in a clear and consistent way and to encourage more acceptable behaviour by providing reinforcing consequences for appropriate behaviours. In addition to this intensive treatment parents were also provided with training in accurate observation, problem solving, learning by doing and teaching behaviour management principles. Both treatments were delivered by specialist CAMHS staff. The standard treatment was delivered by the CAMHS team, which comprised Child Psychiatrists, Clinical Child Psychologists, Specialist Social Workers and Child Therapists. The intensive treatment was undertaken by two Consultant Clinical Child Psychologists. For further details on the interventions see Hutchings *et al.*[43,44]

In terms of resource use the main difference between the two treatments was the intensive treatment's inclusion of three five-hour sessions of unit-based treatment with two consultant clinical psychologists[44] during which videotaped recording of parent-child interactions were used to give feedback to parents and to provide the opportunity for behavioural rehearsal. This lead to a mean cost per child in the control group of £189 and a mean cost per child of £912 for the intervention group based on national reference costs produced by Netten and Curtis[45] for consultant clinical psychologist time with a base year of 1996/97.

Sample

Participants in the project were children aged 2 to 10 years with conduct problems drawn from new referrals to a CAMHS over a period of 20 months. If, based on referral information, the child had no significant physical or intellectual deficit and the problem had been present for more than 6 months, the parent/s were asked to complete an Eyberg Child Behaviour Inventory (ECBI).[46] If the ECBI score was in the top half of the clinical range (148 or over for the 'intensity'; 17 or over for the 'total problem' measure) on either the 'intensity' or 'total problem' scale, and the other scale score was within the clinical range (127 or over for 'intensity'; 11 or over for 'total problem'), parents were invited to participate in the study.

Forty-two of the 47 families (90%) whose ECBI scores met the project criteria agreed to participate. Baseline data were available for 41 participants, of whom 22 families were allocated to the intensive treatment and 19 to the standard treatment on a restricted random allocation basis.[43-44]

Table 1 describes the characteristics of the participating families. On the whole, these were similar. Independent samples t-tests found no significant differences between the intensive and standard groups on any demographic variable tested. These demographic characteristics are summarised in **Table 1.**

Table 1. Demographic Characteristics of the Sample Group

	Standard Group (*n* = 19)			Intensive Group (*n* = 22)			
Sex: Males	16			19			
Females	3			3			
Nº of familes receveing benefit	14			13			
Nº of single parents	5			9			

	Standard Group (*n* = 19)			Intensive Group (*n* = 22)			
	Mean	SD	Range	Mean	SD	Range	*p* value
Mother's age (years)	28	5.76	23-48	29.64	4.87	22-38	0.331
Age of child (months)	73.25	22.31	27.4-104.3	70.89	26.11	33.2-120.8	0.76
Nº of children in family	3	1.15	1-6	2.64	1	1-5	0.447

Data Analytic Procedures

The externalising T-scale of the Child Behavior Checklist Child Behavior Checklist (CBCL)[47] was used as the primary clinical outcome measure at baseline, six month follow-up and four-year follow-up. Two versions of this T-scale were used for ages 2-3 and 4-16 years. Differences in scores between time points for each group were then examined using paired samples T-tests.

Six-month Follow-up

A third of the original sample had moved between recruitment and the six month post-treatment follow-up. All but one of the intensive treatment group participated in the follow-up at six months. Six of the 19 standard treatment group had dropped out of treatment and did not participate in the follow-up. No significant difference existed on any baseline measure between the sample considered here and those lost to follow-up.[44]

Four-year Follow-up (2001)

With the aim of providing longer-term evidence of the effectiveness of parenting interventions for children with severe behavioural problems, participants in the original trial were followed-up at four years. A letter and pre-paid envelope was sent out inviting the families to participate, detailing the purpose of the follow-up study, and informing them that they would be paid £25 to recompense them for their time.[48]

Also at the four-year follow-up point participants completed a client service receipt inventory[49] administered by face-to-face interview asking about the frequency of their child's receipt of health, social and special educational services in the previous six months.

