



Department
for Education

The value for money of children's centre services

**Evaluation of children's centres in
England (ECCE) Strand 5**

Research report

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Executive Summary

Introduction

Following on from the Sure Start initiative of 1998, Children's Centres were launched in 2002 with the aim of giving disadvantaged children the "best possible start in life." The centres provide integrated multi-agency services at a single point of access for families with young children including childcare and early education programmes, health services, parenting classes and specialised family support services.

The Evaluation of Children's Centres in England (ECCE) is a six year study commissioned by the Department for Education and undertaken by NatCen Social Research, the University of Oxford and Frontier Economics. The aim of ECCE is to provide an in-depth understanding of Children's Centre services, including their effectiveness in relation to different management and delivery approaches and their cost. The evaluation studies centres located in the 30 percent most deprived areas and the key elements are organised as five strands:

- strand 1: survey of Children's Centres leaders;
- strand 2: longitudinal survey of families using Children's Centres;
- strand 3: investigation of Children's Centres service delivery and reach;
- strand 4: impact analysis of the effects of Children's Centres on child, mother and family outcomes; and
- strand 5: value for money (cost benefit and cost effectiveness) analysis.

Ten reports have been published as part of the evaluation.¹ This report presents the last output of the evaluation and considers the potential value for money of Children's Centres. It draws on cost data collected from 24 centres and from an analysis of the associations between centre use and improved child and family outcomes. It also uses existing evidence on the links between child and family outcomes when a child is aged three and later life outcomes and on the monetary value of outcomes. As the original intention of this strand to estimate the overall value for money of centres proved infeasible, the value for money has instead been assessed for individual types of services delivered within centres.

¹ These are available at <https://www.gov.uk/government/collections/evaluation-of-childrens-centres-in-england-ecce>

Costs of delivery

The average total weekly delivery cost for the 24 centres reviewed was just under £10,000 (all monetary figures are in 2014 prices). This total cost included both the costs paid by the centres and costs implicitly paid by other government and private organisations or individuals through the provision of venue space and staffing without cost to the centre (including the value of volunteer time). On average, just under 60 percent of costs were attributable to the delivery of specific services while the remaining costs could be attributed to the general running of the centre. Staff costs formed the majority of costs (an average of three quarters) while venue costs and other costs roughly accounted for equal shares of the remaining costs.

The average cost per user hour for the main types of services offered by the centres is presented in table 1. Cost per user hour is the value of resources used to deliver one hour of a service to each child or family, including the use of resources specifically for the service and a share of the general running costs. Across all services, the average cost per user hour was £30. Services using more specialised staff and operated to a greater extent on a one-to-one basis tended to have a higher hourly cost (such as baby health and specialist child and family support). Services offered using less skilled staff and with a tendency to be offered in groups, had lower average costs (such as child play, parent support, childcare and training and education).

Table 1: Costs of service delivery for groups of services

Service type	Cost per user hour		Mean cost per family using the service	
	Mean	[95% confidence intervals]	Any time	Since wave 1
Baby health	£47	[£40 – £56]	£4,468	£3,041
Child play	£9	[£8 – £11]	£2,116	£1,669
Parent support	£14	[£11 – £17]	£958	£831
Specialist child support	£39	[£26 – £51]	£1,242	£973
Specialist family/parent	£41	[£32 – £51]	£1,685	£746
Childcare	£6	[£3 – £9]	£8,454	£6,792
Finance and work support	£55	[£38 – £72]	£3,202	£1,869
Training and education	£15	[£10 – £20]	£1,864	£1,530

Source: ECCE, strand 5

Table 1 also presents the average cost per family using estimates of average hours of service usage from the strand 2 longitudinal survey of families. The sample for this survey contained families with a child aged between nine and 18 months (the “target child”) who were registered at the Children’s Centres which took part in the initial ECCE survey of centres.² The table shows the average delivery costs for each family who used each service type for the average total hours used between nine months prior to the birth of the target child and when that child was aged three (termed “any time”) and for the average total hours used between the first interview when the target child was aged around one and when the child was aged three (termed “since wave 1”). Childcare had the highest average cost per family due to a large average number of hours used and in spite of the low average hourly cost per user. Baby health and finance and work support had the next highest average costs per family, mainly driven by the high average hourly cost per user. The remaining services had lower average costs per family, primarily due to either a low average hourly cost per user (training and education) or a low average number of total hours (parent support and specialist support for children and families/parents).

Associations between service use and outcomes

The associations between the use of different types of Children’s Centre services and improved family outcomes were estimated using data from the strand 2 longitudinal survey of families. Regression models were estimated for a broad range of child and family outcomes comparing outcomes between families who used services at Children’s Centres and families who do not use these types of services at any organisation. These models included a wide array of control variables to make allowance for other factors that might be driving any differences in outcomes.

The original intention of this strand of the evaluation was to assess the overall value for money of centres, but this proved infeasible for two reasons. First, no statistically significant associations were identified between the aggregate measure of centre use³ and better outcomes (possibly because the comparison sample was too small). Second, the prevalence of associations between service use and poorer outcomes suggested that any associations (with either better or poorer outcomes) may reflect selection bias in service use towards particular types of families rather than any impact alone. It would also not be meaningful to use the associations with poorer outcomes in a value for money analysis as this would imply a negative contribution to the benefits side. In order to obtain some insight on value for money, the associations with better outcomes for

² Full details about the longitudinal study of families can be found in Maisey et al (2015), available at [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/472959/RR434 - Evaluation of children s centres in England follow-up survey of families.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/472959/RR434_-_Evaluation_of_children_s_centres_in_England_follow-up_survey_of_families.pdf)

³ Aggregate use of services is defined here as the use of any services in the five mainly used types: baby health, child play, parent support, specialist child and specialist family or parent support.

individual services were taken forward into the value for money estimation and those with poorer outcomes discarded. The value for money analysis is therefore based on hypothetical scenarios of what the value for money would be *if* there were impacts of the magnitudes of the positive association for each service type.

The associations between Children's Centre service use and better child and family outcomes at age three considered in the value for money analysis were:

- Use of baby health services at any time prior to age three is associated with lower conduct problems and a better early home learning environment (HLE).
- Use of child play services between age one and age three is associated with a better early HLE.
- Use of parent support services at any time prior to age three and between age one and age three and is associated with a better early HLE.
- Use of specialist parent/family support services at any time prior to age three and between one year and age three and is associated with a better early HLE.

It should be noted that the ECCE strand 4 report (Sammons et al (2015)) provides an extensive examination of the use of Children's Centres and outcomes for young children and their families, including consideration of different patterns of usage; how outcomes relate to centre characteristics; and how usage and outcomes may vary across different types of families.⁴

Monetary value of benefits

As the ECCE study only followed children until the age of three, the potential longer terms benefits of Children's Centre services were estimated using existing evidence on the links between child and family outcomes at age three and later lifetime outcomes for the child. The available evidence permitted quantifiable links to be drawn between:

- The use of baby health services and *lower* probabilities of truancy, school exclusion, having SEN (special education needs), smoking, youth and adult crime, mental health problems (depression) and poorer physical health.
- The use of baby health services and *higher* educational attainment, hourly wage and probability of being in work.

⁴ The strand 4 report is available at <https://www.gov.uk/government/publications/childrens-centres-their-impact-on-children-and-families> and the technical appendices for this report are available at <http://www.education.ox.ac.uk/research/fell/research/evaluation-of-children-centres-in-england-ecce/>

- The use of child play, parent support and specialist parent/family support services and *lower* probabilities of having SEN or depression.
- The use of child play, parent support and specialist parent/family support services and *higher* educational attainment.

The existing evidence also provided much weaker links between the use of child play, parent support and specialist parent/family support services and the range of later life outcomes listed in the first two bullets.

Monetary valuations of the potential benefits were estimated for the four types of services associated with improved outcomes. Tables 2 and 3 present these valuations for baby health services (via the initial SDQ (Strengths and Difficulties Questionnaire) conduct problems link) and parent support services. The latter is broadly representative of the findings for child play and specialist family/parent support services. The tables highlight that most of the value of the benefits of the services is dependent upon the links to improved labour market outcomes. Indeed, without the associated increase in earnings the services would offer very little financial return. Relatedly, the tables show that most of the benefit accrues to the individual rather than to the Government or society more broadly. In addition, almost all of the benefit to the Government is through increased revenues from Income Tax and National Insurance related to higher earnings rather than reductions in the cost of delivering other services.

Table 2: Value of benefits for baby health services via SDQ conduct problems

Quantifiable outcomes	Total value of benefits	Private	Public	Society
Reduction in truancy	£2	£0	£2	£0
Reduction in exclusion	£7	£0	£7	£0
Reduction in youth crime	£5	£0	£5	£0
Reduction in smoking	£26	£26	-£9	£9
Reduction in mental health problems	£24	£0	£24	£0
Reduction in adult crime	£4	£0	£1	£3
Increase in lifetime earnings	£2,028	£1,573	£455	£0
Reduction in welfare benefits	£141	£0	£141	£0
Total	£2,236	£1,599	£625	£12

Notes: All figures are discounted present values in 2014 prices. There is a negative benefit to the Government from the reduction in smoking due to a loss of tax revenues.

Table 3: Value of benefits for parent support services (since wave 1)

Quantifiable outcomes	Total value of benefits	Private	Public	Society
Reduction in truancy, exclusions, youth and adult crime	£1.16	£0	£0.98	£0.18
Reduction in smoking	£1.67	£1.67	- £0.62	£0.62
Reduction in SEN	£32	£0	£32	£0
Reduction in depression	£18	£0	£18	£0
Increase in earnings	£5,342	£4,144	£1,197	£0
Total (rounded to nearest £)	£5,395	£4,146	£1,247	£1

Notes: See table 2.

Value for money estimates

Cost effectiveness compares the costs of achieving a change in a particular outcome through different interventions (in contrast to the comparison of financial returns to different interventions in cost benefit measures). Table 4 presents the cost effectiveness of the different types of services in raising the early HLE score: specialist family/parent support services and parent support services after the child is aged one offer the greatest potential increase for each pound spent, while baby health and child play services have far lower cost effectiveness. Given that the latter two services have other objectives, this finding may not be surprising.

Table 4: Cost effectiveness of services to increase early HLE at age three

Service group	Average cost of delivery per user	Associated rise in early HLE	Average rise in early HLE per £1,000 spent
Baby health (any time)	£4,468	1.99	0.45
Child play (since wave 1)	£1,669	1.25	0.75
Parent support (any time)	£958	0.92	0.96
Parent support (since wave 1)	£831	1.55	1.86
Special. parent/family support (any time)	£1,685	1.67	0.99
Special. parent/family support (since wave 1)	£746	2.18	2.92

Notes: All figures are discounted present values in 2014 prices. "Any time" covers the use of services between nine months prior to the birth of the survey target child and when that child is aged three at the final interview. "Since wave 1" covers the use of services between the time of the first interview when the target child was around age one and when the child is aged three at the final interview.

Table 5: Summary of value for money estimates

Service group	Average cost of delivery per user	Average benefit per user	Net benefit	Benefit to cost ratio
Baby health (any time) (via SDQ conduct problems)	£4,468	£2,236	- £2,232	0.50
Baby health (any time) (via early HLE)	£4,468	£6,162	£1,694	1.38
Child play (since wave 1)	£1,669	£3,029	£1,360	1.81
Parent support (any time)	£958	£2,985	£2,027	3.12
Parent support (since wave 1)	£831	£5,395	£4,564	6.49
Specialist parent/family support (any time)	£1,685	£6,099	£4,414	3.62
Specialist parent/family support (since wave 1)	£746	£4,827	£4,081	6.47

Notes: See notes to table 4.

The average cost of delivery for each service type was combined with the estimated value of the benefit of the service for each user to derive the measures of cost benefit summarised in table 5. For baby health services, the benefits via a reduction in SDQ conduct problems score and via an improved early HLE have been presented separately, highlighting how the value for money estimates could differ dependent upon which outcomes are considered in an evaluation of the impact.

Most services have a positive net benefit with the average benefit per user exceeding the cost. Only when baby health services are assessed using only the SDQ conduct problems impact is there a negative net benefit. Interestingly, the parent services have a higher benefit to cost ratio than the more child based ones, with a ratio of over six for parent services used between the target child being aged one and three years. These highest returns are driven more by a lower cost per user than a higher benefit per user.

Table 6 presents the value for money for the Government which compares the costs paid by the Government to deliver the services with the value of the benefits accrued to the state. Unsurprisingly given the state's minority share in the value of the benefits, most service groups have negative net benefits and the benefit to cost ratio is below one (and very low in some cases). Only two cases give a moderate positive return.

Table 6: Summary of value for money for the Government

Service group	Average cost to Govt. of delivery per user	Average benefit to Govt. per user	Net benefit	Benefit to cost ratio
Baby health (any time) (via SDQ conduct problems)	£4,468	£625	-£3,843	0.14
Baby health (any time) (via early HLE)	£4,468	£1,417	-£3,051	0.32
Child play (since wave 1)	£1,669	£696	-£973	0.42
Parent support (any time)	£958	£690	-£268	0.72
Parent support (since wave 1)	£831	£1,248	£417	1.50
Specialist parent/family support (any time)	£1,685	£1,403	-£282	0.83
Specialist parent/family support (since wave 1)	£746	£1,108	£362	1.48

Notes: All figures are discounted present values in 2014 prices

Caveats and conclusions

Some important caveats about the value for money estimates should be noted:

- The value for money analysis is for hypothetical scenarios of possible impact sizes on child and family outcomes when a child is aged three. These scenarios are drawn from the observed associations between the use of services and improved outcomes.
- The findings are based on point estimates of mean values for all costs, benefits and other parameters without consideration of the sampling variation. Incorporation of the variation for all elements of the value for money models is neither useful (the resulting confidence intervals would be too broad to be meaningful) nor feasible (the literature sources do not provide the required information).
- Assessment of potential sources of the under-counting of the value of benefits suggests that the main omission is the value of any enhanced well-being associated with service usage, the value of which would accrue to individuals rather than the Government.
- There is a considerable degree of approximation in drawing on related but not necessarily completely appropriate evidence to derive the links between

immediate outcomes and later lifetime outcomes. In addition, one key link is based on a single source of evidence using data from a relatively small sample.

Given these caveats, the main contribution of this analysis is not to produce precise estimates on the value for money, but to identify some key findings about how Children's Centres may offer a monetary return on their costs:

1. Under plausible hypothetical scenarios of impact, the best estimate is that some Children's Centre services provide positive value for money with the monetary valuation of improved outcomes exceeding the costs of delivery.
2. Most of the value of the benefits is derived from improved later labour market outcomes for the children in the families using services. Indeed, without the associated increase in earnings, the services would offer very little financial return.
3. The majority of the benefits accrue to individuals through higher net earnings rather than to the Government. Consequently, the best estimates suggest that only few services provide positive value for money for the Government and the returns are considerably smaller than those for total benefits.
4. Parent support and specialist family/parent support services offer better value for money than the more child based services. This is driven more by a lower cost per user than a higher benefit per user.
5. There is some weak evidence that impacts on the early home learning environment (HLE) at age three have a higher value of benefits than comparable impacts (driven by the same service) on child social development at age three.

The strength of finding (1) should not be under-estimated: if improved outcomes at age three were of little financial value, even maximum feasible impacts (such as raising HLE to its highest score) would not lead to estimates of positive value for money. As it is, this report has shown that policies which have impacts within reasonable bounds of magnitudes on early child and family outcomes can potentially generate substantial monetary returns over and above the costs of delivering the services.

1. Introduction

Following on from the Sure Start initiative of 1998, Children's Centres were launched in 2002 with the aim of giving disadvantaged children the "best possible start in life." The first centres opened in the most deprived areas of the country, but served all families in the centres' catchment areas. The centres provide integrated multi-agency services at a single point of access for families with young children including childcare and early education programmes, health services, parenting classes and specialised family support services.

The Evaluation of Children's Centres in England (ECCE) is a six year study commissioned by the Department for Education and undertaken by NatCen Social Research, the University of Oxford and Frontier Economics. The aim of ECCE is to provide an in-depth understanding of Children's Centre services, including their effectiveness in relation to different management and delivery approaches and their cost. The evaluation studies centres located in the 30 percent most deprived areas and the key elements are organised as five strands:

- strand 1: survey of Children's Centres leaders;
- strand 2: longitudinal survey of families using Children's Centres;
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- strand 5: value for money (cost benefit and cost effectiveness) analysis.

Ten reports have been published as part of the evaluation.⁵ This report presents the last output of the evaluation and considers the potential value for money of Children's Centres. It draws on cost data collected from 24 centres and from an analysis of the associations between centre use and improved child and family outcomes. These two primary data sources on costs and outcomes are combined with existing evidence in two areas: (i) on the links between child and family outcomes when a child is aged three and later life and (ii) on the monetary value of outcomes. An overall monetary value of the benefits of services is estimated and compared to the costs of delivery to assess the value for money (cost effectiveness and cost benefit) of different types of Children's Centres' services.

⁵ These are available at <https://www.gov.uk/government/collections/evaluation-of-childrens-centres-in-england-ecce>

The original intention of this strand of the evaluation was to assess the overall value for money of centres, considering the use of any services at centres. However, no statistically significant associations between aggregate service use⁶ and better outcomes were identified, possibly because the comparison group of families not using the same types of services anywhere was too small. Consequently, value for money has been analysed individually for different types of services, comparing outcomes for families using a specific type of service at Children's Centres with outcomes for families who did not use that type of service at any organisation.

The remainder of the report is structured as follows. Chapter 2 describes the cost data and the average cost of delivery for different types of services offered by Children's Centres. Chapter 3 presents the associations between the use of the different types of services and child and family outcomes when the child is aged three. Chapters four and five review the evidence used to link outcomes at age three to later lifetime outcomes and to estimate monetary values for improvements in outcomes respectively. The penultimate chapter combines these four elements to estimate the value for money of different Children's Centre services and the final chapter draws together the conclusions.

⁶ Aggregate use of services is defined here as the use of any services in the five mainly used types: baby health, child play, parent support, specialist child and specialist family or parent support.

2. The costs of delivering services in Children's Centres

This chapter presents the costs of delivering different types of services in Children's Centres. It describes the collection of cost data from 24 centres and presents the cost per user hour for different services. Combining this hourly cost with the average numbers of hours used by families for different groups of services (from the strand 2 longitudinal survey of families) allows the estimation of the average cost of service delivery per family.

2.1 Methodology for the cost data collection

This section describes the methodology used to collect cost information from Children's Centres and the estimation of the average hourly costs of delivery for different services provided by the centres. Further detail on the methodology and additional analysis of the cost data collected in the first wave can be found in Briggs, Kurtz and Paull (2012). Some minor adjustments made in the second wave of data collection are described in Annex A.

A case study approach was used to collect cost information from centres for a combination of reasons. First, it was important to ensure that complete information would be collected from each centre. Unlike more conventional surveys, any missing information could invalidate all information collected from a centre by resulting in an understated cost. Second, prior to the visits it was not clear how centres recorded cost information and whether they had any records on the usage of different resources. It was also uncertain that managers would easily understand what information was being requested without face-to-face explanation. Third, the amount and detail of data required from each centre was demanding: the presence and aid of researchers was felt to be necessary to assist centre managers in sourcing and providing the quantity of information required. Finally, requesting financial information, including salary levels for individual staff, was thought to require a direct reassurance of confidentiality.

The sample of 24 centres was selected from centres participating in earlier strands of ECCE. Strand 1 of the evaluation was initiated with a sample of 850 centres for the Centre Managers' Survey. This sample contained phase 1 or phase 2 centres located in the 30 percent most deprived areas and was selected to be representative of this group in terms of lead organisation, catchment size and number, and urbanity. Of the 530 centres that responded to that survey, a sub-sample of 120 and a reserve sample of 30 were selected to invite families that used the centres to take part in the Users' Survey for strand 2 of the evaluation. The 24 case study centres for the cost study in strand 5 were taken from, and selected to match, this pool in a range of centre characteristics, regional distribution and the proportions located in urban and rural areas. Table 41 in Annex A presents the characteristics of the 24 centres and a comparison with the centres used in strands 2 and 3 of the evaluation.

Visits to an initial 12 centres were undertaken during March and April 2012 with a further 12 centres visited between November 2013 and February 2014, designed to coincide with the period when families with children in the strand 2 longitudinal study would be using services. Interviews were mainly conducted with centre managers (or equivalent), who were joined in some cases by colleagues responsible for business support, and collected information on the services offered and average numbers of users; staff time used for different services and general (core) running of the centre; staff salaries; venue costs (rent, rates, utilities, etc.) and any other costs (such as that for food, stationary and other materials). Information was recorded on the contributions of staff and use of venue space even when not paid for directly by the centre and a cost imputed for the use of these resources. Information on services, staff and venue usage was collected for a typical week in the month preceding the visit.

