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Tackling the roots of disadvantage



Appendix 4 - The economics of early years' investment

Appendix 4 in Conception to age 2 - the age of opportunity report

APPENDIX 4 – The economics of early years' investment

SECTION I – International studies

How advisable is it for national or local policy-making bodies in the UK, with responsibility for child health or welfare, and control over spending, to switch investment more heavily to the early years? We have conducted a review of both UK and international studies which look at this question from a number of different but complementary perspectives. This Section focuses on the findings of the international studies. Section 2 summarises the UK studies.

Overview

The short answer is there is general expert consensus that it is somewhere between economically worthwhile and imperative to invest more heavily, as a proportion of both local and national spend, in the very earliest months and years of life. Nine approaches to evaluating the outcomes of early years' investment are reviewed here.

- Every approach – even the most cautious and circumspect in its recommendations – finds that returns on investment on well-designed early years' interventions significantly exceed their costs.
- The benefits range from 75% to over 1,000% higher than costs, with rates of return on investment significantly and repeatedly shown to be higher than those obtained from most public and private investments.
- Where a whole country has adopted a policy of investment in early years' prevention, returns are not merely financial but in strikingly better health for the whole population. The benefits span lower infant mortality at birth through to reduced heart, liver and lung disease in middle-age.
- The logical links between the investments and the health benefits are described in the 'Adverse Childhood Experiences' (ACE) studies which reveal that for every 100 cases of child abuse society can expect to pay in middle or old age for (amongst a wide range of physical and mental health consequences):
 - one additional case of liver disease
 - two additional cases of lung disease
 - six additional cases of serious heart disease, and
 - 16% higher rate of anti-depressant prescriptions (Felitti and Anda, 2009)
- None of the estimates takes account of the economic value of the knock-on effect that child abuse averted in one generation will itself result in a cumulative reduction in this dysfunction during future generations.

Summary of studies reviewed

RAND/Karoly et al

The RAND study by Karoly et al (2005) found:

- Statistically significant benefits being delivered in at least two-thirds of 20 early years' programmes, in seven different domains of health and welfare.
- With the exception of two programmes where costs either exceeded their benefits, or could not be monetised, eight cost benefit analyses of early years' programmes, or meta-analyses of such programmes, showed benefits significantly exceeding costs, with payoffs per dollar invested ranging from \$1.80 to \$17.07.
- The estimated net benefits ranged from \$1,400 to nearly \$240,000 per child.
- The greatest benefits come from programmes with long-term follow-up.
- The authors concluded:

'benefit-cost estimates for effective programs are likely to be conservative'

Reynolds et al

- Reynolds et al's (2011) intensive analysis of the Chicago Child-Parent Center Program found benefits of more than \$80,000 per child, with \$10.80 of benefits per \$1 invested.
- They also found that children with four or more family risk factors yielded almost double the benefits of those with fewer (\$12.8 vs. \$7.2 per \$1 invested).
- Children from the highest poverty neighbourhoods had returns more than *four times higher* than those from less disadvantaged areas.

- The Chicago findings are additionally significant because they come not from a pilot study but via evaluating a practice embedded in the Chicago Public Schools' system for over four decades.

Reynolds also identifies a further early years' programme, not included in the RAND analysis:

- The prenatal and infancy and nutrition programme, Women, Infants, and Children (WIC) which reportedly saved \$3.07 per \$1 invested in reduced medical costs in the first year of life (Avruch & Cackley, 1995). This is likely to be a rather conservative estimate of its lifetime benefits.

Federal Reserve Bank of Minneapolis/Rolnick & Grunewald

A different perspective on the issue is provided by bankers from the Federal Reserve Bank of Minneapolis, Rolnick and Grunewald (2003) who calculated that:

- The significantly higher returns found from early years' programmes compared to most public investment is evidence that society is not spending enough on the early years – and that to do so is sound financial policy.
- Internal rates of return for those early years' programmes evaluated exceed both:
 - stock market returns, and
 - returns from typical public policy investments.