Responses

Two families declined to participate. Several families were difficult to trace having moved, some more than once. The

families who had undergone the intensive treatment were easier to engage in the follow-up, as they had been for the six-month follow up, many having maintained intermittent contact with the service. Four-year follow-up data was obtained for 18 families from the intensive treatment group, all of whom had been available at the six-month follow-up. Complete cost and outcome data was available for only 9 of the 13 families in the control group. These families provided the basis for the cost-effectiveness analysis.

The Incremental Cost-Effectiveness (ICER) Analysis

It has become apparent over time that conventional average cost-effectiveness ratios can be erroneous as they fail to incorporate the existence of alternative treatments[50,51] and often hide the sometimes high costs of achieving incremental health-care goals.[52] To circumvent these difficulties an alternative method of analysis has been mooted, incremental cost-effectiveness analysis (ICER). Where practicable an ICER should be preferred to the standard cost-effectiveness method.[52]

The term incremental refers to two aspects of appropriate comparisons in cost-effectiveness analysis.[53] In the first instance two discrete alternatives are being considered while secondly it reflects the fact that both the comparison of radically different programmes and different levels of intensity within one programme are appropriate under this form of analysis.[53]

Costing Perspective

Costs in this study were examined from a multi-sectoral service perspective, that is from the perspective of a number of public service providers, namely those involved in the provision of health, special educational and social services. Costs to parents in terms of forgone earnings as a direct result of their children's behaviour problems were also included in this perspective. This method of estimating costs is in common with Knapp *et al.*[54]
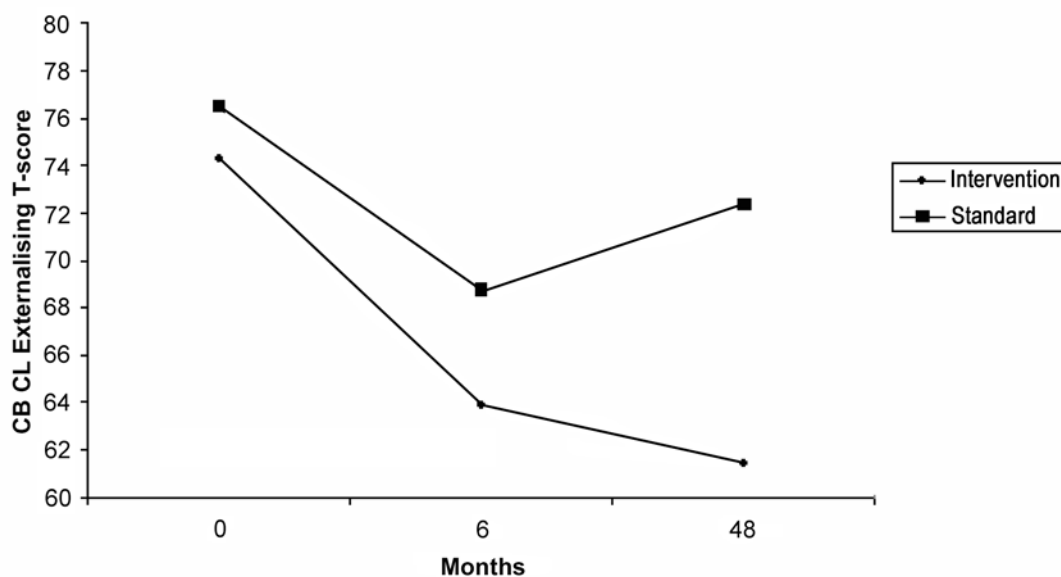
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Figure 1. Child Behavior Checklist (CBCL) Externalising T-Scores at Baseline, Six Months and Four Years.