The collected information was used to derive a measure of the cost of delivering one hour of each type of service to each user (“cost per user hour”), taking into consideration the value of the contribution of other organisations that are not directly paid from Children’s Centre budgets. This combined a “direct” (service delivery) cost per hour (where costs could be specifically attributed to a particular service) and a share of the “core running” cost, allocated across services in proportion to the service hours. All costs presented here have been indexed to March 2014 (increased in line with inflation so that they are equivalent to costs at March 2014 prices) to match with the timing of the final strand 2 survey when the outcomes at age three were measured.⁷ The values of the benefits are correspondingly discounted to the same month.

2.2 Total centre costs

As background information, table 7 presents a summary of the total weekly costs for the 24 centres. The average weekly cost was just under £10,000, with just under 60 percent attributable to the delivery of specific services, on average. Staff costs formed the majority of costs (an average of three quarters) while venue costs and other costs roughly accounted for equal shares of the remaining costs. The maximum and minimum amounts indicate a sizable range in the size of the centres, with the weekly cost for the centre with the highest cost being over four times that of the weekly cost for the centre with the lowest weekly cost. However, in all 24 centres, staff costs constituted more than half of the total cost.

⁷ The costs were broadly similar between the initial 12 centres visited in 2012 and the following 12 centres visited in 2013/14. The sample is too small to draw any conclusions about the degree of change in costs over this period.

Table 7: Total centre costs

	Total costs per week	Percentage of cost by activity		Percentage of cost by type			
		Core running	Service delivery	Staff costs	Venue costs	Other costs	Service contract costs
Mean	£9,616	41%	59%	75%	14%	10%	1%
Minimum	£4,504	17%	34%	57%	8%	1%	0%
Maximum	£20,165	66%	83%	87%	28%	21%	11%

Source: ECCE, strand 5

Notes: Other costs include, for example, expenditures for books and toys, food and other refreshments, medical and hygiene supplies, stationary, marketing materials, office equipment, postage, telephones and internet, IT support, professional fees, licences, CRB checks, transport and building improvements.

2.2 Hourly cost per user for different service types

Table 8 presents the average (mean) cost per user hour for the 21 different types of services for which information was originally collected.⁸ For the value for money analysis, these 21 types were combined into eight broader groups in order to facilitate impact analysis with sufficient sample sizes for each service type.

The first column in the table presents the total number of services in each type offered in the reference week across all 24 centres. Stay and play groups, specialist family support and midwife/health visitor settings had the highest number of services, while home safety, financial support for parents and basic skills and ESOL services for parents had the lowest numbers. Childcare (counted as one service in each centre) was offered in 14 of the 24 centres.

The cost per user hour was divided into three parts:

- Costs paid by the centre.
- Costs implicitly paid by other government organisations in the provision of venue space and staffing without cost to the centre.
- Costs implicitly paid by private organisations and individuals in the provision of venue space and staffing without cost to the centre (including volunteer time).

⁸ These service types were as reported by centre managers: for each service, the manager selected a service category from a showcard of 28 options (for the initial 12 centres) and 24 options (for the subsequent 12 centres) from which the 21 types were derived (further details are presented in Annex A).

Table 8: Hourly cost per user for different types of services

Service type	Number of services	Cost per user hour			
		Paid by centre	Paid by other government organisations	Paid by private sources	Total
Ante natal classes	32	£22	£17	£0	£39
Breast feeding groups	14	£16	£6	£1	£23
Midwife/health visitor sessions	61	£26	£31	£1	£58
Stay and play groups	148	£8	£1	£0	£9
Sports/exercise for babies/children	44	£8	£2	£0	£10
Peer support	39	£11	£2	£0	£13
Parenting classes	35	£11	£2	£0	£13
Activities for parents	14	£17	£3	£0	£20
Home safety advice	4	£15	£1	£0	£16
SALT	27	£19	£9	£0	£28
Psychologist or counsellor	12	£36	£27	£0	£63
Specialist family support	72	£32	£5	£1	£38
Childcare	14	£5	£1	£0	£6
Benefits / tax credits advice	10	£58	£12	£1	£71
Housing / debt advice	11	£45	£7	£1	£53
Employment support	23	£36	£13	£1	£50
Basic IT / job skills course	13	£9	£3	£0	£12
Further education or adult learning	23	£12	£6	£0	£18
ESOL	11	£9	£4	£0	£13
Services in the home	44	£73	£6	£0	£79

Service type	Number of services	Cost per user hour			
		Paid by centre	Paid by other government organisations	Paid by private sources	Total
Other services	36	£31	£13	£1	£45
All services	687	£22	£8	£0	£30

Source: ECCE, strand 5

Table notes: The cost per user hour is the cost of delivering each hour of the services received by families and children (families do not pay directly for most services). Parenting classes were as defined by the centre manager and do not necessarily correspond to the Allen list of evidenced based programmes. Other government organisations include Local Authorities, Health Authorities, Job Centres, colleges, schools and community venues. Private sources include charities, private firms and volunteer staff. Childcare services do not include crèches which support other services: the costs of these supporting crèches are included in the service that they support. Other services include health services (one-to-one breastfeeding by centre staff, children's vitamins, head lice, paediatrician, acupuncture, chiropractor, physiotherapist, dental health, health trainer); healthy eating and dietician; individual use of sensory and soft play rooms; first aid courses, organisation and shopping advice services; life coaching and legal services. The services in this table do not include childminder services (which are not services for children and families) and toy libraries and food banks (where user numbers were not available), but the costs of delivering these services were recorded separately from the listed services.

Across all services, the average cost per user hour was £30. Services using more specialised staff and operated to a greater extent on a one-to-one basis tended to have a higher hourly cost (such as, midwife / health visitor sessions; psychologist/counsellor; financial and work support; and services in the home). On the other hand, services using less skilled staff and with a tendency to be offered in groups, had lower average costs, (such as stay and play groups; sports/activities for babies and children; peer support and parenting classes; childcare⁹; and skills and education classes for parents).

Among the 24 centres, most of the costs were paid directly by centres (73 percent or £22 of the average total of £30 spent for each user hour across all services). Almost all of the remaining cost was paid by other government organisations while private contributions constituted a very small part. Hence, the value for money analysis considers only the total cost from all three sources, noting that this is approximately equal to the cost paid by government.

The average hourly costs for the eight broader groups of services used in the value for money analysis are presented in table 9 (the specific types of services in each group are

⁹ The hourly cost of £6 for childcare is slightly higher than that reported in other studies (for example, see the review in Paull (2015)). There are several possible reasons for this. First, this study includes a monetary valuation for venues which are provided at no direct cost to centres and for volunteer staff. Second, some centres used highly trained and higher cost staff within the childcare service to provide specialist support for some children. Finally, the hourly cost includes a share of the centre's core running costs (overheads) which are likely to be higher than in other childcare settings.

shown in table 10).¹⁰ The table shows both the mean hourly cost per user and the 95 percent confidence intervals for each type. Given the information collected from the 24 case studies, there is a 95 percent probability that these intervals contain the actual mean cost for all children’s centres in the most deprived areas.

Table 9: Hourly cost per user for groups of services

Service group	Number of services	Cost per user hour (£)	
		Mean	[95% confidence intervals]
Baby health	107	£47	[£40 – £56]
Child play	192	£9	[£8 – £11]
Parent support	92	£14	[£11 – £17]
Specialist child support	39	£39	[£26 – £51]
Specialist family/parent support	84	£41	[£32 – £51]
Childcare	14	£6	[£3 – £9]
Finance and work support	44	£55	[£38 – £72]
Training and education	47	£15	[£10 – £20]

Source: ECCE, strand 5

Notes: The estimation of the confidence intervals included cluster effects to allow for the fact that multiple services in the same category were delivered by some centres.

The least expensive groups were child play, parent support, childcare and training and education for parents, while the more expensive groups are baby health, specialist support (for children or families/parents) and finance and work support. The groups with the broadest confidence intervals were the more specialist services (specialist support and finance and work support) which have greater variety in service objectives and the way in which the services are delivered.

2.3 Total cost per family for different service groups

In order to calculate the total cost of using a type of service for each family, information on the average number of hours used by a family was drawn from the strand 2

¹⁰ Services in the home are not included in the value for money analysis because it was not possible to accurately estimate user numbers and hours from the strand 2 longitudinal survey of families. “Other services” are also excluded as they contain too much variety in the nature of the services to meaningful model links between costs and improved outcomes.

longitudinal survey of families.¹¹ To match with the service usage measures used in estimating the relationship with improved outcomes, this average total cost per family was estimated over two time periods (see section 3.1):

- “Any time”: all service usage between nine months prior to birth for the target child and the third interview when the target child was aged three.
- “Since wave 1”: all service usage between the first interview (when the target child was aged approximately one year) and the third interview when the target child was aged three.

Tables 10 and 11 present the average total costs per family for service use for the “any time” period and for the “since wave 1” period respectively. The initial three columns in each table present the proportions of families who used each service type within the group, average total hours used for each individual service and the average total service hours within the group, using data from the strand 2 longitudinal study.¹² Families could use more than one service type in a group: hence, the percentages can sum to greater than 100 percent within each row in the first column. The final column multiplies this average total hours for the group by the average hourly cost from table 9 to present the mean cost for each family in the group (together with 95 percent confidence intervals using the confidence intervals for the average hourly cost per user). It should be noted that these confidence intervals include only the variation in the hourly cost and do not include any measure of confidence around the proportions of families using the service or average hours of use.¹³

For example, in the first row in table 10, 32 percent of families who used any service in the baby health group used ante-natal classes for an average of 15 total hours, while 29 percent used breast-feeding groups for an average of 58 total hours and 97 percent used midwife or health visitor sessions for an average of 76 total hours. Overall, families using any service in the baby health group used an average of 95 total hours across all three

¹¹ The sample for this survey contained families with a child aged between nine and 18 months (the “target child”) who were registered at the Children’s Centres which took part in the initial ECCE survey of centres. The survey collected data at three time points: when the target child was aged 9-18 months old and then again when the child was aged around two and around three. Full details about the longitudinal study of families can be found in Maisey et al (2015), available at [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/472959/RR434 - Evaluation of children s centres in England follow-up survey of families.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/472959/RR434_-_Evaluation_of_children_s_centres_in_England_follow-up_survey_of_families.pdf)

¹² The study did not ask directly for the total number of hours used by families. This information was derived from questions about usage of the five most commonly used services at Children’s Centres on the month that the family started and stopped using the service, frequency of use and typical number of hours attended.

¹³ An alternative measure could have used the mean hourly cost per user and means hours of use for each service type within the group, but this would have required using confidence intervals from some very small samples for each service type. The mean values for the presented approach and this alternative are quite similar, but the confidence intervals for the alternative are much larger.

services.¹⁴ The average cost per family of £4,468 is simply 95 hours multiplied by the hourly cost per user of £47¹⁵.

Tables 10 and 11 present very similar patterns in usage and total cost across the different service groups, which is unsurprising as the time period used in the latter table is a subset of that used in the first table. However, within each service group, average hours are lower in table 11 than in table 10 because of the shorter time period.

The highest average total hours of use were for child play, childcare and training and education, all of which are services which are generally attended on a regular basis over a sustained period. Services used more occasionally and as needed (specialist child and family/parent support; finance and work support) had the lowest total hours, while services attended regularly but over a more limited period (baby health and general parent support) had total hours in the middle of the range.

Childcare had the highest average cost per family (£8,454 using the “any time” period) due to the large average number of hours used (1,409) and in spite of the low average hourly cost per user (£6). Baby health and finance and work support had the next highest average costs per family (£4,468 and £3,202 respectively), mainly driven by the high average hourly cost per user (£47 and £55 respectively). The remaining services had lower average costs per family, primarily due to either a low average hourly cost per user (£9 for child play and £15 for training and education) or a low average number of total hours (parent support and specialist support for children and families/parents).

The cost figures used in the value for money analysis are the average cost per family in tables 10 and 11.

¹⁴ A simpler calculation would have been to simply sum the number of hours across the three types of services for all families using any service in the group and present the average, but the breakdown presented here provides additional insight into the prevalence of use and average hours across the service types.

¹⁵ With some rounding in the numbers as the precise average number of total hours is 95.06.

Table 10: Total cost per family (any time)

Service group: - specific services	Average use per family using some service in group			Average cost per family in group
	% in group using service	Mean hours for each service	Mean total service hours in group	Mean [95% confidence intervals]
Baby health: - ante-natal classes - breast-feeding groups - midwife/health visitor session	32% 29% 97%	15 58 76	95	£4,468 [£3,803 - £5,514]
Child play: - stay and play - organised activities	94% 50%	221 53	235	£2,116 [£1,880 - £2,586]
Parent support: - peer support - parenting classes - organised activities - home safety advice/course	31% 45% 34% 48%	66 48 48 21	68	£958 [£753 - £1,163]
Specialist child support: - speech and language therapy - psychologist/counsellor	86% 19%	29 36	32	£1,242 [£828 - £1,624]
Specialist family/parent support: - psychologist/counsellor - relationship support - other specialist support	21% 25% 71%	42 26 36	41	£1,685 [£1,315 - £2,095]
Childcare	100%	1409	1409	£8,454 [£4,227 - £12,681]
Finance and work support: - benefits and tax advice - housing and debt advice - employment support	77% 22% 34%	37 35 65	58	£3,202 [£2,212 - £4,192]
Training and education: - basic IT / job skills - FE / adult learning - ESOL	33% 78% 17%	81 97 128	124	£1,864 [£1,242 - £2,485]

Source: ECCE, strands 2 and 5

Notes: The mean total service hours in each group is the sum of all hours divided by the number of families using any service in the group (equivalent to the sum of the proportions using each service multiplied by the mean number of hours for each service). The average cost per family is the mean total hours in each group multiplied by the mean hourly cost for the group shown in table 9.

Table 11: Total cost per family (since wave 1)

Service group: - specific services	Average use per family using some service in group			Average cost per family in group
	% in group using service	Mean hours for each service	Mean total service hours in group	Mean [95% confidence intervals]
Baby health: - ante-natal classes - breast-feeding groups - midwife/health visitor session	10% 14% 96%	12 55 58	65	£3,041 [£2,588 - £3,753]
Child play: - stay and play - organised activities	97% 30%	167 79	185	£1,669 [£1,483 - £2,040]
Parent support: - peer support - parenting classes - organised activities - home safety advice/course	29% 53% 35% 33%	56 47 34 19	59	£831 [£653 - £1,009]
Specialist child support: - speech and language therapy - psychologist/counsellor	89% 17%	25 16	25	£973 [£648 - £1,272]
Specialist family/parent support: - psychologist/counsellor - relationship support - other specialist support	20% 22% 72%	45 7 11	18	£746 [£583 - £929]
Childcare	100%	1132	1132	£6,792 [£3,396 - £10,188]
Finance and work support - benefits and tax advice - housing and debt advice - employment support	70% 15% 40%	1 1 82	34	£1,869 [£1,291 - £2,446]
Training and education: - basic IT / job skills - FE / adult learning - ESOL	29% 68% 26%	91 84 70	102	£1,530 [£1,020 - £2,040]

Source: ECCE, strands 2 and 5

Notes: See notes to table 10.

2.4 Summary

This chapter has used data collected from 24 Children's Centres on the hourly cost of delivering different types of services and the average hours of usage by families to estimate the average delivery cost per family who used the service.

For families using a service type at some time between nine months prior to the birth of a child up to when the child is aged three (between age one and age three), the average costs were:

- £4,468 (£3,041) per family for baby health services
- £2,166 (£1,669) per family for child play services
- £958 (£831) per family for parent support services
- £1,242 (£973) per family for specialist child support services
- £1,685 (£746) per family for specialist family/parent services
- £8,454 (£6,792) per family for childcare
- £3,202 (£1,869) per family for finance and work support
- £1,864 (£1,530) per family for training and education

3. Improved outcomes associated with the use of Children’s Centre services

This chapter presents the evidence on the associations between the use of Children’s Centre services and improved outcomes used in the value for money analysis. It uses data from the strand 2 longitudinal survey of families to examine the associations between families’ use of the eight service groups introduced in the previous chapter and a range of child and family outcomes.

3.1 Methodology to estimate associations

Data from the strand 2 longitudinal survey of families was used to analyse the relationships between the use of services reported in the survey and child and family outcomes. This survey involved three waves of interviews with families who were registered at Children’s Centres initially interviewed in strand 1 of ECCE. During the first wave in 2012, 5,717 families with a “target” child aged 9-18 months were interviewed. Of these, 3,599 families were surveyed again via telephone when their child reached the age of two years (wave 2 in 2013) and a final survey of 2,608 of these families was undertaken in 2014 when the child reached the age of three years (wave three). The analysis presented in this chapter is based on data from all three interviews for this final sample of 2,608 families.¹⁶

Each interview collected information on families’ use of Children’s Centre services and use of similar services at other organisations, as well as extensive demographic, health and wellbeing data. The final survey also collected information on the target child’s development at age three via child assessments of cognitive and social development. Further details on the survey can be found in Maisey et al (2013, 2015).

The associations with the use of Children’s Centre services were estimated for 17 individual child, parent and family outcomes when the target child was aged three at the third interview of the survey^{17 18}:

- Child’s cognitive ability using (a) naming vocabulary assessed using the British Ability Scale (BAS) III and (b) picture similarities assessed using the BAS III.

¹⁶ Further details about the sampling for the longitudinal study can be found in Maisey et al (2015), available at [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/472959/RR434 - Evaluation of children s centres in England follow-up survey of families.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/472959/RR434_-_Evaluation_of_children_s_centres_in_England_follow-up_survey_of_families.pdf)

¹⁷ See Elliot and Smith (2011) for further information on the BAS measures, Goodman (1997) for the SDQ measures, Goldberg and Williams (1988) for the GHQ measure, Abidin (1995) for the PSI measures, Matheny et al (1995) for the CHAOS measure, and Sammons et al (2004) or Melhuish et al (2008) for the HLE measure.

¹⁸ Two other outcomes were considered (a child health indicator that measured whether the child had visited hospital for a serious or longstanding health problem and parental drug use) but sample sizes were too small to robustly estimate the associations with service use.

- Child's behaviour using (a) conduct problems measured using the Strengths and Difficulties Questionnaire (SDQ) and (b) total difficulties measured using the emotional symptoms, peer problems, conduct problems and hyperactivity subscales of the SDQ.¹⁹
- Child health using (a) whether child has had a serious injury²⁰ and (b) whether child has been taken to A&E or a Minor Injuries Unit due to an accident or injury.
- Mother's mental health using minor, short-term psychiatric disorders assessed using the General Health Questionnaire (GHQ).
- Mother's lifestyle using (a) whether mother smokes and (b) whether mother drinks alcohol.
- Parental stress using (a) the Parenting Stress Index (PSI) and (b) Parental-child dysfunctional interaction measured through the PSI.
- Home environment using (a) the Confusion, Hubbub and Order Scale (CHAOS) and (b) the early Home Learning Environment (early HLE) scale.
- Parental employment using (a) work participation and (b) number of work hours for mothers and fathers.

The associations between outcomes and the different groups of services were estimated according to the outcomes that the services are assumed to primarily benefit:

- Associations with the use of baby health, child play, parent support, specialist child support, specialist parent/family support and childcare services were estimated for the child outcomes.
- Associations with the use of baby health, child play, parent support, specialist child support and specialist and parent/family support services were estimated for the parent and family outcomes of mothers' mental health, mothers' lifestyle, parental stress and home environment.
- Associations with the use of childcare, finance and work support and training and education services for the parental employment. The parental employment models were also estimated separately for mothers and fathers.

In addition, the associations were tested in two further ways:

¹⁹ These SDQ scales differ from those used in the strand 4 report because they match with links to later outcomes in the existing literature.

²⁰ Serious injuries include a cut needing stitches, staples or steri-strips; crushing of a part of the body; a dislocated joint; a broken bone; a burn or scald; a loss of consciousness; or swallowing of household cleaner / pills / something poisonous.

- Associations with the use of any service in the first five groups combined were estimated to test the relationships with the general use of services rather than specific types. Childcare was not included in this combined measure because it would greatly reduce the size of the comparison sample (shown below).
- Associations with the use of different types of services were estimated in a single, combined regression for each outcome with an explanatory variable for each service type to test whether relationships with the services individually might reflect related use of other services. Previous ECCE reports have shown that services tend to be used in bundles across the different groups and this approach helps identify which services within these bundles might drive differences in outcomes.

The associations with service use were estimated using linear regressions for the outcomes which are continuous variables (BAS and SDQ measures, GHQ measure, PSI measures, CHAOS, early HLE and work hours) and using logistic probability models for the outcomes which have two categories (whether a child has had a serious injury or A&E visit, whether mother smokes or drinks alcohol and work participation).

All models were estimated using two different time periods over which service usage was measured:

- “Any time”: all service usage between nine months prior to birth for the target child and the third interview when the target child was aged three.
- “Since wave 1”: all service usage between the first interview (when the target child was aged approximately one year) and the third interview when the target child was aged three.