They would also significantly exceed returns from many UK large-scale public investments, including (for example) the high speed HS2 rail link.

James Heckman

Another viewpoint from outside the sector is provided by the Nobel Laureate economist James Heckman, whose focus is on economic efficiency and skill formation, rather than avoiding social dysfunction. Heckman (2008) asserts that:

- Financial returns on early years' investments are highest for age 0-3, and diminish progressively as children become older.
- His persuasive argument in logic for why this should be so is supported by reference to the principle that learning begets learning (i.e. early benefits become cumulative) and (disappointing) economic evaluations of such later interventions as attempts to skill-train adolescents.
- Society is demonstrably under-investing in the early years.
- Because early years' interventions both promote economic efficiency and reduce lifetime inequality, they provide policy makers with a rare opportunity to spend money in a way that delivers social and economic benefits at the same time.

Harvard University

The Harvard Center on the Developing Child at Harvard University (2007, 2010) bases its case on the science of neurobiology:

- Because the infant (and human) brain is built from its basic structures upwards, each new stage depends on the quality of the preceding stage.
- This means creating the right conditions for early childhood development is likely to be more effective and less costly than addressing problems at a later age.
- The basic principles of neuroscience and the process of human skill formation indicate that early years' intervention for the most vulnerable children will generate the greatest payback.
- Also, although the large number of children and families who could benefit from additional assistance will require significant increases in funding, extensive research indicates that investment in high quality interventions will generate substantial future returns through:
 - increased taxes paid by more productive adults, and
 - significant reductions in public expenditure on special education, welfare assistance, and incarceration.
- Policy makers can achieve greater return on investments in early childhood education for children from families with low incomes and limited parent education than from remedial programs for adults with limited workforce skills.

While the comparison is different, this latter point echoes the finding of Reynolds et al, that returns are much higher for families from poverty neighbourhoods and those with more family risk factors.

Sweden

Sweden adopts a whole country approach which follows the principle of early years' prevention. The payoff from this policy at a national level is shown in:

- Infant mortality half of that in the UK.
- Obesity levels less than half those in the UK.
- Teenage pregnancy one quarter of the level in the UK.
- Deaths from cancer and smoking-related diseases about 20% lower than the UK.
- Deaths from circulatory diseases 25% lower than in the UK.
- Deaths from chronic liver disease more than 50% lower than in the UK.

Cohen et al – view from the other end of the perspective

In their studies Cohen, Piquero and Jennings (2010) take a different approach by estimating the lifetime costs of bad outcomes for at risk youths, and offering an innovative methodology for assessing early years' interventions whereby their cost-effectiveness can be judged by the minimum number of cases of child abuse, drug abuse or criminality a given intervention can be reliably predicted to prevent.

Applying the costs per family of such typical early years' interventions as First Steps in Parenting, Nurse Family Partnership, the Sunderland Infant Project, Circle of Security, Mellow Parenting, Triple P etc to the Cohen, Piquero and Jennings methodology suggest that such programmes need to be successful in preventing child abuse in only 2% of their participants to pay for themselves, without taking account of what they may deliver in reduced alcohol or drug abuse, future domestic violence or such other benefits as reduced medical and welfare costs.

Washington State Institute for Public Policy (WSIPP)

The Washington State Institute for Public Policy takes a rigorously conservative stance to programme evaluation, based on an absolute 'no false positives' approach. It arguably under-states by some margin the value of preventing child abuse and heavily discounts, or disqualifies, the research findings of many early years' practitioners. Even with these restrictions, it still finds positive benefit to cost ratios for a range of early years' programmes, ranging from \$1.75 per \$1 invested from Parents as Teachers through \$3.23 per \$1 invested for Nurse Family Partnership and \$7 for Parent Child Interaction Therapy to \$10.32 per \$1 invested for Level 4 Group Triple P.