Naturally, a societal perspective encompassing all possible costs arising from conduct disorder would give a much clearer picture. For example, there is strong evidence to suggest that much of the cost of behavioural problems falls on the legal-justice system and that such costs are substantial.[55] However such a process would undoubtedly be highly complex and costly both in terms of time and of financial resources, consequently it proved to be beyond the scope of this research.

Data Analytic Procedures

An analysis was conducted from a multi-sectoral service perspective using complete cost and outcome data for 9 families who received standard treatment, the do nothing scenario and 18 families who received intensive treatment, the alternative. This analysis was enabled by the collection of cost data with respect to:

(i) Providing intensive and standard treatments in terms of therapeutic contact time;

(ii) Conducting an interview-based client service receipt inventory with participants in the trial so as to estimate their child's use of health, social and special educational services in the six month prior to the four-year follow-up.

We added in the cost of the intensive and standard treatments over the original study period in 1996. This left us with a period of three years between the original study intervention and the six months prior to follow-up at four years

Results

Clinical Results

Table 2 summarises the results of the paired sample T-tests which compared the data obtained at both six-month and four-year follow-up with baseline data. Only cases with both pre- and post-treatment data were included in these pair-wise comparisons.

Table 2. Paired Sample T Tests

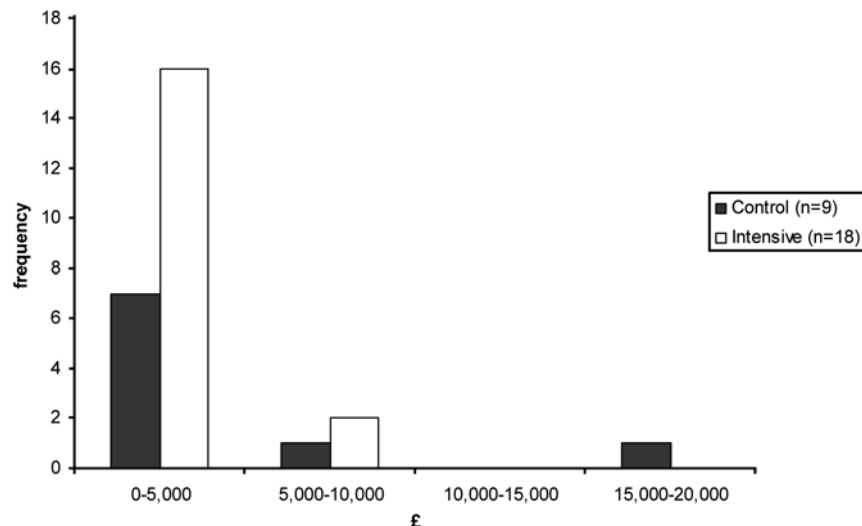| Study 1				
Group	Baseline	6 months	n	p value
Intervention	74.2	63.9	21	$< .01$
Standard	76.5	68.7	12	< 0.1
Study 2				
Group	Baseline	4 years	n	p value
Intervention	74.2	61.4	18	$< .01$
Standard	76	72.3	10	0.198

Figure 2. Side by Side Histograms of the Distribution of Costs per Child for Both Groups.

The pair-wise comparisons revealed that the significant improvement shown for the intensive group at the six-month follow-up was still evident at the four-year follow-up. In contrast, a significant improvement shown by the standard treatment group at six months was not maintained.

At the six-month follow-up, the mean score for the intensive group had decreased significantly to below the clinical cut-off score of 64 and by the four-year follow-up had decreased further to a score well below the clinical range (see **Figure 1**).

Although the initial improvement for the standard group was significant, the mean score remained in the clinical range and had increased at the four-year follow-up so that the improvement since baseline score was no longer significant.

Furthermore, an independent T-test revealed a significant difference between the group mean scores at four-year follow-up $(t_{(29)} = 2.54, p = .027)$. As there was little difference between group scores at baseline, this shows a clear difference in the long-term effect of these two treatments.