The first time period was used because it allows the value for money of pre-birth and early childhood services to be estimated. However, the second time period permits a more robust estimation of the association between service use and outcomes by allowing the inclusion of baseline information from the first interview to control for initial differences prior to service use.

In order to compare the value of the potential benefits with the costs of delivery, the value for money analysis requires a comparison of outcomes for families using Children’s Centre services with those not using the same types of services at any organisation, drawn from the 2,608 families in the final wave of the longitudinal study. If service use has positive impacts on outcomes, inclusion of those using similar services at other organisations in the comparison group would lead to an understatement of the value of the benefits of Children’s Centre services relative to the costs which cannot be addressed in the absence of comparable cost data for the delivery of similar services at other organisations. This meant that families who used similar services at a different type of organisation could not be included in the models.

The consequent sample sizes for modelling associations with the outcomes other than parental employment (that is, use of any services in the first five groups and the first six service groups individually) are shown in table 12. As described above, the associations with use of the remaining two service groups (finance and work support; training and education) were modelled only for parental work outcomes as improvement in parental employment are the primary objectives of these services. The parental work models were estimated separately for mothers and fathers and the relevant sample sizes are shown in table 13.

Table 12: Sample sizes for modelling child, parent and family outcomes

Sample size	Service group						
	First five groups	Baby health	Child play	Parent support	Special. child	Special. parent / family	Childcare
Any time:							
- used service	513	1030	1016	696	210	149	271
- comparison	20	135	231	1301	2044	2238	687
Since wave 1:							
- used service	706	897	942	423	172	102	273
- comparison	228	1024	508	1729	2157	2357	707

Source: ECCE, strand 5

Table 13: Sample sizes for modelling parental employment outcomes

Sample size	Service group							
	First five groups		Childcare		Finance and work support		Training and education	
	Mums	Dads	Mums	Dads	Mums	Dads	Mums	Dads
Any time:								
- used service	514	422	270	195	170	46	130	8
- comparison	20	26	696	592	1774	1753	2011	1897
Since wave 1:								
- used service	704	582	272	198	106	28	97	3
- comparison	227	191	716	605	2089	1908	2137	1931

Source: ECCE, strand 5

The tables highlight that the prevalence of the use of similar services at other types of organisations reduces the total sample across both those using Children's Centre services and the comparison group who did not use that type of service at any organisation. This reduction is greatest for the use of childcare and the use of any

services in the first five groups. For the “any time” timeframe, the comparison group for the use of any services in the first five groups was too small to estimate the relationships with the non-employment outcomes (comparison group of only 20 in table 12). In addition, the use of finance and work support services and training and education services at Children’s Centres by fathers was too low to estimate the parental employment models for these services for fathers (“used service” groups of 8 and 3 in table 13). More generally, the small sample sizes should be noted as a potential reason for the lack of statistically significant findings in some cases.

All models included a range of control variables for other related factors which might drive differences in outcomes between those using the services and the comparison groups. For all outcomes other than parental employment outcomes, the following controls were considered in each model for the child and parent/family outcomes²¹:

- Child factors: the child’s age, gender, ethnicity, developmental issues, overall health at wave 1, diet at wave 1, visits to A&E at wave 1, injuries at wave 1, life event between child’s birth and wave 1.
- Parental factors: mother’s qualifications, age, ethnicity, overall health at wave 1, smoker at wave 1, regular drinker at wave 1, mental health at wave 1, living arrangements at wave 1 and employment patterns.
- Family factors: home language, number of siblings, financial disadvantage, occupational socio-economic status, Household Economic Status (HES) for non-working households, income, home learning environment at wave 1, parent-child dysfunctional interaction at wave 1, relationship quality, parental distress at wave 1, difficult child, CHOAS score at wave 1.
- Changes between waves 1 and 3: divorce/separation, loss of job, new sibling.
- Neighbourhood factors: Income Deprivation Affecting Children Index (IDACI) and a rural indicator.

For the parental employment outcomes, the following controls were included:

- Number of children and number of people in the household.
- Parent’s age, ethnicity²², highest qualification and whether they have a longstanding disability or health problem.

²¹ These models were estimated by a strand 4 analyst and further details on the construction of the “contextualised” models for these outcomes can be found in Sammons et al (2015). The models presented here did not include controls for childcare usage prior to age three.

²² Fathers’ ethnicity was not recorded in the survey and was proxied by mothers’ ethnicity.

- Whether the household rents or owns their accommodation.
- Whether a couple or lone mother in the models for mothers.²³

All models using the “since wave 1” timeframe also included the outcome variable at wave 1 (baseline) with the exception of the BAS and SDQ measures for child development as these are not available from the first interview (due to the target child being too young for the tests). This lack of a measure for the outcome at the baseline is a notable limitation to controlling for other factors in the BAS and SDQ models.

The models for parental employment were estimated by the authors of this report, while those for all other outcomes were estimated by a strand 4 analyst. It should be noted that this chapter has presented a narrowly focused analysis of the associations between the use of Children’s Centre services and child and family outcomes for the purposes of delivering appropriate measures of potential impact for the value for money study. The strand 4 report (Sammons et al (2015)) provides an extensive examination of the use of Children’s Centres and outcomes for young children and their families, including consideration of different patterns of usage (combinations of services and duration and intensity of use); how outcomes relate to centre characteristics (such as resourcing, leadership and structure); and how usage and outcomes may vary across different types of families.²⁴

3.2 Associations with child outcomes

Table 14 presents the findings on the associations between using services at Children’s Centres and the child outcomes. Throughout the tables of findings, statistically significant relationships are reported at the 95% confidence level in shaded cells with “pos”/“neg” for a positive/negative association. The unshaded cells with “ns” indicate no statistically significant association. As several measures have scales in which an increase indicates a worsening outcome, service use associated with a better outcome is highlighted in bold upper case lettering. The symbol “§” is used to indicate a statistically significant association in a regression model with all of the first five service groups included individually (of which there are none in table 14).

²³ There were too few lone fathers to include this variable in the model for fathers.

²⁴ The strand 4 report is available at <https://www.gov.uk/government/publications/childrens-centres-their-impact-on-children-and-families> and the technical appendices for this report are available at <http://www.education.ox.ac.uk/research/fell/research/evaluation-of-children-centres-in-england-ecce/>

Table 14: Associations between service use and child outcomes

Outcome (* = lower is better)	Time-frame	Service group						
		First five groups	Baby health	Child play	Parent support	Special. child	Special. parent / family	Child -care
BAS naming vocabulary	Any time	---	neg	ns	ns	neg	ns	ns
	Since w1	ns	ns	ns	ns	neg	ns	ns
BAS non-verbal	Any time	---	ns	ns	ns	ns	ns	ns
	Since w1	ns	ns	ns	ns	ns	ns	ns
SDQ total difficulties *	Any time	---	ns	ns	pos	pos	ns	ns
	Since w1	ns	pos	ns	ns	pos	ns	ns
SDQ conduct problems *	Any time	---	NEG	ns	pos	pos	pos	ns
	Since w1	ns	ns	ns	pos	ns	pos	ns
A&E *	Any time	---	ns	ns	ns	ns	ns	ns
	Since w1	ns	ns	ns	ns	ns	ns	ns
Injury *	Any time	---	ns	ns	pos	ns	pos	ns
	Since w1	ns	ns	ns	pos	ns	pos	ns

Source: ECCE, strand 5

Notes: All cells with statistically significant associations (at the 95 percent confidence level) are shaded in grey. Associations in bold upper case indicate where service use is associated with improved outcomes and those in lower case indicate where service use is associated with poorer outcomes. The symbol “---“ denotes associations that could not be estimated due to insufficient sample size.

There are no statistically significant associations between the use of any services in the first five groups and the child outcomes (first column of results, table 14). This finding may be due to an insufficient sample size (particularly for the comparison group) and should not be interpreted as evidence of the lack of any association between more general service use and the child outcomes. Considering the types of services individually rather than the aggregate measure of usage identifies several statistically significant associations, but only one is between service use and an improved outcome: use of health services at any time between nine months prior to the birth and age three for the target child is associated with a lower (better) score for SDQ conduct problems. On the other hand, service use is associated with poorer outcomes in 16 cases (in the remaining shaded cells): use of baby health and specialist child services is associated with poorer child cognitive development (lower BAS scores); use of baby health, parent support and specialist child and parent/family services are associated with poorer child behavioural outcomes (higher SDQ scores); and use of parent support and specialist parent/family support services is associated with a higher rate of child injury. Discussion

of the interpretation of the associations between service use and poorer outcomes is presented in section 3.6.²⁵

The lack of any “§” symbols indicates that none of the associations are statistically significant when tested in a regression with several service types. This may, again, be due to insufficient sample size and means that it is not possible to identify whether the associations are due to related use of a different type of service.

3.3 Associations with parent and family outcomes

Table 15 presents the findings on the associations between using services at Children’s Centres and the parent and family outcomes. Interestingly, there is one statistically significant association with the use of any services in the first five groups in spite of the small sample size: the more general measure of use of services is associated with a poorer outcome for the PSI parent-child dysfunctional interaction measure. But the findings for specific service types indicate several associations with an improved early home learning environment (early HLE): use of baby health, child play, parent support and specialist parent/family support services are all associated with a higher (better) early HLE score. On the other hand, service use is associated with poorer outcomes in 14 cases: use of child play and specialist parent/family services are associated with poorer mothers’ mental health; use of specialist parent/family services are associated with a higher (poorer) CHAOS score; and use of baby health, child play, and specialist child and parent/family services are associated with higher (poorer) PSI scores.²⁶

When the five service groups are included individually in the regression model, there is a statistically significant association only between parent support services and a better early HLE outcome, suggesting that it may be related use of this type of service which drives the associations with other service types.

²⁵ The strand 4 analysis (Sammons et al (2015)) showed that general use of centre services and use of health, health visitor and organised activities services are associated with poorer BAS scores at age three and that the general use of services and use of stay and play and health visitor services are associated with poorer SDQ scores at age three (tables 4.2 to 4.6).

²⁶ The strand 4 analysis (Sammons et al (2015)) showed that general use of centre services is associated with poorer mothers’ mental health (tables 5.2, 5.3 and 5.5), but did not identify any association with mothers’ physical health. It also showed that general use of services, use of stay and play services and organised activities services are associated with better early HLE and that general use of services is associated with better CHAOS, but did not identify any associations between service use and the PSI measures at the 95 percent confidence level (tables 6.3 to 6.5 and technical appendix 6.2).

Table 15: Associations between service use and parent and family outcomes

Outcome (* = lower is better)	Timeframe	Service group					
		First five groups	Baby health	Child play	Parent support	Special. child	Special. parent / family
Mother's mental health (GHQ)*	Any time	---	ns	pos	ns	ns	pos
	Since w1	ns	ns	ns	ns	ns	pos
Mother's alcohol consumption *	Any time	---	ns	ns	ns	ns	ns
	Since w1	ns	ns	ns	ns	ns	ns
Mother's smoking *	Any time	---	ns	ns	ns	ns	ns
	Since w1	ns	ns	ns	ns	ns	ns
CHAOS *	Any time	---	ns	ns	ns	ns	pos
	Since w1	ns	ns	ns	ns	ns	pos
HLE	Any time	---	POS	ns	POS	ns	POS
	Since w1	ns	ns	POS	POS §	ns	POS
PSI parental distress *	Any time	---	pos	pos	ns	ns	pos
	Since w1	ns	ns	pos	ns	ns	pos
PSI parent-child dysfunctional interaction *	Any time	---	ns	pos	ns	pos	ns
	Since w1	pos	ns	pos	ns	pos	ns

Source: ECCE, strand 5

Notes: All cells with statistically significant associations (at the 95 percent confidence level) are shaded in grey. Associations in bold upper case indicate where service use is associated with improved outcomes and those in lower case indicate where service use is associated with poorer outcomes. The symbol “---” denotes associations that could not be estimated due to insufficient sample size and “§” denotes a statistically significant association in the regression with all first five service groups included individually.

3.4 Associations with parental employment

Table 16 presents the findings on the associations between using services at Children's Centres and the parental employment outcomes. There are no associations between the use of services and greater work participation or longer work hours. Indeed, use of any of the first five types of services since the target child was aged nine months (since wave 1) is associated with lower work participation and shorter work hours for mothers, while the use of finance and work support services is associated with lower work participation for fathers. It should be noted that these associations hold even with allowance for the differences between service users and the comparison group in a broad range of other potential influences on parental employment and with controls for initial work participation

and work hours in the “since wave 1” models. Of particular note, is that parents who used childcare at Children’s Centres are no more likely to be in work when the target child is aged three than parents who did not use formal childcare at any organisation.²⁷

Table 16: Associations between service use and parental employment

Outcome (* = lower is better)	Timeframe	Service group			
		First five groups	Childcare	Finance and work support	Training and education
Mothers’ work participation	Any time	ns	ns	ns	ns
	Since w1	neg	ns	ns	ns
Mothers’ weekly work hours	Any time	ns	ns	ns	ns
	Since w1	neg	ns	ns	ns
Fathers’ work participation	Any time	ns	ns	neg	---
	Since w1	ns	ns	neg	---
Fathers’ weekly work hours	Any time	ns	ns	ns	---
	Since w1	ns	ns	ns	---

Source: ECCE, strand 5

Notes: All cells with statistically significant associations (at the 95 percent confidence level) are shaded in grey. Associations in bold upper case indicate where service use is associated with improved outcomes and those in lower case indicate where service use is associated with poorer outcomes. The symbol “---“ denotes associations that could not be estimated due to insufficient sample size.

3.5 Size of associations with improvements in outcomes

This section presents the sizes of the statistically significant associations between the use of services at Children’s Centres and improved outcomes which were highlighted above. The sizes of the associations with poorer outcomes are not presented as it would not be meaningful to take these forward into the value for money estimates.

Table 17 presents the size of the association between the use of baby health services (at any time) and the SDQ conduct problems score. The range of the SDQ conduct problems scale is 0 to 10, with 0 to 3 designated as normal, 4 as borderline and 5 to 10 as abnormal. The average score for target children in families who have used baby services at a Children’s Centre and in families who have not used this type of service at any organisation are both within the normal range, but is slightly lower for families who

²⁷ The strand 4 analysis (Sammons et al (2015)) did not identify any associations between service use and household economic status.

have used the Children’s Centre service (2.385 compared to 2.956). Only a small part of this difference (0.571) is explained by other factors included as controls in the model, with a difference of 0.412 potentially attributable to the use of the service. In order to make links with later lifetime outcomes, table 17 also presents the Z score for the difference. This captures the effect size in units of the standard deviation (i.e. it measures the number of standard deviations that the mean for the treatment group is from the mean for the comparison group). Table 17 also presents the 95 percent confidence intervals for the differences which are used in the value for money calculations to estimate “best case” and “worst case” scenarios.

Table 17: Size of associations with SDQ conduct problems score

SDQ conduct problems score	Mean SDQ conduct problems scores		Raw difference between treatment and comparison		Difference between service users and comparison with controls	
	Service users	Comp. group	Mean difference	95% confidence interval	Mean difference	95% confidence interval
Baby health services (any time)						
SDQ conduct problems score	2.385	2.956	- 0.571 (p=0.009)	[-0.994 - -0.148]	- 0.412 (p=0.023)	[-0.767 - -0.057]
Z score (effect size)	n/a	n/a	- 0.260 (p=0.009)	[-0.452 - -0.067]	- 0.187 (p=0.023)	[-0.349 - -0.026]

Source: ECCE, strand 5

Notes: The p value shows the probability that there is no statistically significant difference in the scores between service users and the comparison group. See text for an explanation of the Z score and effect size.

Table 18 presents the size of the associations between use of four different types of Children’s Centre services and improvements in the early HLE (which ranges from 0 to 49 with higher scores indicating a better HLE). The raw differences in early HLE score between those using services and the comparison group is greatest for the use of baby health services (4.204), followed by child play services (2.143) and parent support services (1.182 or 1.602 depending upon the timeframe) and lowest for specialist parent/family support services (0.675 or 0.855, again depending upon the timeframe). Interestingly, the larger differences generally reflect a lower score in the comparison group rather than a higher one in the group of service users. Controlling for differences in other factors notably reduces the magnitude of the differences in the early HLE score for baby health and child play services: this indicates that families using the services tend to have characteristics associated with a higher early HLE score. Controlling for other factors has little impact on the difference for parent support services, but increases the size of the difference for specialist parent/family services: this indicates that families

using these services tend to have characteristics associated with a lower early HLE score. The size of the association is slightly stronger for parent support services when allowance is made for related usage of other service groups (“since wave 1 with other service use” row), but the difference is not large (1.668 compared to 1.550 without this allowance). To maintain consistency with the magnitude of associations used for other services, the measure excluding this allowance is taken forward into the value for money estimates.

Table 18: Size of associations with the home learning environment

HLE score	Mean early HLE scores		Raw difference between treatment and comparison		Difference between service users and comparison with controls	
	Service users	Comp. group	Mean difference	95% confidence interval	Mean difference	95% confidence interval
Baby health services						
Any time	31.081	26.877	4.204 (p<0.001)	[2.473 - 5.934]	1.989 (p=0.019)	[0.331 - 3.646]
Child play services						
Since wave 1	30.564	28.421	2.143 (p<0.001)	[1.118 - 3.169]	1.252 (p=0.011)	[0.286 - 2.219]
Parent support services						
Any time	31.139	29.957	1.182 (p=0.007)	[0.331 - 2.033]	0.923 (p=0.023)	[0.128 - 1.717]
Since wave 1	31.760	30.159	1.602 (p=0.001)	[0.615 - 2.588]	1.550 (p=0.001)	[0.629 - 2.471]
Since wave 1 with other service use	32.511	29.747	2.184 (p=0.010)	[0.533 - 3.836]	1.668 (p=0.037)	[0.100 - 3.236]
Specialist parent/family support services						
Any time	31.440	30.765	0.675 (p=0.393)	[-0.876 - 2.227]	1.972 (p=0.008)	[0.515 - 3.428]
Since wave 1	31.602	30.748	0.855 (p=0.365)	[-0.996 - 2.705]	2.177 (p=0.014)	[0.450 - 3.904]

Source: ECCE, strand 5

Notes: The p value shows the probability that there is no statistically significant difference in the scores between service users and the comparison group. “With other service use” indicates estimates from regression models which include use of each of the first five service types individually.

Table 18 also presents the 95 percent confidence intervals which are used in the value for money calculations to estimate “best case” and “worst case” scenarios.

3.6 Interpretation of associations

Without randomly selected treatment and control groups or a robust model of selection, caution should always be exercised in interpreting associations as evidence of a causal relationship and concluding that the treatment (use of service in this case) has an impact on outcomes. Although a broad range of control characteristics have been included here (including baseline measures of the outcomes in some cases), it is not possible to rule out the possibility that those using services and those not are different in ways that have not been captured in the control variables. In the absence of a randomly selected comparison group or evidence on the precise natures of selection into the use of services, it is not possible to identify the direction of causation.

The prevalence of the associations between service use and poorer outcomes is counter-intuitive to interpretation as a causal relationship as it seems unlikely service use would make outcomes worse. Given that families choose whether or not to use services and that centre staff may guide some families towards the use of particular services, it is likely that these associations include a “selection effect”. The associations between the use of specialist services and poorer child development and behavioural outcomes could reflect that families with children who would have poorer outcomes are more likely to use the service (with the corollary that the poorer outcomes for service users could have been even worse if they had not used the service). For example, the ECCE strand 4 report (Sammons et al (2015)) shows that high disadvantage families are more likely to use Children’s Centres long term than low disadvantaged families and that high disadvantaged families are more likely to use specialist services aimed at parents and families.²⁸ On the other hand, the associations between the use of several types of services and a better early HLE could reflect that families with a higher early HLE are more likely to see potential benefits in using the services and have a greater tendency to use them (with the corollary that the better early HLE outcomes for service users are not caused by service use). Hence, caution should be applied to both the associations with better outcomes and those with poorer outcomes as the possibility of selection bias cannot be applied in one case and not the other.

²⁸ See section 7.2. High disadvantaged families constituted 20 percent of the sample and were families that generally rented where they lived (83 percent), were generally in receipt of some kind of benefit (59 percent received Income Support, 69 percent received Housing Benefit) and were generally classed as workless households (78 percent).

3.7 Summary

This chapter has examined the relationships between the use of services at Children's Centres and child and family outcomes at age three using data from the strand 2 longitudinal survey of families.

There are no statistically significant association between the measure of more general service use (use of any of the first five service groups) and improved outcomes. Consequently, it is not possible to analyse the value for money for Children's Centres overall. However, there are several associations between the use of specific types of services and better child and family outcomes at age three:

- Use of baby health services at any time prior to age three is associated with lower SDQ conduct problems and a better early HLE (home learning environment).
- Use of child play services between age one and age three is associated with a better early HLE.
- Use of parent support services at any time prior to age three and between age one and age three and is associated with a better early HLE.
- Use of specialist parent/family support services at any time prior to age three and between one year and age three is associated with a better early HLE.