Their methodology and mandated legislative focus lead them to recommend many more teen than early years' programmes. Such interventions should not be seen in terms of either/or; both provide higher returns to society than the bulk of public and private investments.

The following provides further detail on the evaluations above:

Review of cost benefit studies of early years' programmes

A) Rand review of early years' investments

The PNC Grow Up Great initiative is a ten-year, \$100-million programme to improve school- readiness for children from birth to age 5. PNC Financial Services Group Inc partnered with Sesame Workshop (producers of Sesame Street) and Family Communications Inc, producers of Mister Rogers' Neighborhood, to develop content for the initiative, guided by an advisory council of experts in the early childhood field.

As part of the initiative, PNC asked the RAND Corporation to prepare a thorough, objective review and synthesis of current research on interventions in early childhood, looking at:

- the potential consequences of not investing additional resources in the lives of children – particularly disadvantaged children – prior to school entry;
- the available range of early intervention programmes, focusing on those rigorously evaluated;
- the demonstrated benefits of interventions with high-quality evaluations and the features associated with successful programmes;
- the returns to society associated with investing early in the lives of disadvantaged children.

Carried out by Karoly, Kilburn and Cannon (2005), the study notes that disadvantages in early childhood have significant implications for how well prepared children are when they enter school, not only in cognitive skills but also in socialisation, self-regulatory behaviour, and learning approaches. Children with more disadvantaged

backgrounds enter school with lower levels of knowledge and social competencies, and achievement gaps tend to widen over time. Children from disadvantaged backgrounds experience higher rates of special education use and dropping out of school; lower rates of employment and higher rates of welfare dependency, delinquency and crime. The authors comment:

Even if only a portion of these detrimental outcomes in childhood and adulthood can be averted, the benefits may be substantial

Turning to evaluation, the study observes that while many early childhood interventions have been implemented, only a relatively small subset have been evaluated using scientifically sound methods. After rigorous review, the authors identified published evaluations for 20 early childhood programmes with well-implemented experimental, or strong quasi-experimental, designs. The study then examined the following benefit domains:

- cognition and academic achievement
- behavioural and emotional competencies
- educational progression and attainment
- child maltreatment
- health, accidents and injuries
- delinquency and crime
- social welfare programme use
- labour market success

Statistically significant benefits were found in at least two-thirds of the programmes reviewed in every one of these benefit domains, with one exception (social welfare programme use). (See Tables S.2 and S.3 of the original Karoly et al report.) The magnitudes of the favourable effects were often (though not always) sizable.

Seven of the 20 programmes studied had been subjected to cost-benefit analyses. The authors summarised the findings of these studies, together with benefit-cost meta-analyses of home visiting programmes for at risk children and early childhood education programmes for low-income 3-4-year-olds, based on rigorous outcome evaluations. The results are summarised in the table below, arranged by age of participants at the time of the last follow-up (adapted from Table S.4 in the original):

Benefit-Cost Results for Selected Early Childhood Intervention Programs

Program	Age at Last Follow-Up	Program Costs per Child (\$)	Total Benefits to Society per Child (\$)	Net Benefits to Society per Child (\$)	Benefit-Cost Ratio
Follow-Up During Elementary School Years					
Comprehensive Child Development Program	5	37,388	-9	-37,397	—
HIPPY USA	6	1,681	3,032	1,351	1.80
Infant Health and Development Program	8	49,021	0	-49,021	—
Follow-Up During Secondary School Years					
Nurse Family Partnership — higher-risk sample	15	7,271	41,419	34,148	5.70
Nurse Family Partnership — lower-risk sample	15	7,271	9,151	1,880	1.26
Nurse Family Partnership — full sample	15	9,118	26,298	17,180	2.88
Home Visiting for at risk mothers and children (meta-analysis)	Varies	4,892	10,969	6,077	2.24
Follow-Up to Early Adulthood					
Abecedarian	21	42,871	138,635	95,764	3.23
Chicago Child-Parent Center	21	6,913	49,337	42,424	7.14
Perry Pre-School (including intangible crime costs)	27	14,830	76,426	61,595	5.15
Early Childhood Education for low-income 3- and 4-year-olds (meta-analysis)	Varies	6,681	15,742	9,061	2.36
Follow-Up to Middle Adulthood					
Perry Preschool	40	14,830	253,154	238,324	17.07