Cost Analysis Results

Table 3 presents the results of the client service receipt inventory for children in the standard and intensive treatment groups for the six-month period prior to four-year follow-up. All costs are in 1999/2000 prices unless otherwise stated. The sources of costs are stated in **Table 3**. As far as possible, a similar methodology was used in extracting cost information from national and local sources. National costs published by the Personal Social Services Research unit at the University of Kent were employed[45] while local costs were provided by Gwynedd Council Education Department and Gwynedd Council Social Services Department. National costs routinely include capital, staff time, training and travel however costs obtained from local sources were total unit costs and their providers were unable to provide a breakdown of these costs into fixed and variable. **Figure 2** provides a side-by-side histogram of the distribution of costs per child for both the control and intervention treatment groups.

Side-by-side Histogram

From **Figure 2** it is clear that the vast majority of case for both groups were less than £5,000 with over 75% of cases in the control group and over 85% of those receiving the intensive intervention falling into this category. The outliers of this distribution for the control group consisted of two children receiving full-time special education while the two Intensive intervention subjects in the £5,000-£10,000 bracket spent periods in respite foster care. Coed Menai, the residential school has a lower cost per child than Canolfan Byrnffynnon. This may be due to the former having a much larger number of pupils and certain economies of scale being brought to bear.

Discounting of Costs

We used a base year of 1996/7, discounting costs that were incurred at the point of four-year follow-up by 3%. We then adjusted costs to 1999/2000 prices using the Hospital and Community Health Service Pay and Prices Index.[45]

The mean cost per child of health care, social care and special educational services was £1005.60 per child in the intensive treatment group and £4400.44 per child in the standard treatment group. Adjusting these costs for time and risk as outlined above the mean cost per child of health care, social care and special educational services becomes £872(SD £1692) for the intervention group and £3816(SD £5564) for the control. A student T-test revealed a significant difference in means between the control and intervention groups $(p = 0.0465)$. At this point the costs of the two treatments were included (£189.09 for the standard treatment and £912.22 for the intensive treatment) and an incremental cost-effectiveness ratio (ICER) point estimate of £-165 was generated.

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Table 3. Client Service Receipt Inventories and Costs

Service	Unit cost (£)	Unit	Year on which unit costs based	Intervention group		Standard treatment group		Source of unit cost information
				Total units of service utilisation	Cost over six-month period (£)	Total units of service utilisation	Cost over six-month period (£)	
Educational costs								
Statement of educational needs	61	Per statement	1999/2000	4	244	2	122	Netten & Curtis, 2000 Clinical psychologist cost (schema 7.3)
One-to-one classroom assistance (teaching assistant)	12	Per hour	2001/2	117	1404	52	624	Gwynedd Council Education Dept
Small group assistance (teaching assistant)	4	Per hour per child (based on Estimated 3 children per group)	2001/2	156	624	52	208	Gwynedd Council Education Dept
Special teaching (special needs teacher)	24	Per hour	2001/2	52	1248	936	22464	Gwynedd Council Education Dept
Special school attendance – Coed Menai (residential)	3500	Per child per six months	2001/2	0	0	1	3500	Gwynedd Council Education Dept
Special school attendance – Brynffynnon (non-residential)	9000	Per child per six months	2001/2	0	0	1	9000	Gwynedd Council Education Dept
School assessments	61	Per assessment	1999/2000	1	61	2	122	Netten & Curtis, 2000
Educational costs sub-total					3581		36040	

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→ Table 3. Client Service Receipt Inventories and Costs