Estimates from the model with all first five service types included indicates that the driver of the association with a better early HLE outcome is possibly due to the use of parent support services, with the associations for other service types reflecting associated use of parent support services.

A value for money analysis requires evidence on impact, that is, a causal relationship between the policy and outcomes. But interpretation of the associations identified here as a causal relationship is problematic: the prevalence of associations between service use and poorer outcomes suggests that any associations (with either better or poorer outcomes) may reflect selection into services by particular types of families as well as impact. It would also not be meaningful to take forward the associations with poorer outcomes into the value for money analysis as this would imply a negative contribution to the benefits side.

In order to obtain some insight on value for money, the associations with better outcomes are taken forward into the value for money estimation and those with poorer outcomes discarded. Given that these associations should not be interpreted as impact, the value for money analysis is therefore based on hypothetical scenarios of what the value for money would be *if* there were impacts of the magnitudes of these associations.

4. The links between immediate impacts and longer term outcomes

As the ECCE study has only followed children until the age of three, the potential longer term benefits of Children's Centre services must be estimated using existing evidence on the links between child and family outcomes when a child is aged three and later lifetime outcomes for the child. This chapter draws on current literature sources to estimate the potential longer term outcomes of the scenarios of the potential impacts of Children's Centres on SDQ conduct problems and early HLE at age three.

4.1 SDQ conduct problems at age three and later outcomes

Two sources are used to link the SDQ conduct problems score at age three to a range of later outcomes:

- Evidence on the link between the SDQ conduct problems score at age three and at age seven from Croft et al (2015).
- Evidence on the links between the Bristol Social Adjustment Guide (BSAG) (an alternative measure of social skills) at age seven with a range of lifetime outcomes at age 42 from Carniero, Crawford and Goodman (2011).

In the absence of evidence on the relationships between the SDQ conduct problems and BSAG measures of social development, one assumption is used:

- It is assumed that a one standard deviation change in the SDQ conduct problems is equal to a one standard deviation change in the BSAG scale.²⁹

Croft et al (2015) use data from the Millennium Cohort Study to estimate the correlation between SDQ scores at different ages. A statistically significant positive relationship between the SDQ conduct problems score at age three with that at age seven is identified and it is estimated that a higher score of 1 at age three is correlated with a higher score of 0.64 in the measure at age seven.³⁰

²⁹ Using the standard deviation allows the change in the SDQ measure to be mapped to the BSAG measure without the need for them to have the same scales. Although there is no evidence on the relationship between the SDQ measure and the BSAG measure, an examination of the underlying questions indicates a similarity between the SDQ conduct problem questions and the BSAG segments A.3.2 and A.3.3 (hostility towards children and hostility towards adults) and there are strong correlations between these submeasures and the overall BSAG score at age seven (Shepherd (2013)).

³⁰ Other studies have used the same data source to identify similar correlations across various SDQ subscales including Cullis and Hansen (2008), Joshi, Ketende and Parsons (2011), Sullivan et al (2010) and Dex, Cullis and Hansen (2010). Croft et al (2015) is used as it links SDQ conduct problems which is the subscale required to link with other evidence at age seven.

Carniero, Crawford and Goodman (2011) use data from the National Child Development Study (NCDS) to examine the links between the BSAG measure of social maladjustment at age seven and outcomes at age 42. In the report, the score is normalised to have a mean of 0 and variance of 1. Poorer development scores on the BSAG scale at age seven are strongly correlated with an increased likelihood of truancy, being excluded from school, dealings with the police and smoking by age 16; depression, mental health issues and physical health at age 42; dealings with the police at 33-42 years old; and lower levels of educational attainment, employment and wage at age 42.

Table 19: Service use and longer term outcomes via SDQ at age three

Longer term outcomes	Correlation with a one standard deviation increase in the BSAG score	Correlation with use of baby health services (x -0.187 x 0.64)
Probability that ever truant by age 16	0.022 **	- 0.0026
Probability ever excluded or suspended from school by age 16	0.002 **	- 0.0002
Probability have ever been in trouble with police or ever been in court by age 16	0.016 **	- 0.0019
Probability smoke more than 40 cigarettes a day at age 16	0.013 **	- 0.0016
Probability of depression at age 42	0.019 **	- 0.0023
Probability of mental health problems at age 42	0.016 **	- 0.0019
Probability of poor or fair health (rather than good or excellent) at age 42	0.019 **	- 0.0023
Probability had dealings with the police or in court between ages 33 and 42	0.012 *	- 0.0014
Probability highest qualification is O levels or above at age 42	- 0.028 **	0.0033
Probability highest qualification is higher education degree at age 42	- 0.036 **	0.0043
Probability in work at age 42	- 0.021 **	0.0025
Log gross hourly wage at age 42	- 0.025 **	0.0030

Sources: Carniero, Crawford & Goodman (2011) and ECCE strand 5

Notes: ** / * indicate statistically significant at the 0.01 / 0.05 level. Correlations from tables 4.1, 4.3 and 4.5 in Carniero, Crawford & Goodman (2011) with the signs of the correlations reversed to match with the SDQ conduct problems that a higher score reflects a poorer outcome.

The first column in table 19 presents the size of the statistically significant correlations between the standardised BSAG social score at age seven and longer term outcomes from Carniero et al. The final column multiples these correlations by the size effect on the SDQ conduct problems score at age three of using baby health services estimated from the ECCE data (0.187) and by the correlation between the SDQ conduct problems score

at age three and at age seven (0.64). Using the assumption that a one standard deviation difference in the SDQ conduct problems score is equivalent to a one standard deviation in the BSAG score, this final column shows the correlation between the use of baby health services at Children's Centres at any time prior to age three and the longer term outcomes. For example, use of baby health services is estimated to be associated with a 0.0016 lower probability that a child will smoke more than 40 cigarettes a day at age 16 and with a 0.0025 higher probability that they will be in work at age 42.

To prevent the double-counting of benefits, two links in table 19 are not taken forward. First, the link with higher educational attainment is excluded because monetary value for this outcome can only be estimated from associated improvements in labour market outcomes and a lower likelihood of depression, both of which have direct links from the SDQ measure at age three which are preferable to use. Second, the link with depression is excluded because it is assumed this is also included in the broader measure of mental health (GHQ).

Other UK studies have also identified relationships between early life social behaviour and later outcomes. Stringaris et al (2014) use data from the Avon Longitudinal Study of Parents and Children (ALSPAC) to identify links between patterns of SDQ conduct problems across childhood and adolescence to depression at age 18, but their study does not cover later adult outcomes. Other studies have used NCDS and the British Cohort Study (BCS) data to identify links between Rutter measures of social behaviour at ages five and seven and later educational attainment, depression, male unemployment and wages (Buchanan, Flouri and Ten Brinke (2002), Feinstein (2000) and Feinstein and Duckworth (2006)). Studies analysing the National Survey of Health and Development (NSHD) have also identified links between social behaviour at the later ages of 13 and 15 to subsequent outcomes for educational attainment, mental health, family life and relationships and economic problems (Colman et al (2009)) and to causes of death (cancer for women and coronary heart disease for men) (Maughan et al (2014)). This literature provides strong supporting evidence for the links used here, but the paper by Carneiro et al provides the most comprehensive, up-to-date and compatible estimates.

4.2 HLE score at age three and later outcomes

Three sources are used to link the early HLE score at age three to later outcomes:

- Evidence on the link between the early HLE score at age three and educational attainment at age 16 from Sammons et al (2014a).
- Evidence on the link between educational attainment at age 16 and the probability of depression at age 42 from Chevalier & Feinstein (2006).
- Evidence on the link between the early HLE score at age three and the probability of SEN (special educational needs) at age 10 from Anders et al (2010).

Sammons et al (2014a) use EPPSE data³¹ to examine the links between the early HLE score at age three and educational attainment at age 16. The analysis showed positive links between early HLE at age three and a range of measures of educational achievement (including total GCSE score and the grades achieved in English and Maths) but the measure of at least five good GCSEs (at grades A* to C) is used as a monetary value of this level of attainment is available in the existing evidence.³² As the analysis in Sammons et al is based on five discrete early HLE score categories, the average change in the continuous measure used in the ECCE analysis was subtracted from the early HLE score for all families using the service type to estimate the proportions of families in a higher category associated with service use.³³ These proportions are presented in table 20. For example, the use of baby health services at any time is associated with 1.3 percent of families being in the second lowest early HLE group rather than the lowest, 5.8 percent in the third lowest group rather than the second, and 5.8 percent and 7.2 percent similarly for the top two early HLE groups.

The bottom row of table 20 presents the differences in the proportions of children between the early HLE groups who go on to achieve at least five good GCSEs at age 16 from Sammons et al (2014a).³⁴ For example, the proportion of children in the second early HLE category at age three who achieve five good GCSEs at age 16 is 15.5 percentage points higher than the proportion for the lowest early HLE category. The final column presents the change in the proportion of children with five good GCSEs associated with the service usage, estimated by multiplying the proportion of children in a higher group with the greater likelihood of attaining the five good GCSEs in the higher group and summing across the four pairs of early HLE categories. For example, use of baby health services is associated a higher proportion of 2.7 percentage points of children attaining five good GCSEs.

³¹ The EPPSE (Effective Pre-School, Primary and Secondary Education) study collected data on approximately 2,800 children from the start of pre-school at the age of three in 1997 and an additional group of about 300 children with no pre-school experiences at school entry at age five in 1999 until six months after the end of compulsory schooling at age 16. The study considers the aspects of pre-school provision which have a positive impact on children's attainment, progress and development.

³² Earlier EPPE and EPPSE studies also found that the HLE at age three was associated with better educational attainment at ages 7, 10, 11 and 14 (Sammons et al (2004, 2007, 2008, 2011), Sylva et al (2008), Melhuish et al (2008)). Educational attainment at younger ages has no direct value in itself, so only the final study with the link to age 16 is used here.

³³ This ignores any variation in the differences across families, but regression models of the kind presented in chapter 3 do not provide information on this variation. In addition, it should be noted that the distribution of early HLE scores for service users varies notably across service types which means that similar changes in the continuous early HLE score for service types can result in quite dissimilar changes in the discrete groups.

³⁴ These are the raw proportions from table 2.3 in Sammons et al (2014a). Ideally, the differences in proportions would be those controlling for variation in other characteristics between the groups (for example, as in the model in table A4.9), but these differences cannot be derived from the presented odds ratios due to the non-linear nature of these models (simply applying the reported odds ratios to the raw proportion for the lowest HLE group generated unrealistic proportions across the groups).

Table 20: Service use and GCSE attainment via early HLE at age three

Service type	Proportion of children in higher early HLE group associated with service use				Change in proportion with 5 good GCSEs associated with service use
	From 0-13 to 14-19	From 14-19 to 20-24	From 20-24 to 25-32	From 25-32 to 33-49	
Baby health (any time)	0.013	0.058	0.058	0.072	0.027
Child play (since wave 1)	0.012	0.028	0.028	0.032	0.013
Parent support (any time)	0.010	0.023	0.039	0.027	0.013
Parent support (since wave 1)	0.028	0.033	0.073	0.043	0.023
Specialist parent/family support (any time)	0.007	0.027	0.060	0.087	0.026
Specialist parent/family support (since wave 1)	0.010	0.049	0.039	0.059	0.021
<i>Change in probability of five good GCSEs</i>	<i>0.155</i>	<i>0.079</i>	<i>0.112</i>	<i>0.187</i>	

Sources: Sammons et al (2014a) and ECCE strand 5

Notes: The middle four columns indicate the proportion of children who are in a higher HLE score group associated with the service use. For example, use of baby health services (at any time) is associated with 1.3 percent of children having an HLE score that falls in the 14-19 range rather than in the 0-13 range; 5.8 percent who have an HLE score in the 20-24 range rather than the 14-19 range, and so on.

Chevalier & Feinstein (2006) estimate the casual effect of education on mental health using data from the NCDS.³⁵ They estimate that the probability of depression at age 42 is 5.1 percentage points lower for men whose highest qualification is at least O levels (GCSEs) than those with lower levels of education. Similarly, the proportion of women with depression at age 42 is estimated to be 4.2 percentage points lower for those whose highest qualification is at least O levels (GCSEs) than those with lower levels of education. Assuming that this difference is similar between those with five good GCSEs and those with lower educational attainment, multiplying the average difference in the likelihood of depression for men and women by the change in the proportion with five good GCSEs associated with service use generates an estimate of the reduction in the likelihood of depression associated with each service use, as shown in the final column in table 21.

³⁵ Earlier evidence has also identified this link: Feinstein (2002) used the NCDS and BCS to show that education to at least level 1 was linked with lower depression, while Bynner et al (2003) used the same data sources to show that graduates were less depressed than those with qualifications below level 2.

Table 21: Service use and adult depression via early HLE at age three

Service type	Change in proportion with five good GCSEs associated with service use	Change in proportion with adult depression
Baby health (any time)	0.027	- 0.0012
Child play (since wave 1)	0.013	- 0.0006
Parent support (any time)	0.013	- 0.0006
Parent support (since wave 1)	0.023	- 0.0011
Specialist parent/family support (any time)	0.026	- 0.0012
Specialist parent/family support (since wave 1)	0.021	- 0.0010

Sources: Chevalier & Feinstein (2006) and ECCE strand 5

Anders et al (2010) use data from EPPE 3-11 years to show that a low early HLE score (below 25) is statistically significantly associated with a greater risk of a child having special educational needs (SEN) at age 10. Using multivariate logistic models, they estimate that the odds of a child with an early HLE score of 24 or less at age 3 being identified as SEN for reading difficulties at age 10 is one and a half times as high as those with a early HLE score of 25 or more (odds ratio of 1.49). A similar association was found for SEN in relation to difficulties with number work (odds ratio of 1.36). As the sample was reasonably evenly divided between the two early HLE categories and the proportion of all children with any SEN was 15 percent, this indicates that, with allowance for difference in other influences, the proportion of children with SEN is 6 percentage points higher for children in the lower early HLE group than those in the higher one.³⁶

Similar to before, applying this link to the ECCE data requires that the change in the continuous early HLE measure associated with service use is converted into a change across the two discrete early HLE categories. Table 22 presents the proportions of families in the higher early HLE group due to the associated service usage in the first column and the associated change in the proportion of all children with SEN at age 10 (estimated by multiplying the proportion of children in the higher early HLE group by the lower proportion of children with SEN in the higher group (0.06)).

³⁶ An overall average proportion of 15 percent with SEN would be obtained from proportions of 18 percent in the lower HLE group and 12 percent in the higher HLE group, generating a difference of 6 percentage points.

Table 22: Service use and SEN at age 10 via early HLE at age three

Service type	Proportion of children in higher early HLE group due to associated service use	Change in proportion with SEN at age 10
Baby health (any time)	0.058	- 0.003
Child play (since wave 1)	0.028	- 0.001
Parent support (any time)	0.039	- 0.002
Parent support (since wave 1)	0.073	- 0.004
Specialist parent/family support (any time)	0.060	- 0.003
Specialist parent/family support (since wave 1)	0.039	- 0.002

Sources: Anders et al (2010) and ECCE strand 5

Evidence on two further links from early HLE at age three to later outcomes could not be quantified for the purpose of this study:

- There is a body of evidence linking higher educational attainment with better physical health and healthier lifestyles (for example, see Feinstein et al (2006)). However, UK sources of evidence could not be used to quantify this link. In some cases, the distinction in qualifications or level of schooling did not match with five good GCSEs: Bynner et al (2003) link obesity and smoking to graduate level attainment; Feinstein (2002) links a lack of qualifications to obesity; and Clark and Royer (2013) and Silles (2009) both investigate the impacts of additional years of compulsory schooling introduced in 1947 and 1972 (with differing conclusions). Sabates and Feinstein (2004) use the British Household Panel Survey (BHPS) to show that having qualifications at least to level 2 is associated with greater use of preventative care for women, but subsequent links from this to later health outcomes were not identified.
- Other evidence suggests a link between low levels of schooling and the likelihood of crime. However, the qualification level considered (left school at compulsory school age in Hansen (2003) and lack of any qualifications (Machin et al (2011)) could not be matched to the five good GCSEs measure used here, while the former source also uses outdated 1992 data and the latter source only analyses property crime. However, as described in the following section, a link can be made between early HLE at age 3 and later crime via an SDQ measure at age seven.

4.3 HLE scores at age three, SDQ at age seven and later outcomes

One of the weaknesses of the previous section is that the association between service use and early HLE at age three could only be linked to a relatively small number of later outcomes including educational attainment at age 16, adult depression and the likelihood of SEN during childhood. In this section, a broader range of potential longer term effects are explored using evidence on the link between the early HLE at age three and an SDQ anti-social behaviour score at age seven from Sammons et al (2004). This is used in combination with the evidence used earlier from Carniero et al (2011) to link social development at age seven to a range of lifetime outcomes at age 42 and with the assumption that a one standard deviation change in the SDQ anti-social behaviour score is equal to a one standard deviation change in the BSAG scale.

Table 23 presents the associations between early HLE at age three and anti-social behaviour at age seven using the approach of table 20 to convert the associations between service use and a continuous measure of early HLE into a discrete measure of five categories which can be matched to the findings in Sammons et al (2004).³⁷

Table 23: Service use and BSAG score at age seven via early HLE at age three

Service type	Change in BSAG score at age seven (in standard deviations)	As a proportion of association for baby health via age 3 SDQ conduct problems (- 0.120)
Baby health (any time)	- 0.013	0.108
Child play (since wave 1)	- 0.006	0.048
Parent support (any time)	- 0.005	0.044
Parent support (since wave 1)	- 0.008	0.065
Specialist parent/family support (any time)	- 0.011	0.095
Specialist parent/family support (since wave 1)	- 0.011	0.088

Sources: ECCE strand 5

Using the links via early HLE at age three, use of baby health services (any time) is associated with a 0.013 size effect (standard deviation) on the BSAG measure of social

³⁷ In places of the difference in the proportion attaining five good GCSEs in table 20, the change in SDQ anti-social behaviour at age seven is applied to each proportion of families in a higher early HLE category. These proportions (in standard deviations) are 0.030 for the differences between categories 0-13 and 14-19 (unexpectedly higher in the higher HLE category) and - 0.100, - 0.024 and - 0.085 for the remaining three differences between categories (size effects from table 3.3 in Sammons et al (2004)).

development at age seven. This is much smaller than the association via SDQ conduct problems at age three: the final column of the table shows that the link via early HLE at age three is around one tenth the size of the association via SDQ conduct problems at age three (the size of latter being -0.120). Similarly, the final column of table 23 shows that the associations for all the services are much smaller (between only 4 and 11 percent) than the link for baby health services via SDQ conduct problems at age three.

When these associations are combined with the links to later outcomes using the evidence from Carniero et al (2011), the associated effects on later outcomes are extremely small (and cannot be discerned at less than 5 decimal places). For this reason, the links to later outcomes (and associated monetary values in the following chapter) via this path are not presented separately, but are considered as a group when the monetised values of the benefits are brought together in chapter 6.

4.4 Caveats on the links

Three caveats on this model of links constructed from the available evidence should be noted. First, the links involve a considerable degree of approximation in drawing on related but not necessarily completely appropriate evidence. In particular, many of the estimated links are drawn from samples more representative of the general population than the ECCE sample drawn from families registered with Children's Centres. Second, the key link between early HLE at age three and later educational attainment is drawn from evidence from a single study which uses the relatively small EPPSE sample which over-sampled children using particular types of early education.

Third, links to later lifetime outcomes have only been included where there is existing evidence of a link from the measures used in ECCE to later outcomes for which a monetary value can be estimated. The model may understate the value of benefits for the following reasons:

- The link between SDQ conduct problems and physical health at age 42 is not included as the definitions of "poor" and "fair" over "good" and "excellent" cannot be linked to monetary valuations. The link between higher educational attainment and physical health is also not included because suitable sources with quantifiable links could not be identified.
- The link between early HLE at age three and later childhood outcomes through reduced conduct problems at age seven may be weaker than more direct links between early HLE at age three and use of family services during later childhood. This weaker link may lead to an understatement of the value of the subsequent benefits.
- Links may exist between SDQ conduct problems and early HLE at age three and subsequent measures of well-being. Evidence of such links has not been identified

with the exception of a link between higher early HLE and greater school enjoyment and higher “academic self-concept” at age 16 (Sammons et al (2014b)), but this has not been included because no monetary value could be linked to this outcome.

- Intergenerational links may exist between improved adult outcomes, better parenting skills and improved outcomes for their children, but evidence for these has not been identified.

The possible magnitude of the monetary value of these omissions is assessed in section 6.2 after the evidence on monetisation has been presented.

4.5 Summary

This chapter has examined the existing literature to identify sources of evidence to link the scenarios of the potential impacts of Children’s Centres on SDQ conduct problems score and early HLE at age three to later lifetime outcomes.