NOTES: All dollar values are 2003 dollars per child and are the present value of amounts over time where future values are discounted to age 0 of the participating child, using a 3 percent annual real discount rate.

Because of differences in evaluation methodology (such as which benefits are measured and monetised) the authors caution that these results cannot identify exactly which programmes have the highest returns. However, they can demonstrate whether, in principle, early childhood intervention programmes generate benefits outweighing their costs.

One of the programmes evaluated (the Comprehensive Child Development Program, or CCDP) was not shown to be effective, because it could not generate net economic benefits. Another (the Infant Health and Development Program, or IHDP) had favourable effects as of the follow-up at age 8, for example in IQ and maths achievement for heavier low birth weight (but not very low birth weight) babies, but the outcomes assessed could not be translated into dollar savings. For the remaining studies (including the meta-analyses), the estimates of net benefits ranged from about \$1,400 to nearly \$240,000 per child. The returns to society for each dollar invested ranged from a low of \$1.26 to a high of \$17.07. Positive net benefits were found for both expensive and low-cost programmes. Favourable returns were found both for home-visiting and parent education programmes as well as combination programmes.

The largest benefit-cost ratios were found in programmes with longer-term follow-up because they allowed measurement at older ages of outcomes that most readily translate into dollar benefits. These outcomes included educational attainment, delinquency, crime and earnings. The authors conclude:

'Not only do the studies ... based on long-term follow-up, demonstrate that the benefits from early interventions can be long-lasting, they also give more confidence that the savings the programs generate can be substantial'

and observed that:

'benefit-cost estimates for effective programs are likely to be conservative'

(because so few are funded to track the long-term outcomes and so translate them to dollar benefits).

B) Large-scale city-wide approach

Recognising Karoly et al's point that evaluations which take account of benefits over a longer time scale will provide more accurate pictures of cost benefit analysis, Reynolds et al (2011) carried out a cost benefit analysis of the Chicago Child-Parent Center (CPC) Early Education Program using data collected up to age 26. The 2011 analysis was able to use actual rather than projections for earnings and adult crime prevention outcomes and also included benefits on health and wellbeing, including mental health and substance use.

The analysis showed that preschool participants in the CPC had:

- significantly higher rates of high school completion
- completed more years of education
- significantly lower rates of felony arrest
- higher rates of health insurance coverage and lower rates of depressive symptoms, as assessed from ages 22 to 24
- lower rates of daily smoking and substance misuse by age 26

Juvenile benefits included lower rates of:

- special education placement
- child maltreatment and
- out-of-home placement, and juvenile arrest

Percentage reductions over the comparison group ranged from one third to one half.

A benefit to cost analysis of the preschool programme showed a ratio of \$10.80 benefits per \$1 invested with an average economic return to society of \$92,220 for a cost of \$8,512 per participant.

Benefits to the public, excluding earnings and participant benefits, totalled \$61,246 with a benefit to cost ratio of \$7.20 per dollar invested.

Children with four or more family risk factors received nearly double the benefits of those with fewer such risk factors (\$12.80 vs. \$7.20), and children from the highest poverty neighbourhoods achieved returns more than four times higher than those for children from less disadvantaged areas.

Estimates were robust across a wide range of analyses, including Monte Carlo simulations.