Service	Unit cost (£)	Unit	Year on which unit costs based	Intervention group Total units of service utilisation	Intervention group Cost over six-month period (£)	Standard treatment group Total units of service utilisation	Standard treatment group Cost over six-month period (£)	Source of unit cost information
				N = 18	198.94	N = 9	4004.44	
Social Service costs								
Foster care	538	Per child per week	1999/2000	20.5 weeks	11029	0	0	Netten & Curtis, 2000
Sessional worker assistance	5.47	Per hour	2001/2	133	727.51	182	995.54	Gwynedd Council Social Services Dept
Child social worker (children) clinic contact	23	Per hour	1999/2000	0	0	3	69	Netten & Curtis, 2000
Social worker (children) home visit	24.08	Per hour (incl. travel costs)	1999/2000	19	457.52	12	288.96	Netten & Curtis, 2000
Social services costs sub-total					12214.03		1353.50	
Mean costs				N = 18	678.56	N = 9	150.38	

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→ Table 3. Client Service Receipt Inventories and Costs

Service	Unit cost (£)	Unit	Year on which unit costs based	Intervention group		Standard treatment group		Source of unit cost information
				Total units of service utilisation	Cost over six-month period (£)	Total units of service utilisation	Cost over six-month period (£)	
Health service costs								
A&E contacts	65	Per attendance	1993/1994	7	455	0	0	Netten & Curtis, 2000
GP surgery contacts	15	Per visit	1999/2000	16	240	9	135	Netten & Curtis, 2000
GP home visits	37	Per visit (incl. travel)	1999/2000	0	0	2	74	Netten & Curtis, 2000
Paediatric outpatient consultant contact	97	Per attendance	1999/2000	3	291	1	97	Netten & Curtis, 2000
Paediatric day patient contact	126	Per day	1999/2000	1	126	0	0	Netten & Curtis, 2000
Inpatient contact	315	Per night	1997/8	1	315	0	0	Netten & Curtis, 2000
Tests	41	Per spine scan	2000/1	0	0	1	41	North West Wales Trust
Nurse home visit	N/A	No utilisation reported	–	–	-	-	-	-
Psychiatrist contact	68	Per contact	1999/2000	4	272	4	340	Generic outpatient contact cost (Netten & Curtis, 2000: 73)
Clinical psychologist home visit	62.08	Per hour of client contact (incl. travel)	1999/2000	3	186.24	0	0	Netten & Curtis, 2000
Clinical psychologist visit	61	Per hour of client contact	1999/2000	3	183	0	0	Netten & Curtis, 2000
CAMHS team member home visit	35.08	Per hour of client contact (incl. travel)	1999/2000	0	0	33	1508.44	Netten & Curtis, 2000 (Schema 10.4)