Existing evidence on the association between SDQ conduct problems at age three and later outcomes suggests that usage of baby health services at Children’s Centres is associated with:

- a lower probability of truancy by age 16 of 0.26 percentage points
- a lower probability of exclusion from school by age 16 of 0.02 percentage points
- a lower probability of having dealings with the police or courts by age 16 of 0.19 percentage points
- a lower probability of smoking more than 40 cigarettes a day at age 16 of 0.16 percentage points
- a lower probability of depression at age 42 of 0.23 percentage points
- a lower probability of having mental health problems at age 42 of 0.19 percentage points
- a lower probability of having dealings with the police or courts between age 33 and 42 of 0.14 percentage points
- a higher probability of being in work at age 42 of 0.25 percentage points
- a higher hourly wage at age 42 of 0.3 percent

Existing evidence on the association between better early HLE at age three and later outcomes suggests that:

- Use of baby health services is associated with a higher likelihood of attaining at least five good GCSEs of 2.7 percentage points; a lower likelihood of adult depression of 0.12 percentage points ; and a lower likelihood of the child having SEN at age 10 of 0.3 percentage points.
- Use of child play services is associated with a higher likelihood of attaining at least five good GCSEs of 1.4 percentage points; a lower likelihood of adult depression of 0.06 percentage points ; and a lower likelihood of the child having SEN at age 10 of 0.1 percentage points.
- Use of parent support services is associated with a higher likelihood of attaining at least five good GCSEs of 1.3 percentage points; a lower likelihood of adult depression of 0.06 percentage points; and a lower likelihood of the child having SEN at age 10 of 0.2 percentage points (or 2.3, 0.11 and 0.4 percentage points respectively if only used since the child was aged one year).
- Use of specialist parent/family support services is associated with a higher likelihood of attaining at least five good GCSEs of 2.6 percentage points; a lower likelihood of adult depression of 0.12 percentage points; and a lower likelihood of the child having SEN at age 10 of 0.3 percentage points (or 2.1, 0.1 and 0.2 percentage points respectively if only used since the child was aged one year).

In addition, evidence on the link between early HLE at age three and anti-social behaviour at age seven suggests that use of child play, parent support and specialist parent/family support services are also associated with lower rates of truancy and exclusion, smoking and youth and adult crime and with improved mental and physical health, although the associations are extremely small.

The following caveats on the model of links constructed from the available evidence should be noted:

- There is a considerable degree of approximation in the links using evidence drawn from related but not necessarily completely appropriate evidence.
- A key link between early HLE at age three and educational attainment is based on a single source of evidence using a relatively small sample.
- Some benefits may not be counted because suitable evidence on the links to later outcomes is not available or because the monetary value of the final outcomes cannot be estimated

5. The monetisation of benefits

This chapter presents the methodology and estimated values for the monetisation of the benefits from the scenarios of the potential impacts of Children's Centres. Following the evidence on the potential impacts at age three (presented in chapter three) and the links to later lifetime outcomes (presented in chapter four), it presents estimates of the monetised values for the benefits of lower truancy and school exclusion, special educational needs, crime, smoking, depression and mental health problems and of higher educational attainment, work participation and wages. In each case, the values of the benefits are divided between those accruing to individuals (those who used the services), to the government (through increased revenues or reduced spending on services other than Children's Centres) and to society more broadly (other individuals who did not use the services).

5.1 Discounting, indexation and double-counting

In line with the usual approach for value for money analysis, the value of all benefits are discounted back to the time of impact (when the child is aged three) to reflect the fact that benefits occurring in the future are of less value. In line with HM Treasury guidance, a discount rate of 3.5 percent is applied for the first 30 years after the intervention and 3 percent thereafter for up to 70 years following the intervention (HM Treasury (2003)). In addition, all historical prices are indexed to 2014 using HM Treasury GDP deflators (HM Treasury (2015)).

When estimating the monetary value of outcomes, it is important not to double-count across different links to the final outcome being monetised. For example, chapter 4 has identified links between outcomes at age three and both the adult wage level and adult crime, but valuations of the benefits of lower crime typically include associated higher earnings. As the value of higher earnings is counted directly, it must be excluded from the value of lower crime. Indeed, the main adjustment required in this chapter to ensure the avoidance of double-counting is to exclude the value any earnings benefits from links with several outcomes. Further steps are taken to avoid double-counting in chapter 6 with the combining of all benefits.

5.2 Reduced school expulsion and truancy

In section 4.1, it was estimated that use of baby health services at Children's Centre is associated with a lower probability of school exclusion of 0.02 percentage points and a lower probability of truancy of 0.26 percentage points.

Brookes et al (2007) use a broad review of the existing literature to estimate the costs of school exclusion and truancy (the report is also used in the New Economy Unit Cost Database (New Economy (2016))). Their estimates take into account all present and

future costs up to age 65 for a child who is aged six in 2005, but the figures presented here are discounted back to age three and indexed to 2014 prices.

The study estimates that average costs of exclusion include £22,263 to the education system up to age 16 (£748 in administration costs plus £21,515 in alternative education costs), £1,128 annual cost between the ages of 10 to 28 for health services (including hospital inpatient and outpatient services, psychiatric treatment and abortions and miscarriages) and £6,666 for associated foster and residential care costs (£3,504 for social services and £3,162 for the care). Exclusion is also related to costs of lower educational attainment and higher crime rates, but these costs are counted in more direct links to the use of baby health services and are excluded here to avoid the double counting. Taken together, the discounted cost of exclusion is £30,058. Combining this with the reduction in the probability of exclusion of 0.02 percentage points associated with the use of baby health services generates an estimated associated value of £7.19 which accrues to the Government.

Brookes et al (2007) undertake a similar analysis for the cost of persistent truancy, defined as missing at least five weeks of school a year. In the absence of other evidence, it is assumed that the likelihood of being a persistent truant at age 16 will have a similar association with baby health services as any truancy or suspension.³⁸ The average cost to local education authorities' welfare services of pursuing persistent truants is estimated to be £782 (other costs in the report including lost earnings, higher unemployment and higher crime are not included here to avoid double-counting as these particular costs are contained directly in other outcomes of this analysis). Combining this with the reduction in the probability of truancy of 0.26 percentage points associated with the use of baby health services generates an estimated associated benefit of £2.06 which accrues to the Government.

5.3 Reduced Special Educational Needs (SEN)

In section 4.2, it was estimated that use of Children's Centre services is associated with a reduction in the proportion of children at age ten with SEN of between 0.1 and 0.4 percentage points across different types of services.

A national total for Government expenditure on SEN can be compiled using section 251 outturn data from local authorities' statements about planned and actual expenditure on education and children's social care (DfE (2014b)). The relevant items of expenditure in 2014 for SEN are shown in table 24. Given that were there were 1.5 million pupils with SEN in England in 2014, including those both with and without a statement of SEN (DfE (2014a)), this implies an average annual cost per child with SEN of £887. Assuming that

³⁸ This may overstate the cost, but any overstatement will have minor impact on the final conclusions as the overall value is very low.

this average annual cost is applied to each year when the child is of compulsory school age (5 to 16), the lifetime present value of the costs at age three is £8,286. Multiplying this by the reduction in the likelihood of having SEN associated with the use of each type of Children’s Centre service generates the estimated lifetime present values shown in table 25.

Table 24: Local authority expenditure on SEN

£ millions	Early Years	Prim. school	Second. school	Special schools	AP / PRUs	Post school	Total
Support services	£54	£195	£123	£69	£4	£3	£447
Support for inclusion	£10	£77	£46	£29	£3	£1	£166
Direct payments	£0.02	£0.1	£0.04	£0.4	£0	£2	£2
Transport	£0.04	£3	£2	£17	£1	£0.2	£23
Home/school transport	£4	£85	£85	£381	£6	£20	£580
Administration	-	-	-	-	-	-	£107
Total							£1,325

Source: Table S251 (DfE, 2014b)

Notes: Administration includes assessment, co-ordination and monitoring costs.

Table 25: Monetised value of lower SEN

Service type	Total value (to the Government)
Baby health (any time)	£24.71
Child play (since wave 1)	£12.18
Parent support (any time)	£17.12
Parent support (since wave 1)	£32.35
Specialist parent/family support (any time)	£26.66
Specialist parent/family support (since wave 1)	£17.31

5.4 Reduced crime

In section 4.1, it was estimated that use of baby health services at Children’s Centres is associated with a lower probability of having ever been in trouble with the police or ever been in court at age 16 (by 0.19 percentage points) and between the ages of 33 and 42 (by 0.14 percentage points). In monetising the value of these benefits, it is assumed that “in trouble with the police or been in court” over the period is analogous to committing

one crime over the period. On the one hand, this may overestimate the cost as dealings with the police may not result in a crime being committed, but, on the other hand, there may also be some underestimation due the assumption of a single crime when multiple ones may have been committed.

Estimates of the average cost of crime are drawn from the New Economy Unit Cost Database (New Economy (2016)) and indexed to 2014/15 prices³⁹. This source estimates that the average economic cost (lower earnings or growth in the local economy) is £724, the fiscal cost (costs or savings to the public sector) is £652 and the social cost (the wider losses to society) is £1,765.⁴⁰ As earnings benefits are directly included elsewhere, the economic value has been excluded here to avoid double-counting. Using these estimates, the fiscal and social value of the reduction in crime between the ages of 33 and 42 associated with the use of baby health services is £3.47 or £0.35 per year. Summing the annual benefit across the adult life from age 18 until age 42 and discounting back to age three generates a total associated value of £3.71 (with £1 accruing to the Government and £2.71 to society).

Estimates from the same source indicate that the average fiscal cost of a first time entrant under 18 to the Criminal Justice System in the first year following an offence is £3,559 (indexed to 2014/15 prices).⁴¹ No economic or social costs are presented for youth crime. Using this estimate, the value of a reduction in youth crime up to age 16 associated with the use of baby health services is £6.82 or £1.14 per year if it is assumed that the total amount covers the period from age 11. Discounting back to age three, this implies a total associated value of £4.76 which accrues to the Government.

5.5 Reduced smoking

In section 4.1, it was estimated that use of baby health services at Children's Centre is associated with a lower probability (by 0.16 percentage point) of smoking more than 40 cigarettes a day at age 16.

An analysis of the economics of smoking is presented by Action on Smoking and Health (ASH (2014)). A breakdown of the estimated annual costs to individuals, the Government and society are presented in table 26.⁴² It is estimated that a 20-a-day smoker of premium cigarette brand spends £2,900 a year on smoking, although the report notes that the costs to the individual due to lost productivity and early retirement due to ill-

³⁹ Earlier estimates on the cost of crime are also available in Dubourg et al (2005) and Brand and Price (2000) but these have been updated by those on the New Economy Unit Cost Database.

⁴⁰ Fiscal costs of crime include such items as the cost of victim services, health services and the criminal justice system. Social costs of crime include such items as defensive or insurance expenditure, physical and emotional costs to individuals, loss of property and lost output (Dubourg et al (2015)).

⁴¹ Earlier estimates of the cost of youth crime are also available in Prince's Trust (2010).

⁴² This does not include the economic benefits due to the manufacture and sale of tobacco products.

health related to smoking have not been quantified. In spite of the large costs to the Government in social and health care, the revenue from tobacco taxation means that smoking has a large net benefit to the Government which approximately balances the cost to society. The final row of the table presents the annual cost per smoker, based on an estimate of approximately 8.8 million smokers in the England.⁴³

Table 26: Costs of smoking

	Private (individuals)	Government	Society
Financial cost to individual	£2,900		
Social care costs of older smokers		£1.1 billion	
NHS cost of treating diseases		£2 billion	
Mass media health campaigns		£0.008 billion	
Revenue from tobacco taxation		<i>minus</i> £12.5 billion	
Lost productivity from premature deaths			£3 billion
Cost to businesses of smoking breaks			£5 billion
Smoking-related sick days			£1 billion
Fires caused by smokers' materials			£0.4 billion
Total	£2,900	<i>minus</i> £9.4 billion	£9.4 billion
Cost per smoker	£2,900	<i>minus</i> £1,064	£1,067

Sources: ASH, 2014

Notes: The costs have been indexed to 2014 where needed. Cost per smoker differs in the last two columns due to rounding in the £9.4 billion totals in the row above.

Assuming that an individual who smokes at age 16 will continue to smoke until they are age 50 and using the estimate that almost 40 percent of smokers start smoking regularly before the age of 16 (ASH, 2015), it can be estimated that the lower likelihood of smoking at age 16 of 0.16 percentage points associated with the use of baby health services has a present discounted value of £25.54. This is divided between a private benefit of £25.57 to individuals, a benefit to society of £9.40 and a net cost to the Government of £9.37.

⁴³ In 2012, 20 percent of adults (age 16 and over) in England were reported to be smokers (HSCIC, 2014). Applying this to ONS population estimates of the number of 16-90 year olds in England (ONS, 2015a) indicates that there are approximately 8.8 million smokers in England.

5.6 Reduced depression and mental health problems

In section 4.1, it was estimated that use of baby health services at Children’s Centre is associated with a lower probability of mental health problems (by 0.19 percentage points) via an improved SDQ conduct problems score at age three. In section 4.2, it was also estimated that use of Children’s Centre services are associated with a reduction in the likelihood of depression of between 0.06 and 0.12 percentage points across different types of services via improved HLE at age three.

Table 27: Costs of mental health disorders

Disorder	Number of people (million)	Service costs (£ billion)	Lost earnings (£ billion)	Total costs (£ billion)
Depression	1.24	£1.95	£6.75	£8.69
Anxiety disorders	2.28	£1.44	£8.93	£10.36
Schizophrenic disorders	0.21	£2.58	£2.06	£4.65
Bipolar disorder/ related conditions	1.14	£1.90	£4.14	£6.04
Eating disorders	0.12	£0.02	£0.04	£0.06
Personality disorder	2.47	£0.81	£8.35	£9.16
Child/adolescent disorders	0.61	£0.16	£0.00	£0.16
Dementia	0.58	£17.21	£0.00	£17.21
Total	8.65	£26.08	£30.25	£56.34

Sources: McCrone et al, 2008

Notes: The costs have been indexed from 2007 to 2014.

Table 27 presents estimates from the King’s Fund (McCrone et al (2008)) on the costs of mental health disorders.⁴⁴ To avoid the double-counting of higher earnings associated with the use of services, only the service costs of mental health disorders are counted here which include spending by health, social care and other agencies. As the outcome measure is mental health problems at age 42, it is assumed that this reflects problems between the ages of 18 and 42 and service costs due to child and adolescent disorders and dementia are excluded from the cost calculations. This may underestimate benefits as it does not consider the early-onset of dementia or the use of child and adolescent

⁴⁴ Estimates on the costs of mental health problems are also presented in the Sainsbury Centre for Mental Health (2003) and Centre for Mental Health (2010), but the former contains dated estimates and the latter does not include information on the prevalence and costs for different conditions which is required here.

mental health services when transitioning into adulthood. The average annual service cost of all other mental health disorders is £1,167 per person. Summing this across the ages of 18 to 42, discounting back to age three and multiplying by the reduced likelihood of mental health disorders associated with use of baby health services (0.19 percentage points) generates a lifetime present value of the associated benefit of £23.86 which accrues to the Government.

Table 27 shows that the average annual service cost of depression per person is £1,570. Summing this across the ages of 18 to 42 and discounting back to age three produces the lifetime cost up to age 42. This is multiplied by the reduced likelihoods of depression associated with the use of different types of services via improved early HLE at age three to produce the lifetime present values of the associated benefits presented in table 28. Again, all of these benefits accrue to the Government.

Table 28: Monetised value of lower depression

Service group	Benefits to the Government
Baby health (any time)	£20.68
Child play (since wave 1)	£10.17
Parent support (any time)	£10.00
Parent support (since wave 1)	£18.08
Specialist parent/family support (any time)	£20.47
Specialist parent/family support (since wave 1)	£16.21

5.7 Higher educational attainment

In section 4.2, it was estimated that use of Children’s Centre services is associated with a higher proportion of children attaining five good GCSEs of between 1.3 and 2.7 percentage points across different types of services.

There is a body of evidence linking educational attainment to higher lifetime earnings which could be used to estimate a monetary value for the benefits associated with the use of Children’s Centres services. The preferred source is Cattán, Crawford and Dearden (2014) because it provides some of the most up-to-date estimates of the returns to qualifications (superseding, for example, Conlon and Patrignani (2011) and Greenwood et al (2007)) and also uses educational qualifications which match with the links used here. The main alternative would be a combination of Hayward, Hunt and Lord (2014) and Walker and Zhu (2013), which provide equally robust and recent evidence of the returns to qualifications, but which require a larger number of assumptions to adjust the estimates of the returns to match the links used here. A comparison of appropriately adjusted estimates indicates that the sources would generate reasonably similar magnitudes of benefits. Further details on this comparison are provided in Annex B.

Cattan et al (2014) use data from the British Household Panel Survey (BHPS) and the Labour Force Survey (LFS) to develop a model of earnings which allows for higher levels of educational attainment both to increase earnings when in work and to raise the probability of being in work. Their findings indicate that the average lifetime gain in gross earnings from five good GCSEs (discounted to age four) is £248,423 for men and £180,232 for women.⁴⁵ Taking the average for men and women, discounting back to age three and indexing to 2014 prices generates an average difference in gross lifetime earnings of £210,754.

In addition to the gross earnings, there are also benefits from higher employer National Insurance (NI) contributions. The average rate of NI contributions paid by employers for workers aged 18 to 64 is estimated to be 10 percent (calculated by applying the rates and personal allowances applicable in 2014 to the mean annual pay in each age group (HMRC 2015a, 2015b)). Adding this to the gross return generates a total return of £231,353. The same sources also provide an estimate of 15 percent for the average combined rate of Income Tax and NI contributions paid by employees which can be used to divide the benefit in gross earnings between that accruing to individuals and that accruing to the Government. Another potential saving to the Government is reduced welfare payments as a result a lower likelihood of being out of work, but the approach presented in Cattan et al (2014) does not present this probability and the value of reduced welfare payments cannot be derived.

Table 29: Monetised value of higher GCSE attainment

Service group	Total value	Benefits to the individual	Benefits to Government
Baby health (any time)	£6,111	£4,741	£1,370
Child play (since wave 1)	£3,005	£2,331	£674
Parent support (any time)	£2,956	£2,293	£663
Parent support (since wave 1)	£5,342	£4,144	£1,197
Specialist parent/family support (any time)	£6,048	£4,692	£1,356
Specialist parent/family support (since wave 1)	£4,790	£3,716	£1,074

⁴⁵ Drawn from table 2.2 in Cattan et al (2014) with the average gross lifetime earnings for the three higher qualification levels weighted by the current distribution in the population aged 23-24 from ONS (2014b). This captures not just the return to moving up one qualification level (the marginal return) but also assumes that further qualifications will be obtained with the same likelihood as for anyone currently achieving five good GCSEs.

Applying the total average return (£231,353) to the change in the proportions of those with five good GCSEs associated with use of different types of services provides an estimate of the total value of the association for each service type. This is presented in the first column in table 29, with the remaining two columns showing how the benefit is divided between the individual and the Government.

5.8 Higher work participation and hourly wage

In section 4.1, it was estimated that use of baby health services at Children’s Centre is associated with a higher probability of being in work at age 42 of 0.25 percentage points and a higher hourly gross wage at age 42 of 0.3 percent.

Assuming these changes at age 42 reflect the average change over the working life from ages 18 to 64, mean annual gross earnings and employment rates across this working life (ONS (2014a, 2015)) can be used to estimate the total increase in lifetime gross earnings associated with the use of baby health services. These statistics are shown in table 30, together the mean expected gross annual earnings calculated as the mean earnings for workers multiplied by the employment rate. The final column presents the change in the expected mean earnings with an increase in the hourly wage of 0.3 percent and an increase in the probability of working of 0.25 percentage points.

Table 30: Lifetime value of higher work participation and hourly wage

Age band	Mean gross annual earnings (2014)	Employment rate (Apr–June 2014)	Mean expected gross annual earnings	Change in mean expected earnings associated with use of baby services
18-24	£14,263	60%	£8,579	£62
25-34	£24,807	81%	£19,987	£122
35-49	£30,646	83%	£25,514	£154
50-64	£27,146	68%	£18,585	£124

Source: ECCE strand 5

Discounting the amounts for each year back to age three and summing over all the years produces a total average increase of £1,847 in lifetime gross earnings. As with the change in gross earnings in the previous section, 10 percent is added to the gross number for the benefits to Employer NI to obtain a total value of £2,028, of which £1,573 accrues to the individual and £455 accrues to the Government in Income Tax and NI contributions.

The higher employment rate also has benefits in reduced spending on welfare benefits. Using the 2014/15 weekly Income Support (and JSA Income-based) amounts of £57.35 for those under age 25 and £72.40 for those aged over 25 (Department for Work and

Pensions (2014)), it can be calculated that a 0.25 percentage point increase in the employment rate between the ages of 18 and 64 generates an average lifetime saving in welfare payments (discounted to age three) of £141.23.