Reynolds et al also evaluated the benefits of intervention at school age and found that these also justified the cost of the investment – but with significantly lower returns than the preschool programme (\$1.70 to \$2.00 per \$1 invested). Here again, returns were much higher for disadvantaged children.

The Reynolds findings are significant. The Chicago Child-Parent Center programme has been established in the Chicago Public Schools' system for over four decades. Although costing moderately more than other contemporary federal and state-financed programmes, the CPC programme has generally similar teacher qualifications, class sizes and ratios, instructional approaches, school-based structures, and scope of services.

The CPC findings reinforce the Karoly conclusions that there can be high economic returns from preschool programmes for children at risk, and suggest these can apply even when programmes are implemented on a large scale.

Reynolds et al also report on a very early intervention programme, not included in the Karoly analysis: the prenatal and infancy nutrition programme Women, Infants, and Children (WIC) which reportedly saved \$3.07 per \$1 invested in reduced medical costs in the first year of life alone – due to reduced rates of low birth weights (Avruch & Cackley, 1995).

A number of studies have found links between low birth weight and such expensive problems in later life as high blood pressure and coronary heart disease (Barker 1995). Lewitt et al (1995) calculated that low birth weight children incur additional annual costs of \$1,500 (in 1988) up to the age of 15 in terms of health care and education. Low birth weight has also been negatively correlated with adult health, qualification and labour market attainment (Case et al, 2005, Currie and Hyson, 1999) hence the benefits of the WIC programme are probably very significantly understated.

C) Bankers' eye view on where public spending should be focused

A hard-nosed banking perspective on the economics of early years' investment is provided by Rolnick and Grunewald (2003). Art Rolnick is Senior Vice President and Director of Research, and Rob Grunewald is Regional Economic Analyst at the Federal Reserve Bank of Minneapolis. They show that investment in human capital breeds success for the overall economy. They contrast the ratio of earnings for those with degrees compared to the average worker prior to 1983 (40% higher) and in the 2000s (closer to 60% higher). The premium for an advanced degree has grown even more, from 60% to over 100%.

Rolnick and Grunewald compare the value of investment in early childhood development with investments in other public projects. Well-grounded benefit-to-cost ratios are seldom calculated for public projects, but an alternative measure – the internal rate of return (IRR) or compound return on the project – can be used to compare the financial return to public as well as private investments.

Rolnick and Grunewald converted the paybacks from the Perry preschool programme and arrived at an IRR of 16%, after adjustment for inflation. They also calculated that about 80% of the benefits went to the general public (e.g. students were less disruptive in class and committed fewer crimes), yielding over a 12% internal rate of return for society in general.

While the authors did not calculate the IRR for other early years' development programmes, Reynolds et al do this for the CPC preschool programme, arriving at an IRR of 18% (Reynolds et al, 2011).

Rolnick and Grunewald observe that preschool investment returns are much higher than those achieved by other public investments, or by most private industry investments. Commenting on the large sums of money spent in the US on supporting, or rescuing, underperforming businesses, in investments in sports stadia and other forms of public investment, they conclude that society is under-investing in the early years – otherwise the rates of return would be brought down by natural competition to a more equivalent level for society in general.

To put this method in perspective: the UK Department of Transport estimates the rate of return on the new HS2 high-speed rail link at between £1.80 and £2.50 per £1 invested. In an analysis of 15 economic studies of programmes from birth to age 9, Reynolds and Temple (2008) found an average economic return (expressed in pounds) of £2.83 per £1 invested for interventions implemented before age 5.

Rolnick and Grunewald conclude by recommending heavy public investment in early childhood development programmes.

D) Study of the costs of failing to intervene early on the pathway to dysfunction

Cohen, Piquero and Jennings (2010) stand on its head the question of how worthwhile it is to invest in early years' programmes,

Rather than wait a couple of decades for the results of a well-designed longitudinal study and cost benefit analysis, they propose the value of investments can be determined much more rapidly by knowing the cost of the adverse outcomes such programmes are designed to prevent, then calculating the rate of success required by a programme to justify its cost. If a programme's success rate is clearly exceeding the requisite break-even point, we can judge it is a sound investment without waiting years to make the decision.