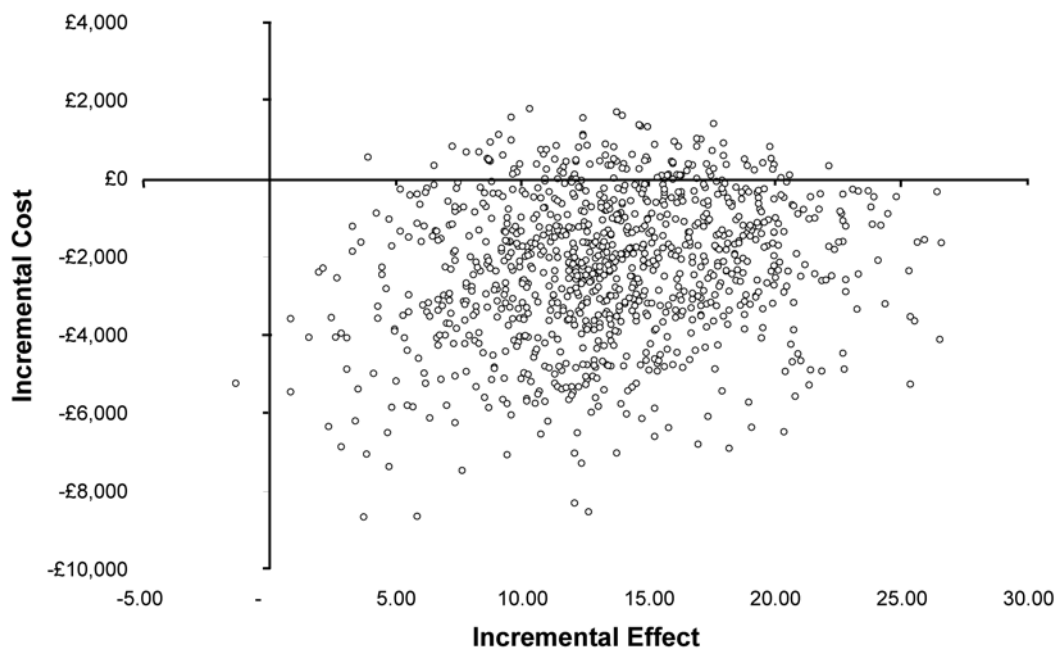| Service	Unit cost (£)	Unit	Year on which unit costs based	Intervention group		Standard treatment group		Source of unit cost information
				Total units of service utilisation	Cost over six-month period (£)	Total units of service utilisation	Cost over six-month period (£)	
Parenting group	8.8	Per session per person	2001	27	237.6	0	0	Based on clinical psychologist costs from Netten & Curtis, 2000
Referral for parental guidance	15	Per referral	2001	0	0	1	15	Netten & Curtis 2000 – GP consultation cost
Health service costs total					2305.84		2210.44	
Mean health service cost per child				N = 18	128.1	N = 9	245.60	
Grand total					18100.87		39603.94	
Total mean cost per child				(n = 18)	1005.6	(n = 9)	4400.44	

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Figure 3. Cost-Effectiveness Plane.

Bootstrapping

Uncertainty in economic evaluation is increasingly dealt with through sensitivity analyses and statistical tests such as non-parametric bootstrapping.[56] Due to the very small sample size and skewed nature of our cost data caused by a few high-cost outliers, we undertook a 1,000 replication bootstrap (see **Figure 2**). This involved using the statistical software package S-plus to resample from our data set to generate a median bootstrapped ICER point estimate. The analysis was rerun using an EXCEL macro for bootstrapping provided by Andrew Briggs[56] yielding a point estimate of -£224.

Figure 3 shows the cost-effectiveness plane (CE plane). The density of the intensive intervention can be seen to fall across a number of quadrants of the CE plane, namely the North-East (NE), South-East (SE) and South-West (SW) quadrants. **Figure 4** shows a cost-effectiveness acceptability curve (CEAC) for the intensive intervention. The CEAC cuts the *y*-axis at 0.896 and asymptotes at 0.999.

Interpretation

The point estimate ICER of £-224 may be interpreted as the cost saving gained per unit of decrease (improvement) on the externalising T-scale of switching from the control treatment to the intervention treatment, i.e. switching to the intensive treatment will not only provide greater clinical effect but is £224 less costly per unit of decrease on the CBCL scale than the standard treatment from a multi-sectoral perspective. However because points on the CE plane fall in the NE and SW quadrants as well as the SE quadrant it is impossible to say that the intensive intervention has significantly different costs or effects to the control group.[57] The CEAC shows that

89.6% of points on the CE plane represent a cost-saving for the intensive intervention over the control while 99.9% represent an improvement in effect. The CEAC also shows that costs and effects for the intensive treatment cannot be said to be significantly different to those of the control as the curve neither cuts the *y*-axis nor asymptotes at 1[57]. However we can see from the CE plane that the vast majority of points do fall within the ''dominant'' SE segment and there are circumstances (requiring subjective judgement) under which the intensive treatment may in fact be cost-effective.[57]

Discussion

The goal of the current research was to ascertain which of two interventions in the delivery of a parent training programme was superior in terms of cost and clinical effect: a standard treatment delivered by the CAMHS team or a unit-based intervention with an intensive component. Clinical effectiveness for the two interventions was measured by means of a pragmatic controlled trial. An incremental cost-effectiveness analysis was then conducted because it allows a long-run direct comparison of the two competing treatments with respect to efficacy and cost. As more cost-effectiveness studies are conducted in this field this will enable the comparison of ICERs for the purpose of informing the allocation of scarce public resources necessary in the implementation of evidence-based policy.