5.9 Summary

In this chapter, a range of evidence has been used to place monetary values on the immediate and longer term changes in outcomes associated with the scenarios of impacts for the use of Children's Centre services.

The present value of the benefits of the reduction in SDQ conduct problems at age three associated with use of baby health services is estimated to be £2,236. This is can be disaggregated into:

- £2 for reduced truancy and £7 for reduced exclusion
- £5 for reduced youth crime and £4 for reduced adult crime
- £26 for reduced smoking
- £24 for reduced mental health problems
- £2,169 for increased lifetime earnings and reduced spending on welfare benefits

The present value of the benefits of the improvement in early HLE at age three associated with use of Children's Centre services is estimated to be:

- £6,111 for increased lifetime earnings; £21 for a lower probability of depression; and £26 for a lower probability of a child having SEN for baby health services
- £3,005 for increased lifetime earnings; £10 for a lower probability of depression; and £12 for a lower probability of a child having SEN for child play services
- £2,956 for increased lifetime earnings; £10 for a lower probability of depression; and £17 for a lower probability of a child having SEN for parent support services (and £5,342, £18 and £32 respectively for usage since the child was aged one year)
- £6,048 for increased lifetime earnings; £20 for a lower probability of depression; and £27 for a lower probability of a child having SEN for specialist family/parent support services (and £4,790, £16 and £17 respectively for usage since the child was aged one year)

6. Estimates of the value for money of Children's Centres

This chapter brings together estimates of the costs of delivering services in Children's Centres from chapter three with the estimated valuations of the benefits under the scenarios of potential impacts from chapter five. It begins with an analysis of the value of the benefits before presenting the value for money estimates of cost effectiveness and cost benefit. The precision of the estimates and question of constructing confidence intervals are then discussed.

6.1 Drivers of the value of benefits

Figures 1 through 4 map out the evidence on the benefits of baby health, child play, parent support and specialist parent/family support services. For parent support and specialist parent/family services, the timeframe since wave 1 is presented to represent both cases (as this timeframe will be shown to have the highest cost benefit ratios). In figures 2 to 4, because the changes in the top path (the links through the top orange box) are so small, some have been combined and the double-counting with outcomes in the lower path for earnings and mental health outcomes removed.

Figure 1 highlights three key points about the drivers of the value of the benefits. First, the value is very sensitive to the strength of the relationship between service use and later outcomes. The initial link between use of baby health services and reduced SDQ conduct problems at age three is not strong and the lasting effect to age seven is only partial (a correlation of 0.64 rather than a perfect 1). Although there are many links to later lifetime outcomes from the conduct problems at age seven, the relationships are generally very weak with changes in the proportions with poorer outcomes ranging from 2 in 10,000 children for exclusion to almost 3 in 1,000 children for truancy. Combined with fairly low monetary values for improvements in these outcomes, the values of most of the benefits are low (typically below £25). In contrast, the association between service use and educational attainment via early HLE at age three is much stronger: use of the service is associated with an increase of almost 3 in 100 children attaining five good GCSEs. Consequently, the value of the return to earnings is much higher through early HLE in the lower path than through SDQ conduct problems in the higher path.

Second, most value is derived from higher lifetime earnings rather than reduced use of Government services. Even a weak link with a small proportionate change in labour market outcomes can have a large absolute effect because (a) the magnitude of earnings is generally higher than most service costs per individual and (b) virtually everyone has earnings while many fewer individuals use the kind of specialised Government services which potentially benefit from improvements in early child outcomes. For example, a very small rise in the average hourly wage can accumulate to a large sum over the lifetime for

many individuals. This highlights that any intervention which positively impacts on labour market outcomes is likely to offer greater value for money.

Third, most of the benefits accrue to individuals through higher earnings (net of Income Tax and NI). The main value accruing to the Government is in the form of increased Income Tax and NI receipts and, to a lesser degree, in reduced welfare payments. The value of the reduced costs of services is relatively small even though a broad range of services have been included.

Figure 1 also highlights potential issues of double-counting in the value of the benefits when there are multiple links to the same outcomes. In this case, there are two instances of potential double-counting:

- Higher earnings are included through both the SDQ conduct problems path and through the early HLE at age three path (noting that any value in higher earnings has been removed from the valuations of other outcomes in chapter 5).
- The benefits of reduced depression are included explicitly in the early HLE path and are also included in the benefits of reduced mental health in the SDQ conduct problems path.

Unless it can be assumed that the reductions in SDQ conduct problems and increase in early HLE at age three are completely independent (for example, if completely different sets of families experienced one or the other), the total benefit for the use of baby health services should exclude one of the double-counted amounts. But it is not clear which should be excluded. One criterion could be to exclude the lowest (highest) amount to generate the most optimistic (pessimistic) estimate. It might also be possible to use some measure of the degree of correlation between the two improved outcomes associated with service use in order to partially discount the double-counting. In the absence of information on this degree of correlation, the cost benefit estimates below simply present the benefits from the two alternative branches (via SDQ conduct problems and via early HLE). Given that a large proportion of the value of the benefit is derived from higher earnings - which are counted in both alternatives - this presents the approximate range of value for money estimates if the two outcomes were correlated (i.e. assuming that the improvements in behaviour measured by the SDQ conduct problems and in early HLE at age three are closely related).⁴⁶

⁴⁶ This is the more cautious approach: if the two outcomes were completely unrelated, the total value of the benefits would approximately equal the sum of the two alternative valuations.

Figure 1: Mapping the benefits of baby health services

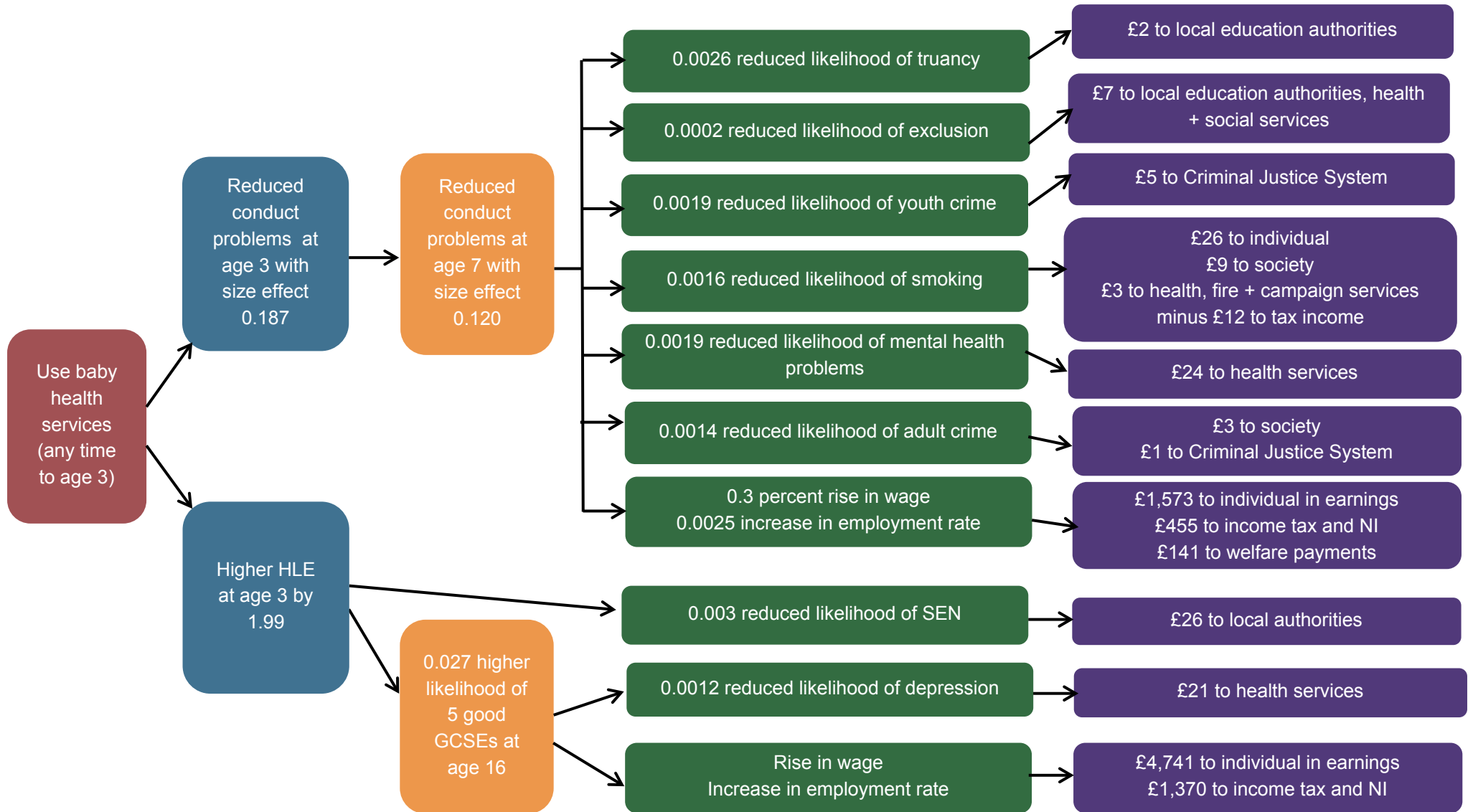


Figure 2: Mapping the benefits of child play services

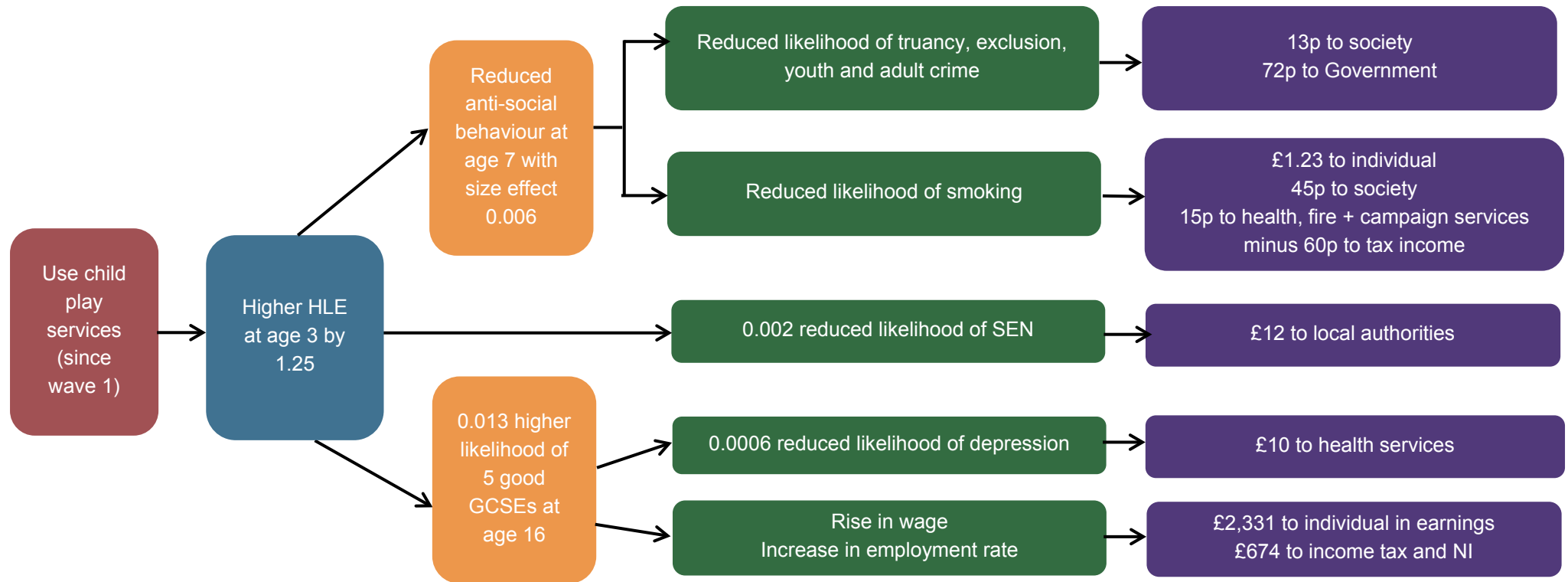


Figure 3: Mapping the benefits of parent support services

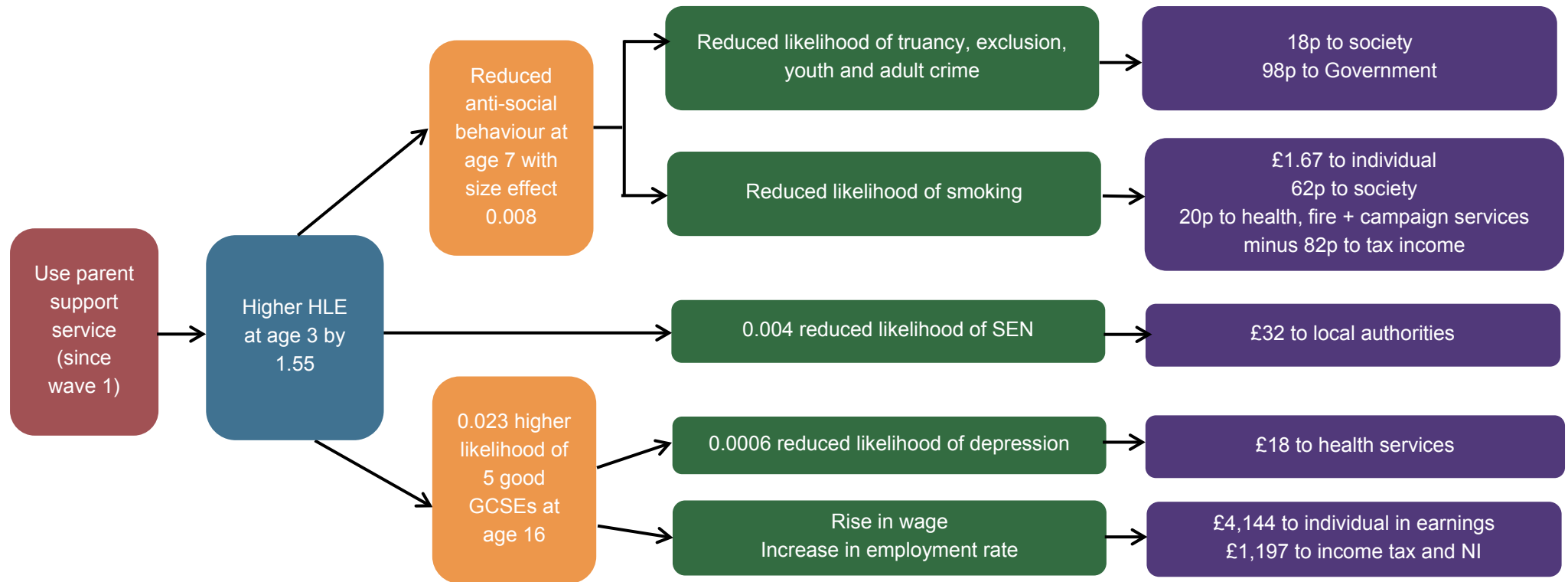
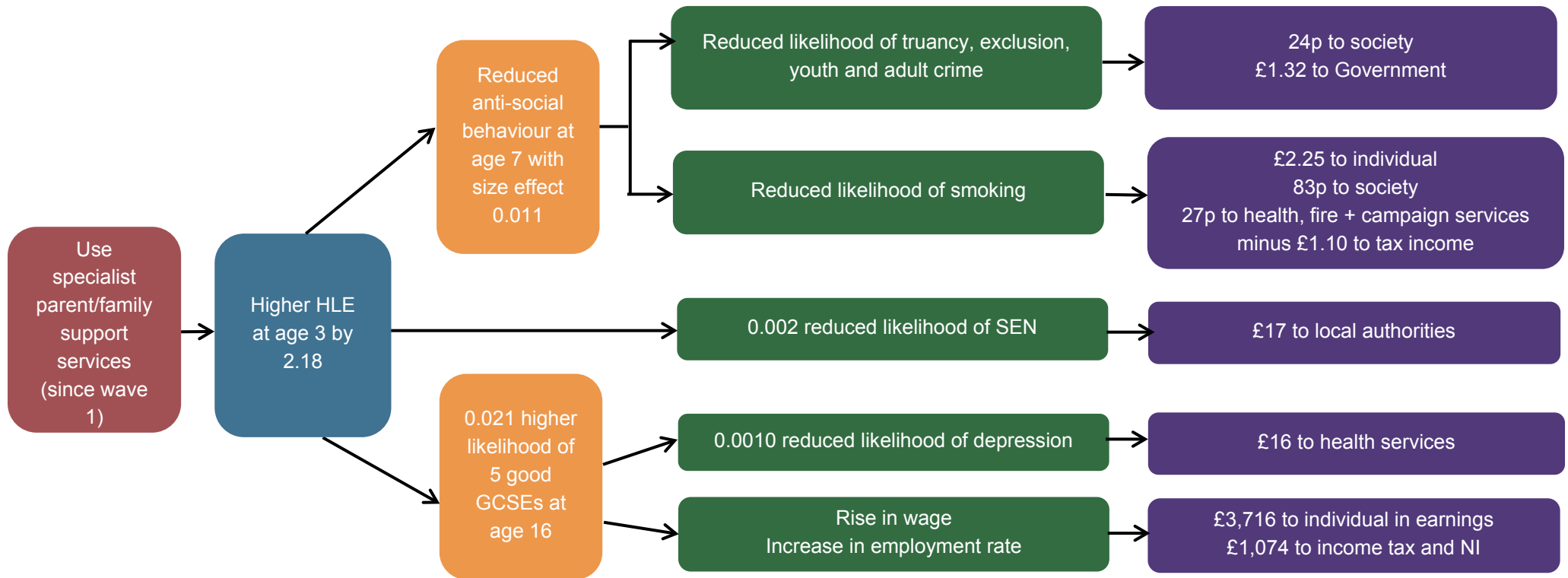


Figure 4: Mapping the benefits of specialist parent/family support services



Figures 2 through 4 present the mapping for the three service types whose use is associated only with improvements in early HLE at age three. These figures reiterate the key points in figure 1: the main value of benefits is driven by higher earnings and most of the value accrues to private individuals rather than the Government. In addition, they provide two illustrations of how the value of benefits can be sensitive to the evidence that is available. First, the links to outcomes in the top half of the figures are very weak, driven by the very weak link from HLE at age three to anti-social behaviour at age seven (as shown by the small effect sizes relative to the analogous effect size in figure 1). It is possible that *if* there were evidence on the links directly between early HLE at age three and these childhood and later outcomes, the benefits *might* have greater value. Second, comparing figures 2 and 3 shows that the similar impact on the average value of early HLE at age 3 (1.25 and 1.55) can be associated with a larger differences in later educational attainment (0.013 and 0.023) because of the conversion to discrete categories of early HLE. A link using a continuous measure might have resulted in more similar sizes of change in educational attainment and values of benefits for the two types of services.

6.2 Undercounting in the value of benefits

In chapter 4, it was noted that some benefits may not have been counted in the value for money model. The magnitude of the potential undercounting of benefits from these sources can be assessed:

- Noting that the earnings benefit is already counted directly, the value of improved physical health is likely to be of a similar magnitude to that of the reduced service costs for improved mental health (£24 in figure 1). In addition, some of the value of improved physical health has been captured in the benefits of reduced smoking. Overall, the value of the omitted benefits is unlikely to be large.
- Stronger direct links between early HLE at age three and the later outcomes of reduced truancy, exclusion, youth and adult crime and smoking may increase the value of these benefits. However, the estimated values are so small that even a 10-fold increase in the strength of the link would add value of less than £100 in all cases.
- The value of the effects on future generations of children would need to be discounted by at least twenty years and this alone would half the value of any benefits. Adding links on inter-generational outcomes would be likely to further substantially reduce the value of any benefits.
- It is not possible to assess the likely magnitude of the value of potential associated improvements in measures of well-being due to the absence of links to any established measure. One point to note is that these benefits would accrue to individuals rather than to the Government.

Overall, it is likely that the main source of under-counting in the benefits would be in enhanced well-being which would accrue to individuals rather than the Government.

6.3 Cost effectiveness

Cost effectiveness compares the costs of achieving a change in a particular outcome through different interventions (in contrast to the comparison of financial returns to different interventions in cost benefit measures considered in the following section). It has the advantage that it can show how money should be spent to achieve the greatest impact on a particular outcome, but the drawback that it does not consider the value of all potential impacts.

Table 31 presents the cost effectiveness of the different types of services in raising the early HLE score. The final column shows the average rise in early HLE for each £1,000 spent for each service type. The analogous measure for reducing SDQ conduct scores at age three can only be calculated for one service type and is therefore not useful.