Cohen (1998) provided one of the most comprehensive attempts to calculate the costs of crime. His research estimated that the typical career criminal caused \$1.3 to \$1.5 million in external costs. The overall estimate of the 'monetary value of saving a high-risk youth' was put at between \$1.7m and \$2.3 million (per youth).

More recently Cohen and Piquero (2009) used a more comprehensive cost methodology plus new data on career offenders, and estimated the present value of saving a single high-risk youth (as of birth) at between \$2.6 and \$4.4 million.

In a follow-up paper, 'Estimating the Costs of Bad Outcomes for At Risk Youth and the Benefits of Early Childhood Interventions to Reduce Them', Cohen, Piquero, and Jennings (2010) conducted a thorough analysis of a range of adverse outcomes for society (and the individual), placing a monetary value on each.

The authors conducted a literature search through a series of electronic databases to identify potential early childhood prevention/intervention programmes with long-term results on at least one rigorous evaluation relating to the following outcomes:

- crime/delinquency;
- education;
- alcohol and drug abuse;
- smoking;
- child abuse and neglect;
- physical health problems; and
- teenage pregnancy.

They then required the study to contain, or be capable of:

- a well-constructed comparison group;
- quantifiable evidence to determine whether a programme was successful at preventing/reducing the relevant outcomes of interest;
- replication in 'real-world' settings.

Following an exhaustive search, 14 well-designed studies with long-term follow-up results met the selection criteria. The majority of these programmes started during pregnancy or at birth and followed the children (and sometimes the mothers) for a considerable time, ranging from 4 to more than 30 years. Most were home-visitation programmes, with some day-care/school-based programmes and some early parent training programmes (see original article for list). One programme was Australian (the Busselton Project), one was Canadian (the Montreal Longitudinal Experimental Study) and the remainder were American.

Next, Cohen et al examined the costs of each social ill identified as being related to an at-risk childhood and conducted an extensive literature review on both the incidence of impacts and their costs. Their article takes 20 pages to describe in detail their methodology for estimating the costs of each adverse outcome. We will not summarise their approach here other than to say it was conducted with considerable rigour.

Cohen et al estimate the following present value costs for the outcomes below:

Adverse outcome	Lifetime present value cost
career criminal	\$2.1-\$3.7 million
drug abuse	c. \$700,000
alcohol dependence	c. \$700,000
child abuse and neglect	\$250,000 to \$285,000
smoking	\$260,000
diabetes	\$187,000
asthma	\$144,000
teen pregnancy	\$120,000 to \$140,000
coronary heart disease	\$127,000

One-time criminal offenders were estimated to cost \$78,500 – thus crime has a range of costs between that lower sum, and the cost of a career criminal.

Cohen et al conclude:

‘properly designed programs and policies that focus on early childhood intervention have the potential to produce significant social benefits’

Noting that the large-scale longitudinal data which, in a perfect world, would allow early childhood intervention programmes to be evaluated on the basis of their long-term [cost] effectiveness is hard to come by, they again stand the question on its head and propose the reverse approach of asking the question ‘how effective must a program be before it pays for itself?’

So, at a stroke, Cohen and colleagues resolve a major challenge for international policy makers! Instead of having to wait a decade or more, plus the expense of a Randomised Control Trial, before being able to judge the cost-effectiveness of relatively new or under-researched programmes, a judgment can be made in a fraction of the time if the operational effectiveness of the programme can be established. Provided this is greater than the break-even performance needed to justify the programme’s costs it can be judged to be cost-effective and worthy of investment.