It was found that while the bootstrapped figures yielded an ICER point estimate of £-224 the intensive intervention did not significantly differ from the control in terms of costs or effects. However under certain circumstances involving resource/outcome trade-offs the intensive intervention could be said to be cost-effective.[58]
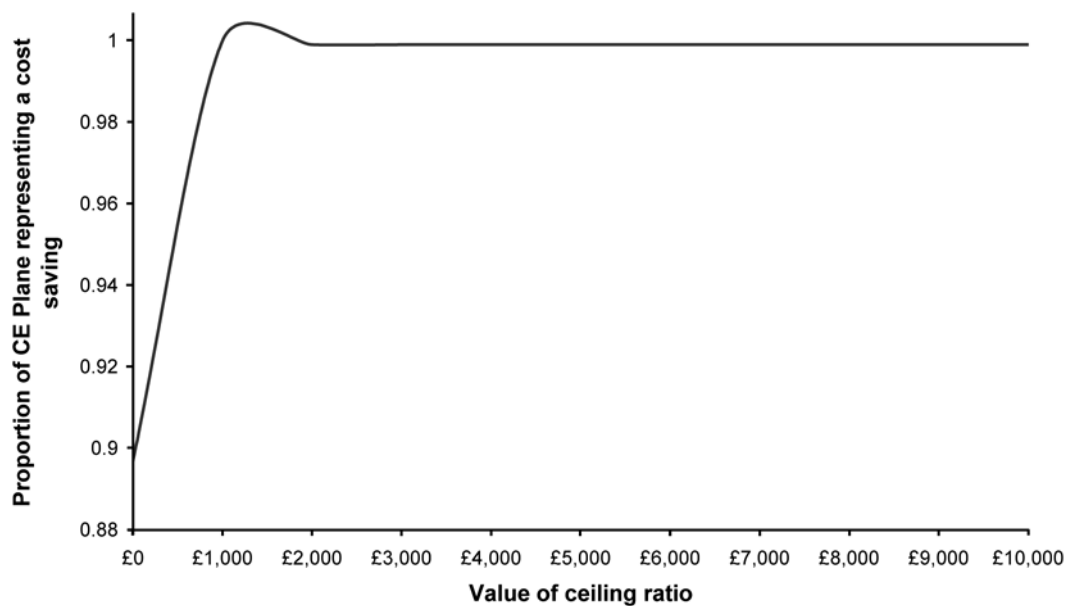
Figure 4. Cost-Effectiveness Acceptability Curve.

The current research has implications for health and social care provision, use and policy. The analysis in this paper should be considered a pilot due to the small sample size. It suggests two options, firstly the need for a larger randomised control trial; secondly the need to amalgamate, where methodologically robust, findings from other small pilot evaluations in order to strengthen the cost-effectiveness evidence base for policy in the field of child mental health services. In the mean time, we believe our results indicate that investment by health and social services in intensive interventions may be more effective than the standard practice that is currently in use under certain circumstances. Therefore if policy is to be evidence-based and the best use of public resources is to be made it may well be advantageous for parent training schemes to be provided by means of the intensive treatment model rather than in the standard form that it has previously taken.

However, further research would be desirable here. While the cost-effectiveness of the intensive treatment has been ascertained on a pilot basis under certain circumstances (resource/outcome tradeoffs), the authors feel that the current research is constrained somewhat in its findings by its small sample size. This difficulty could be circumvented were a larger cohort size to be used. Therefore, it is posited that a study with a larger sample size would prove instructive in verifying the cost-effectiveness of the intensive intervention.

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