Table 31: Cost effectiveness of services to increase early HLE at age three

Service group	Average cost of delivery per user	Associated rise in early HLE	Average rise in early HLE per £1,000 spent
Baby health (any time)	£4,468	1.99	0.45
Child play (since wave 1)	£1,669	1.25	0.75
Parent support (any time)	£958	0.92	0.96
Parent support (since wave 1)	£831	1.55	1.86
Specialist parent/family support (any time)	£1,685	1.67	0.99
Specialist parent/family support (since wave 1)	£746	2.18	2.92

Notes: All figures are discounted present values in 2014 prices

If the objective were to achieve an increase in the average early HLE score, supporting specialist family/parent support services or more general parent support services after the child is aged one potentially offers the greatest increase for each pound spent. These services are associated with rises in the early HLE score by 2.92 and 1.86 for each £1,000 spent respectively. Baby health and child play services have far lower cost effectiveness, raising the average early HLE score by 0.45 and 0.75 respectively. Given that the latter two services have other objectives (in addition to helping to improve the early HLE) this finding may not be surprising.

6.4 Cost benefit

A summary of the costs and monetised benefits of the services associated with the scenarios of improved outcomes is presented in table 32. For baby health services, the benefits via a reduction in SDQ conduct problems score and via an improved early HLE have been presented separately, highlighting how the value for money estimates can differ dependent upon which outcomes are considered in an evaluation of impact.

The services associated with higher early HLE at age three have a positive net benefit with the average benefit per user exceeding the cost. Only when baby health services are assessed using only the SDQ conduct problems impact is there a negative net benefit. Indeed, the evidence suggests, using the hypothesised scenarios for baby health services, that impacts on early HLE have a greater value of benefits than impacts on child development as measured in SDQ conduct problems. But this finding should be treated with some caution because the estimation of impacts is not completely comparable as baseline outcome controls were included for the HLE measure and not for the SDQ measure. Interestingly, the parent services have a higher benefit to cost ratio than the more child based ones, with a ratio of over six for parent services used between the target child being aged one and three years. These highest returns are driven more by a lower cost per user than a higher benefit per user.

Table 32: Summary of cost benefit estimates

Service group	Average cost of delivery per user	Average benefit per user	Net benefit	Benefit to cost ratio
Baby health (any time) (via SDQ conduct problems)	£4,468	£2,236	- £2,232	0.50
Baby health (any time) (via early HLE)	£4,468	£6,162	£1,694	1.38
Child play (since wave 1)	£1,669	£3,029	£1,360	1.81
Parent support (any time)	£958	£2,985	£2,027	3.12
Parent support (since wave 1)	£831	£5,395	£4,564	6.49
Specialist parent/family support (any time)	£1,685	£6,099	£4,414	3.62
Specialist parent/family support (since wave 1)	£746	£4,827	£4,081	6.47

Notes: All figures are discounted present values in 2014 prices

Tables 33 and 34 present the benefits disaggregated by source and the recipient. Two themes noted from the figures are highlighted again. First, the main and dominating source of value in the benefits is the association of service use with higher earnings. The

value of all other types of benefits are small and alone offer little by way of financial return from Children’s Centre services. Second, most of the benefit accrues to the individual rather than the Government or society more broadly. And almost all of the benefit to the Government is not through reductions in the cost of delivering other services but through increased revenues from Income Tax and National Insurance related to higher earnings.

Table 33: Disaggregation of benefits for baby health services via SDQ conduct problems

Benefits	Total value of benefits	Private	Govt.	Society
Reduction in truancy	£2	£0	£2	£0
Reduction in exclusions	£7	£0	£7	£0
Reduction in youth crime	£5	£0	£5	£0
Reduction in smoking	£26	£26	-£9	£9
Reduction in mental health problems	£24	£0	£24	£0
Reduction in adult crime	£4	£0	£1	£3
Increase in earnings	£2,028	£1,573	£455	£0
Reduction in welfare benefits	£141	£0	£141	£0
Total	£2,236	£1,599	£625	£12

Notes: All figures are discounted present values in 2014 prices

Table 34: Disaggregation of benefits for various services via early HLE

Service type	Total value	Private	Govt.	Society
Higher earnings				
Baby health (any time)	£6,111	£4,741	£1,370	£0
Child play (since wave 1)	£3,005	£2,293	£663	£0
Parent support (any time)	£2,956	£2,293	£663	£0
Parent support (since wave 1)	£5,342	£4,144	£1,197	£0
Specialist parent/family support (any time)	£6,048	£4,692	£1,356	£0
Specialist parent/family support (since wave 1)	£4,790	£3,716	£1,074	£0
Reduced SEN				
Baby health (any time)	£26	£0	£26	£0
Child play (since wave 1)	£12	£0	£12	£0
Parent support (any time)	£17	£0	£17	£0
Parent support (since wave 1)	£32	£0	£32	£0
Specialist parent/family support (any time)	£27	£0	£27	£0
Specialist parent/family support (since wave 1)	£17	£0	£17	£0
Reduced depression				
Baby health (any time)	£21	£0	£21	£0
Child play (since wave 1)	£10	£0	£10	£0
Parent support (any time)	£10	£0	£10	£0
Parent support (since wave 1)	£18	£0	£18	£0
Specialist parent/family support (any time)	£20	£0	£20	£0
Specialist parent/family support (since wave 1)	£16	£0	£16	£0

Notes: All figures are discounted present values in 2014 prices

Finally, table 35 presents the value for money for the Government which compares the costs paid by the Government to deliver the services with the value of the benefits accrued to the state. Unsurprisingly given the state's minority share in the value of the

benefits, most service groups have negative net benefits and the benefit to cost ratio is below one (and very low in some cases). Only two cases give a moderate positive return.

Table 35: Summary of value for money for the Government

Service type	Average delivery cost to Govt. per user	Average benefit to Govt. per user	Net benefit	Benefit to cost ratio
Baby health (any time) (via SDQ conduct problems)	£4,468	£625	-£3,843	0.14
Baby health (any time) (via early HLE)	£4,468	£1,417	-£3,051	0.32
Child play (since wave 1)	£1,669	£696	-£973	0.42
Parent support (any time)	£958	£690	-£268	0.72
Parent support (since wave 1)	£831	£1,248	£417	1.50
Specialist parent/family support (any time)	£1,685	£1,403	-£282	0.83
Specialist parent/family support (since wave 1)	£746	£1,108	£362	1.48

Notes: All figures are discounted present values in 2014 prices

6.5 Confidence intervals and precision

The findings presented above have been based on point estimates of the mean values for all costs, benefits and other parameters without any consideration of the sampling variation. Incorporation of the variation for all elements of the value for money models is neither useful (the resulting confidence intervals would be too broad to be meaningful) nor feasible (the literature sources do not provide the required information). Instead, a more limited exercise is performed to illustrate the breadth of uncertainty in the value for money estimates.

Introducing sampling variation recognises that the information used from samples (rather than population statistics) has some imprecision in that the sample mean values may differ from the population mean values. Confidence intervals bound the degree of imprecision, identifying the range which has a 95 percent probability that it contains the true population mean. In this section, sampling variation is introduced from two sources:

- From the hourly cost of delivery, recognising that the mean costs from the sample of 24 centres may differ from the true population mean.

- From the estimated associations between centre use and outcomes at age three, recognizing that the average relationships observed within the ECCE sample may differ from those in the entire population of Children’s Centres users (and their comparison groups).

It should be noted that sampling from other sources is not considered, including that from the numbers of user hours used to estimate the cost per family and from the evidence sources on links to later outcomes. It should be noted that some of these later sources do not have any sampling variation where population statistics have been used.

As an example of the potential uncertainty in the value for money estimates, summary findings for two scenarios are presented:

- A “best case” based on the lower bound of the 95 percent confidence interval for the hourly costs of service delivery and on the upper bound of the interval for the estimated associations between service use and child and family outcomes at age three.
- A “worst case” scenario based on the upper bound for the cost and the lower bound for the benefit.

Table 36 presents the headline findings for these “best case” and “worst case” scenarios. Perhaps unsurprisingly, there is a broad range in the net benefits between the worst and best case scenario: for baby health services, the range is around £15,000, although use of parent support services since wave 1 has the smallest range of just under £3,000. Most of the variation in is driven by the benefit rather than the cost side, highlighting a higher degree of imprecision around the estimates of the associations between service use and outcomes than in the cost estimates in spite of the small sample used for the collection of cost data.⁴⁷ In four cases, the worst case scenario has a negative net benefit suggesting that the findings of positive value for money may not hold for the broader population.

⁴⁷ It may be noted that the value of the benefits is zero in three cases in the worst case scenario. This has arisen because of the need to convert the discrete measure of HLE used in the associations between service use and outcomes at age three into a categorical variable and does not reflect that the benefits are not statistically significantly different from zero.

Table 36: Best and worst case value for money summary

Service group	Average cost of delivery per user	Average benefit per user	Net benefit	Benefit to cost ratio
Best case				
Baby health (any time) (via SDQ conduct problems)	£3,803	£4,178	£375	1.10
Baby health (any time) (via early HLE)	£3,803	£13,688	£9,885	3.601
Child play (since wave 1)	£1,483	£6,157	£4,674	4.15
Parent support (any time)	£753	£5,759	£5,006	7.65
Parent support (since wave 1)	£653	£5,395	£4,742	8.26
Specialist parent/family support (any time)	£1,315	£9,004	£7,989	6.85
Specialist parent/family support (since wave 1)	£583	£10,986	£10,403	18.84
Worst case				
Baby health (any time) (via SDQ conduct problems)	£5,514	£330	−£5,184	0.06
Baby health (any time) (via early HLE)	£5,514	£0	−£5,514	0.00
Child play (since wave 1)	£2,040	£0	−£2,040	0.00
Parent support (any time)	£1,163	£0	−£1,163	0.00
Parent support (since wave 1)	£1,009	£2,813	£1,704	2.54
Specialist parent/family support (any time)	£2,095	£3,508	£1,413	1.67
Specialist parent/family support (since wave 1)	£929	£0	−£929	0.00

Notes: All figures are discounted present values in 2014 prices.

6.6 Summary

This chapter has collated the various elements required to calculate the value for money of the different types of Children's Centres services.

Under the scenarios of potential impacts drawn from chapter three, the evidence suggests that:

- Most of the value of the benefits of the services is dependent upon the links to improved labour market outcomes. Indeed, without the associated increase in earnings the services would offer very little financial return.
- Using the hypothesised scenarios of impacts for baby health services, impacts on early HLE at age three have a greater value of benefits (£6,162) than impacts on child development as measured in SDQ conduct problems at age three (£2,236). However, this finding should be treated with some caution as the estimation of impacts for the two measures is not completely comparable.
- Specialist family/parent support services and parent support services after the child is aged one potentially offer the greatest cost effectiveness to increase early HLE at age three, raising the average early HLE score by 2.92 and 1.86 respectively for each £1,000 spent in comparison to estimates of 0.45 and 0.75 for each £1,000 spent on baby health and child play services respectively.
- All four types of services considered would offer positive value for money with benefit to cost ratios ranging from 1.4 for baby health services to 6.4 for specialist parent/family services.
- Parent services have a higher benefit to cost ratio than child based ones, driven more by a lower cost per user than a higher benefit per user.
- The majority of the benefits accrue to individuals rather than to the Government. This means that only two of the six cases considered have positive value for money for the Government and the returns are moderate.

Two potential caveats on these findings have been explored. First, assessment of potential sources of the under-counting of the value of benefits suggests that the main omission is the value of enhanced well-being associated with the use of services, the value of which would accrue to individuals rather than the Government. Second, the positive findings for value for money are heavily reliant on the associations between service use and early HLE. Allowing for some sampling variation in this association in the best/worst case scenarios has shown that the findings of positive value for money may not hold for the broader population.

7. Conclusions

The original intention of this strand of the evaluation was to assess the overall value for money of centres, comparing the value of the benefits from the use of any or all services at centres with the costs of delivery. However, this proved infeasible for two reasons:

- No statistically significant associations were identified between the aggregate measure of centre use⁴⁸ and better outcomes that could be used in a value for money model, possibly because the comparison group of families not using the same types of services was small.
- The prevalence of associations between service use and poorer outcomes suggests that any associations (with either better or poorer outcomes) may reflect selection bias in service use towards particular types of families rather than any impact alone. It would also not be meaningful to use the associations with poorer outcomes in a value for money analysis as this would imply a negative contribution to the benefits side.

In order to obtain some insight on value for money, the associations with better outcomes for individual services were taken forward into the value for money estimation and those with poorer outcomes discarded. The value for money analysis is therefore based on hypothetical scenarios of what the value for money would be *if* there were impacts of the magnitudes of the positive association for each service type.

There are also some caveats around the estimates from the value for money for these impact scenarios:

- The most important caveat is that the findings are based on point estimates of mean values for all costs, benefits and other parameters without consideration of the sampling variation. Incorporation of this variation for all elements of the value for money models is neither useful (the resulting confidence intervals would be too broad to be meaningful) nor feasible (the literature sources do not provide the required information). However, introduction of sampling variation from just two sources (around the hourly costs of delivery and in the associations between service use and initial outcomes) indicates that the value for money estimates would have very broad confidence intervals and are not statistically significant at normal levels of confidence.
- Assessment of potential sources of the under-counting of the value of benefits suggests that the main omission is the value of any enhanced well-being

⁴⁸ Aggregate use of services is defined here as the use of any services in the five mainly used types: baby health, child play, parent support, specialist child and specialist family or parent support.

associated with service usage, the value of which would accrue to individuals rather than the Government.

- There is a considerable degree of approximation in drawing on related but not necessarily completely appropriate evidence to derive the links between immediate outcomes and later lifetime outcomes. In addition, one key link is based on a single source of evidence using data from a relatively small sample.

Given these caveats, the main contribution of this analysis is not to produce precise estimates on the value for money, but to identify the broad elements of how Children's Centres may offer a monetary return on their costs. Based on the scenarios of impacts drawn from the observed associations between services use and outcomes, the key findings are:

1. Under plausible hypothetical scenarios of impact, the best estimate is that some Children's Centre services provide positive value for money with the monetary valuation of improved outcomes exceeding the costs of delivery.
2. Most of the value of the benefits is derived from improved later labour market outcomes for the children in the families using services. Indeed, without the associated increase in earnings, the services would offer very little financial return.
3. The majority of the benefits accrue to individuals through higher net earnings rather than to the Government. Consequently, the best estimates suggest that few services provide positive value for money for the Government and the returns are considerably smaller than those for the total benefits.
4. Parent support and specialist family/parent support services offer better value for money than the more child based services. This is driven more by a lower cost per user than a higher benefit per user.
5. There is some weak evidence that impacts on the early home learning environment (HLE) at age three have a higher value of benefits than comparable impacts (driven by the same service) on child social development at age three.

The strength of finding (1) should not be under-estimated: if improved outcomes at age three were of little financial value, even maximum feasible impacts (such as raising HLE to its highest score) would not lead to estimates of positive value for money. As it is, this report has shown that policies which have impacts within reasonable bounds of magnitudes on early child and family outcomes can potentially generate substantial monetary returns over and above the costs of delivering the services.

References

- Abidin, R. R. (1995), *Parenting Stress Index: Professional Manual (3rd Edition)*, Psychological Assessment Resources Inc.
- Action on Smoking and Health (ASH), (2014), *The Economics of Tobacco Fact Sheet*, ASH 121 http://www.ash.org.uk/files/documents/ASH_121.pdf
- Action on Smoking and Health (ASH), (2015), *Young People and Smoking Fact Sheet*, ASH 108 http://ash.org.uk/files/documents/ASH_108.pdf
- Anders, Y., Sammons, P., Taggart, B., Sylva, K., Melhuish, E. and Siraj-Blatchford, I., (2010), "The influence of child, family, home factors and pre-school education on the identification of special educational needs at age 10", *British Educational Research Journal*, vol 37, issue 3, pp 421-441 <http://www.bbk.ac.uk/psychology/our-staff/academic/edward-melhuish/documents/andersetal2011.pdf>
- Brand, S. and Price, R., (2000), *The economic and social costs of crime*, Home Office Research Study 217
<http://webarchive.nationalarchives.gov.uk/20110218135832/rds.homeoffice.gov.uk/rds/pdfs/hors217.pdf>
- Briggs, N., Kurtz, A. and Paull, G. (2012), *Evaluation of Children's Centres in England (ECCE): Strand 5: Case studies on the costs of centres in the most deprived areas*, Department for Education Research Report DFE-RR256, November
<https://www.gov.uk/government/publications/evaluation-of-childrens-centres-in-england-ecce-strand-5-case-studies-on-the-costs-of-centres-in-the-most-deprived-areas>
- Brookes, M., Goodall, E. and Heady, L. (2007), *Misspent Youth, the cost of truancy and exclusion*, New Philanthropy Capital <http://www.thinknpc.org/publications/misspent-youth/>
- Buchanan, A., Flouri, E. and Ten Brinke, J. A. (2002), "Emotional and behavioural problems in childhood and distress in adult life: risk and protective factors", *Australian and New Zealand Journal of Psychiatry*, vol 36, issue 4, pp 521-527
<http://onlinelibrary.wiley.com/doi/10.1046/j.1440-1614.2002.01048.x/abstract>
- Bynner, J., Dolton, P., Feinstein, L., Makepeace, G., Malmberg, L. and Woods, L. (2003), *Revisiting the Benefits of Higher Education*. London: The Smith Institute
http://dera.ioe.ac.uk/5167/1/rd05_03.pdf
- Carniero, P., Crawford, C. and Goodman, A., (2011), "The Impact of Early Cognitive and Non-Cognitive Skills on Later Outcomes", University College London, Institute for Fiscal Studies and Georgetown University, American Economic Association 2012 Annual Meeting Conference Paper
<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&uact=8&ved=0CCEQFjAAahUKEwigsZHUypLIAhWpKdsKHUnJAMQ&url=https%3A%2F>

http://www.aeaweb.org/2012conference/program/retrieve.php?pdfid%3D492&usg=AFQjCNFFSSmJFGf3slZ9Bmas4_XigxJrvG&sig2=uaQMoCHMASYIK8kcKEhhsQ (Permission to cite granted by authors)

Cattan, S., Crawford, C. and Dearden, L., (2014), *The economic impact of pre-school education and quality*, Institute for Fiscal Studies Report R99
<http://www.ifs.org.uk/uploads/publications/comms/R99.pdf>

Centre for Mental Health, (2010), *The economic and social costs of mental health problems in 2009/10*, October <http://www.centreformentalhealth.org.uk/economic-and-social-costs>

Chevalier, A. and Feinstein, L., (2006), "Sheepskin or Prozac: The Causal Effect of Education on Mental Health", Centre for Economics of Education Discussion Paper no. 71, <http://eprints.lse.ac.uk/19405/>

Clark, D. and Royer, H. (2013), "The Effect of Education on Adult Health and Mortality: Evidence from Britain", *American Economic Review*, vol 103, no. 6, pp 2087-2120
<https://www.aeaweb.org/articles.php?doi=10.1257/aer.103.6.2087>

Colman, I., Murray, J., Abbott, R. A., Maughan, B., Kuh, D., Croudace, T. and Jones, P. B., (2009), "Outcomes of conduct problems in adolescence: 40 year follow-up of national cohort", *British Medical Journal*, vol 338 <http://www.bmj.com/content/338/bmj.a2981>

Conlon, G., and Patrignani, P., (2011), *The Returns to Higher Education Qualifications*. Department for Business Innovation and Skills Research Paper Number 45
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32419/11-973-returns-to-higher-education-qualifications.pdf

Croft, S., Stride, C., Maughan, B. and Rowe, R., (2015), "Validity of the Strengths and Difficulties Questionnaire in Preschool Children", *Paediatrics*, vol 135, no 5, pp e1210-e1219 <http://pediatrics.aappublications.org/content/135/5/e1210>

Cullis, A., and Hansen, K. (2008), *Child Development in the First Three Sweeps of the Millennium Cohort Study*, Department for Children, Schools and Families, Research Report DCSF-RW077 <http://dera.ioe.ac.uk/8787/1/dcsf-rw077.pdf>

Department for Education (2014a), *Children with special educational needs: an analysis – 2014*, SFR31/2014 <https://www.gov.uk/government/statistics/children-with-special-educational-needs-an-analysis-2014>

Department for Education (2014b), *Section 251 budget: 2014 to 2015 data*
<https://www.gov.uk/government/publications/section-251-budget-2014-to-2015-data>

Department for Work and Pensions (2014), *Benefit and Pension Rates*, DWP035, April
<https://www.gov.uk/government/publications/benefit-and-pension-rates-april-2014>

Dex, S., Cullis, A. and Hansen, K., (2010), *The development of children living in Wales: Analysis of the Millennium Cohort Study, Final Report to the Welsh Assembly Secondary Analysis Programme*, Centre for Longitudinal Studies, Institute of Education, London
http://www.cls.ioe.ac.uk/library-media%5Cdocuments%5CWelsh_Assembly_Report_July2010.pdf

Dubourg, R., Hamed, J. and Thorns, J., (2005), *The economic and social costs of crime against individuals and households 2003/04*, Home Office Report 30/05
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191498/Green_Book_supplementary_guidance_economic_social_costs_crime_individuals_households.pdf

Elliott, C. D. and Smith, P., (2011), *British Ability Scales Third Edition*, London: GL Assessment

Feinstein, L., (2000), "The Relative Economic Importance of Academic, Psychological and Behavioural Attributes Developed in Childhood", Centre for Economic Performance Discussion Paper 443, London School of Economics and Political Science
<http://eprints.lse.ac.uk/20206/>

Feinstein, L., (2002), *Quantitative Estimates of the Social Benefits of Learning, 2: Health (Depression and Obesity)*. Centre for Research on the Wider Benefits of Learning Research Report no. 6, Institute of Education
<http://eprints.ioe.ac.uk/18651/1/WBLResRep6.pdf>

Feinstein, L. and Duckworth, D., (2006), *Development in the early years: its importance for school performance and adult outcomes*. Centre for Research on the Wider Benefits of Learning Research Report no. 20, Institute of Education
<http://eprints.ioe.ac.uk/5970/1/Feinstein2006Development.pdf>

Feinstein, L., Sabetas, R., Anderson, T. M., Sorhaindo, A. and Hammond, C. (2006), *What are the Effects of Education on Health?*, Measuring the Effects of Education on Health and Civic Engagement: Proceedings of the Copenhagen Symposium, OECD
<https://www1.oecd.org/edu/innovation-education/37425753.pdf>

Goldberg, D. and Williams, P., (1988), *A user's guide to the General Health Questionnaire*, Windsor Berks, NFER-Nelson

Goodman, R. (1997), "The Strengths and Difficulties Questionnaire: A Research Note", *Journal of Child Psychology and Psychiatry*, vol 38, no 5, pp 581-586
<http://www.ncbi.nlm.nih.gov/pubmed/9255702>

Greenwood, C., Jenkins, A. and Vignoles, A., (2007), *The Returns to Qualifications in England: Updating the Evidence Base on Level 2 and Level 3 Vocational Qualifications*. Centre for the Economics of Education DP 89, London School of Economics.
<http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0ah>

[UKEwjS25yNiLjJAhVItxoKHdY-ABsQFgghMAA&url=http%3A%2F%2Fcee.lse.ac.uk%2Fceedps%2Fceedp89.pdf&usg=AFQjCNGuCtcmdRCLxBn6ppcnF0XiOo975g&sig2=x4XAIBhJCrcU9eYR1whl7w](http://www.cls.ioe.ac.uk/library-media/documents/Education%20and%20the%20Crime-Age%20Profile.pdf)

Hansen, K. (2003), *Education and the Crime-Age Profile*, Department of Sociology and Centre for Economic Performance, London School of Economics.

<http://www.cls.ioe.ac.uk/library-media/documents/Education%20and%20the%20Crime-Age%20Profile.pdf>

Hayward, H., Hunt, E., and Lord, A., (2014), *The economic value of key intermediate qualifications: estimating the returns and lifetime productivity gains to GCSEs, A level and apprenticeships*, Department for Education Research Report DFE-RR398A

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387160/R398A - Economic Value of Key Qualifications.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387160/R398A_-_Economic_Value_of_Key_Qualifications.pdf)

Health and Social Care Information Centre (HSCIC), (2014), *Statistics on Smoking*.

<http://www.hscic.gov.uk/catalogue/PUB14988/smok-eng-2014-rep.pdf>

HM Revenue and Customs (2015a), *Income Tax rates and allowances: current and past*.

<https://www.gov.uk/government/publications/rates-and-allowances-income-tax/income-tax-rates-and-allowances-current-and-past>

HM Revenue and Customs (2015b), *Rates and allowances: National Insurance contributions*

<https://www.gov.uk/government/publications/rates-and-allowances-national-insurance-contributions/rates-and-allowances-national-insurance-contributions>

HM Treasury (2003), *The Green Book, Appraisal and Evaluation in Central Government*.

HM Treasury, London:TSO

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

HM Treasury (2015), *The Blue Book: GDP deflators at market prices, and money GDP: October 2015*

<https://www.gov.uk/government/statistics/gdp-deflators-at-market-prices-and-money-gdp-october-2015-the-blue-book>

Joshi, H., Ketende, S. and Parsons, S. (2011), *Child Development at Age Seven in Wales: Analysis of the Millennium Cohort Study*. Welsh Government Social Research,

Number 25/2011 <http://learning.gov.wales/docs/learningwales/publications/130212child-development-age7-walesen.pdf>

Machin, S., Marie, O. and Vujic, S. (2011), "The Crime Reducing Effect of Education", *The Economic Journal*, vol. 121, pp 463-484

<http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0297.2011.02430.x/abstract>

McCrone, P., Dhanasiri, S., Patel, A., Knapp, M., Lawton-Smith, S. (2008), *Paying the Price- the cost of mental health care in England in 2026*, King's Fund.

http://www.kingsfund.org.uk/sites/files/kf/Paying-the-Price-the-cost-of-mental-health-care-England-2026-McCrone-Dhanasiri-Patel-Knapp-Lawton-Smith-Kings-Fund-May-2008_0.pdf

Maisey, R., Poole, E., Chanfreau, J. and Fry, A., (2015), *Children's centres evaluation in England: Strand 2: longitudinal survey of families using children's centres in the most disadvantaged areas*, Department for Education Research Report, DFE-RR434, February <https://www.gov.uk/government/publications/childrens-centres-in-england-evaluation-survey-of-families>

Maisey, R., Speight, S. and Haywood, S. with Hall, J., Sammons, P., Hussey, D., Goff, J., Evangelou, M. and Sylva, K., (2013), *Evaluation of Children's Centres in England (ECCE): Strand 2: Baseline Survey of Families Using Children's Centres in the Most Disadvantaged Areas*, Department for Education Research Report DFE-RR260, April <https://www.gov.uk/government/publications/evaluation-of-childrens-centres-in-england-strand-2-baseline-survey-of-families-using-childrens-centres-in-the-most-disadvantaged-areas>

Matheny, A. P., Wachs, T. D., Ludwig, J. L. and Phillips, K. (1995), "Bringing order out of chaos: Psychometric characteristics of the confusion, hubbub and order scale", *Journal of Applied Developmental Psychology*, vol16, issue 3, pp 429-444 <http://www.sciencedirect.com/science/article/pii/0193397395900284>

Maughan, B., Stafford, M., Shah, I. and Kuh, D., (2014), "Adolescent conduct problems and premature mortality: follow-up to age 65 years in a national birth cohort", *Psychological Medicine*, vol 44, no. 5, pp 1077-86 <http://www.ncbi.nlm.nih.gov/pubmed/23962416>

Melhuish, E. B., Phan, M.B., Sylva, K., Sammons, P., Siraj-Blatchford, I. and Taggart, B., (2008), "Effects of the Home Learning Environment and Preshcool Center Experience upon Literacy and Numeracy Development in Early Primary School" *Journal of Social Issues*, vol 64, no. 1 <http://www.bbk.ac.uk/psychology/our-staff/academic/edward-melhuish/documents/JSI2008.pdf>

New Economy (2016), *Unit Cost Database (v.1.4)*. <http://neweconomymanchester.com/our-work/research-evaluation-cost-benefit-analysis/cost-benefit-analysis/unit-cost-database>

Office for National Statistics, (2014a), *Annual survey of hours and earnings, Table 6.7a* <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-328216>

Office for National Statistics (2014b), *Qualifications and Labour Market Participation in England and Wales* http://www.ons.gov.uk/ons/dcp171776_367378.pdf

Office for National Statistics, (2015), *Labour Market Statistics, November 2015 Table A05 NSA* <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-381603>

Paull, G., (2015), "Appendix 7: Briefing Note on Childcare Costs and Spending Estimates" in House of Lords Select Committee on Affordable Childcare, *Affordable Childcare: Report of Session 2014-15*, February
<http://www.publications.parliament.uk/pa/ld201415/ldselect/ldaffchild/117/11702.htm>

Prince's Trust (2010), *The Cost of Exclusions: counting the cost of youth disadvantage in the UK*
<http://www.inspiringenterprise.rbs.com/sites/default/files/resources/theprincestrustthecostofexclusion.pdf>

Sabates, R. and Feinstein, L., (2004), *Education, training and the take-up of preventative healthcare*, Centre for Research on the Wider Benefits of Learning Report no. 12.
<http://eprints.ioe.ac.uk/15064/1/WBLResRep12.pdf>

Sainsbury Centre for Mental Health, (2003), *The economic and social costs of mental illness, policy paper 3* <http://www.centreformentalhealth.org.uk/economic-and-social-costs-2003>

Sammons, P., Hall, J., Smees, R., and Goff, J., with Sylva, K., Smith, T., Evangelou, M., Eisenstadt, N. and Smith, G., (2015), *The impact of children's centres: studying the effects of children's centres in promoting better outcomes for young children and their families*, Department for Education Research Report DFE-RR495, December
<https://www.gov.uk/government/publications/childrens-centres-their-impact-on-children-and-families>

Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., Elliot, K. and Marsh, A., (2004), *EPPE Technical Paper 11: The Continuing Effects of Pre-school Education at age 7 Years*, Department for Education and Skills Technical Paper 11
http://www.ioe.ac.uk/EPPE_TechnicalPaper_11_2004.pdf

Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., Barreau, S. and Grabbe, Y., (2007), *EPPE, 3-11. Influences on children's development and progress in Key Stage 2: Social/behavioural outcomes in Year 5*. Department for Children, Schools and Families, Research Report DCSF-RR007 http://www.ioe.ac.uk/Socs_report_Yr_5.pdf

Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B. and Hunt, S., (2008), *EPPE 3-11. Influences on children's attainment and progress in Key Stage 2: Cognitive outcomes in year 6*. Department for Children, Schools and Families, Research Report DCSF-RR048 http://www.ioe.ac.uk/Cog_report_Yr6.pdf

Sammons, P., Sylva, K., Melhuish, E., Siraj-Blatchford, I., Taggart, B., Toth, K., Draghici, D. and Smees, R., (2011), *EPPSE 3-14. Influences on students' attainment and progress*

in Key Stage 3: Academic outcomes in English, Maths and Science in Year 9.

Department for Education [http://www.ioe.ac.uk/EPPSE_3-14_students_attainment_and_progress_in_KS3_Academic_outcomes_RR\(1\).pdf](http://www.ioe.ac.uk/EPPSE_3-14_students_attainment_and_progress_in_KS3_Academic_outcomes_RR(1).pdf)

Sammons, P., Sylva, K., Melhuish, E., Siraj, I., Taggart, B., Toth, K. and Smees, R., (2014a), *Influences on student's GCSE attainment and progress at age 16*, EPPSE Research Report. Department for Education. http://www.ioe.ac.uk/Research_Home/16-Influences-Students-GCSE-Attainment-Progress-RR.pdf

Sammons, P., Sylva, K., Melhuish, E., Siraj, I., Taggart, B., Toth, K., Smees, R., and Welcomme, W., (2014b). *EPPSE 3-16+, Influences on students' dispositions and well-being in Key Stage 4 at age 16*, Department for Education http://www.ioe.ac.uk/Research_Home/16-Influences-Students-Dispositions-well-being-KS4-RR.pdf

Shepherd, P., (2013), *Bristol Social Adjustment Guides at 7 and 11 years*, Institute of Education, University of London, January <http://www.cls.ioe.ac.uk/library-media/documents/NCDS%20Bristol%20Social%20Adjustment%20Guides%20final.pdf>

Silles, M., (2009), "The Causal Effect of Education on Health: Evidence from the United Kingdom", *Economics of Education Review*, vol 28, issue 1, pp 122-128 <http://www.sciencedirect.com/science/article/pii/S0272775708000551>

Stringaris, A., Lewis, G. and Maughan, B., (2014), "Developmental pathways from childhood conduct problems to early adult depression: findings from the ALSPAC cohort", *The British Journal of Psychiatry*, vol 205, no 1, pp 17-23 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4076653/>

Sullivan, A., Joshi, H., Ketende, S. and Obolenskaya, P., (2010), *The consequences at age 7 of early childhood disadvantage in Northern Ireland and Great Britain*, Institute of Education, London http://www.cls.ioe.ac.uk/library-media%5Cdocuments%5CAge7_early%20childhood_disadvantage.pdf

Walker, I. and Zhu, Y., (2013), *The impact of university degrees on the lifecycle of earnings: some further analysis*, Department for Business, Innovation and Skills Research Paper Number 12 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/229498/bis-13-899-the-impact-of-university-degrees-on-the-lifecycle-of-earnings-further-analysis.pdf

Annex A: Additional information on the collection of cost data

A.1 Methodological changes since wave 1

Some minor changes were made in the second wave of data collection and analysis from the methodology described in Briggs, Kurtz and Paull (2012). First, some services were re-categorised in order to ensure a match in categories between strands 4 and 5:

- Breast-feeding support was divided into breastfeeding groups; one-to-one breast-feeding support delivered by midwives and health visitors (in the midwife/health visitor sessions category) and one-to-one support delivered by run by centre staff (in the other services category).
- All services delivered in the home were moved into the new category of services in the home (including many of the home safety advice services).
- Individual use of sensory and soft play rooms was moved from stay and play groups into other services.
- Relationship support was included in specialist family support because there were too few services to estimate costs separately.
- Specialist and respite childcare was moved from childcare into specialist family support.
- Smoking cessation was moved from other services into specialist family support.
- Costs of services for childminders were separated and not presented because the impact analysis only includes services for families and children
- Costs of toy libraries and food banks were separated and not presented because it was not possible to estimate the number of user hours for these services.

Second, all costs were indexed to March 2014 using the monthly House Price Index (HPI) for venue costs, the Average Weekly Earnings (AWE) index for the whole economy for staff costs and the Consumer Price Index (CPI) for other costs.

A.2 Sample characteristics

Table 37 presents the characteristics of the 24 centres visited to collect cost data and a comparison with the centres in strands 2 and 3 of the evaluation. Overall, the samples are reasonably well matched in terms of these background characteristics.

Table 37: Centre characteristics in strands 2/3 and strand 5

Percentage of centres with characteristic	Strands 2/3 sample	Strand 5 sample
Number of centres led by leader:		
One	61	67
Two	18	13
Three	8	8
Four	5	4
More than four	8	8
Management organisation:		
Private/independent	3	4
NHS	4	4
Maintained nursery school	4	4
Maintained primary school	13	13
National charity/voluntary	9	8
Local charity/voluntary	5	8
Local Authority	53	50
Social enterprise / mutual	1	0
Mixture reported	8	8
Site set-up:		
Main site only	31	25
Main site + other venues	33	33
Main site + satellites	33	42
Main site + satellites + other venues	1	0
No main site	3	0
Original centre organisation:		
Sure start local programme	35	29
Neighbourhood nursery	2	4
LA maintained nursery school	6	8
LA family centre / day nursery	3	4
Voluntary family or day centre	6	4
None – new centre	27	25
Local / community based centre	4	8
Mixture reported	18	17
Sources of income:		
All from LA	41	30
Most from LA, <10% fees/partner	39	43
Most from LA, >10% partner	3	4
Most from LA, >10% fees	11	17
Most from LA, >10% fees/partner	1	4
Most from partners	2	0
Most from fees	3	0
Directly providing early learning or childcare	78	83
Mean number of services	28	28
Mean number of staff	29	31
Mean number of registered users (aged 9-18 months)	194	147

Percentage of centres with characteristic	Strands 2/3 sample	Strand 5 sample
In region:		
North East	4	4
North West	13	13
Yorkshire & the Humber	11	8
East Midlands	5	13
West Midlands	17	17
East of England	9	8
London	17	17
South East	12	8
South West	12	13
In area:		
Rural	9	8
Urban	91	92

Source: ECCE strands 2/3 and 5

Annex B: Monetisation of lifetime earnings

This annex provides further details on the comparisons in the estimates of the lifetime earnings associated with higher educational attainment referred to in section 5.7. It compares the estimates drawn from Cattan, Crawford and Dearden (2014) with those drawn from a combination of Hayward, Hunt and Lord (2014) and Walker and Zhu (2013).

Table 38 provides a brief summary of the data sources, comparison across qualification levels and estimation methodology used in each report. There are numerous differences between the approaches which could explain differences in the final estimates and a deeper investigation would be required to establish whether one approach was superior to the other. Overall, the reports use broadly the same data sources and there is no outstanding issue which differentiates them.

For the purposes of this report, the key issue is the comparability of the final estimates with the ECCE evidence. In particular, the Cattan et al report considers five good GCSEs (matching the ECCE evidence) while the Hayward et al report considers five good GCSEs including both maths and English. In addition, the latter two reports require more adjustments to obtain appropriate estimates for this report:

- Reported estimates in Cattan et al require indexation to 2014 prices and discounting from age four to age three.
- Reported estimates in Hayward et al require division by 1.3 to remove the addition of employer costs, indexation to 2014 prices and discounting from age 18 to age three.
- Reported estimates in Walker and Zhu require division by 0.9 to add back VAT; division by 0.85 to add back Income Tax and Employee NI (assumed to be at a rate of 15%), addition of £35k for the degree level to add back approximate costs of student loans and foregone earnings while studying, indexation to 2014 prices and discounting from age 18 to three.

Hence, the estimates provided in the Cattan et al report are preferable to use because they require fewer assumptions to adjust to the required numbers and they match better to the ECCE evidence in the definition of five good GCSEs.

Table 38: Comparison of methodologies to estimate lifetime earnings from educational attainment

Catton, Crawford and Dearden (2014)	Hayward, Hunt and Lord (2014)	Walker and Zhu (2013)
Data: BHPS 1993-2008 and LFS 1993 Q1-2012 Q4	Data: LFS 2006 Q1 to 2013 Q1	Data: BHPS 1991 to 2008 and LFS 1993 to 2010
Compares four highest qualification categories at age 22 (five good GCSEs).	Compare highest intermediate qualifications at current age (five good GCSEs including maths + English).	Compares 2+ A-levels and degree at age 18.
Earnings = annual labour market income (BHPS) and gross weekly pay*52 (LFS). Employment = in work if annual earnings < £1,000.	Earnings = gross weekly pay in main job. Employment = ILO work definition.	Earnings = average hourly wage rate *2080 (*1820) for men (women) based on average annual hours in LFS.
<p>Methodology:</p> <ul style="list-style-type: none"> • Use BHPS to simulate earnings/employment lifetime profile for each qual. allowing for persistent shocks and non-employment. Employment probabilities modelled on simulated earnings. • BHPS earnings distribution transformed to match LFS distribution using a ranking of earnings for each age at 24 percentage points. • Return to qual = difference in PDV of lifetime earnings. 	<p>Methodology:</p> <ul style="list-style-type: none"> • Regressions of average earnings and employment probability with qual. interacted with age and age squared (quadratic) and common vector of demographic controls. • Return to qual. = differences in average annual earnings and probability of work at each age. 	<p>Methodology:</p> <ul style="list-style-type: none"> • Forecast lifecycle earnings for each qual. using regressions for the lifecycle earnings profile (changes with age using panel element) and earnings levels (using cross-section data) using LFS. Similar approach to forecast lifetime probability of work. • Simulate gross earnings for each individual • Return to qual = difference in PDV of lifetime earnings.
<p>Estimates (table 2.2):</p> <ul style="list-style-type: none"> • Gross earnings • 2013 prices • Discounting to age 4 	<p>Estimates (tables 3 + 9):</p> <ul style="list-style-type: none"> • Gross earnings plus 30% for non-wage labour costs • 2013 Q1 prices • Discounting to age 18 	<p>Estimates (table 13):</p> <ul style="list-style-type: none"> • Gross earnings minus student loan repayments; foregone earnings while studying; Income Tax; NI; and VAT (10%). • April 2012 prices • Discounting to age 18

It can also be shown that the final estimates of the returns to five good GCSEs (with and without the requirement to include maths and English) are reasonably similar between the sources. Table 39 presents the adjusted estimates from the three reports to give the present discounted values of lifetime gross earnings. There are some notable differences between the estimates, particularly for five good GCSEs which may be due to the difference in the requirement of including maths and English. However, applying the distribution of qualifications above five good GCSEs generates an average return for men and women from having at least five good GCSEs of £211,000 using the Cattan et al source and £168,000 using a combination of the Hayward et al and Walker and Zhu sources. Given the differences in methodologies and the variation in the definition of the five good GCSEs category, these estimates are reasonably close.

Table 39: Adjusted estimates for lifetime earnings from alternative sources

£1,000	Men			Women		
	Catton et al	Hayward et al	Walker & Zhu	Catton et al	Hayward et al	Walker & Zhu
Average PDF:						
Anything < than 5 GCSEs	359	n/a	n/a	162	n/a	n/a
5 good GCSEs	471	n/a	n/a	240	n/a	n/a
2+ A Levels	519	n/a	490	255	n/a	384
Degree	726	n/a	648	441	n/a	610
Difference with level below:						
5 good GCSEs	112	48	n/a	78	49	n/a
2+ A Levels	47	42	n/a	16	36	n/a
Degree	207	n/a	158	185	n/a	226



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