They give as a theoretical example a programme found to reduce obesity in young children, with the expectation that in turn this will reduce diabetes and heart disease over their lifetime. If the programme covered 1,000 children at a cost of \$1 million, one could calculate the break-even point at which the programme would pay for itself. Given an average cost of c.\$150,000 per case of heart disease or diabetes, the programme could be judged a success if it prevented seven cases (i.e. the benefits are 7 times \$150,000 or \$1.05 million). Thus if it works for 0.7% of the children in the treatment programme it can be judged to be cost-effective.

Based on the costs of early years’ programmes, and using Cohen et al’s estimates, the rate of effectiveness in preventing cases of child abuse and neglect need be no more than 2% per participant for such programmes to pay for themselves.

E) The Adverse Childhood Experiences’ studies

Another ‘avoidance of negative outcomes’ approach which is relevant to juxtapose with the work of Cohen et al is the series of studies carried out by Vincent Felitti and colleagues in the Californian Adverse Childhood Experiences’ (ACE) studies. This was (and is) a major American epidemiological study providing retrospective and prospective analysis in over 17,000 individuals of the effect of traumatic experiences, during the first eighteen years of life, on adolescent and adult medical and psychiatric disease, sexual behaviour, healthcare costs, and life expectancy.

The ACE Study was carried out by Kaiser Permanente’s Department of Preventive Medicine in collaboration with the US Center for Disease Control and Prevention (CDC). Subjects were Kaiser Health Plan patients – middle-class Americans, all with high quality health insurance. The participants were 80% white including Hispanic, 10% black, and 10% Asian; 74% had attended college; their average age was 57. Almost exactly half were men, half women.

There were 2 waves to the study, with 8 categories of ACEs studied in the first wave and two categories of neglect added (at the request of participants) in the second wave. ACEs in a general, middle-class population were unexpectedly high.

The researchers created for each individual an ACE Score, a count of the number of categories of adverse childhood experience during their first 18 years. The ACEs were captured in three groups – Abuse (emotional, physical and sexual); Household dysfunction (domestic violence, alcoholic or drug user in the home, household

member imprisoned, household member chronically depressed, suicidal, mentally ill, or in psychiatric hospital, and child not raised by both biological parents); and Neglect (physical and emotional).

ACE Score does not tally incidents within a category; the occurrence during childhood or adolescence of any one category of adverse experience is scored as only one point. The ACE Score therefore can range from 0 to 8 or 10, depending on which stage of the study.

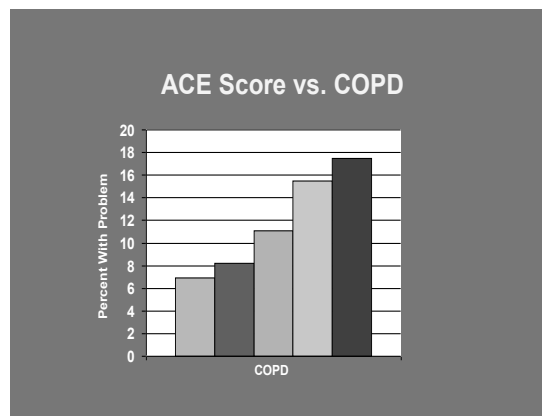
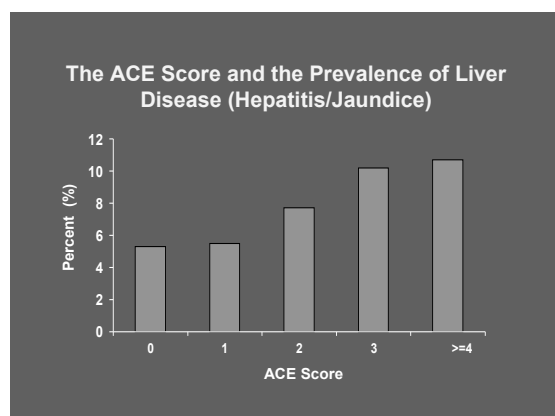
Only one third of this middle-class population had an ACE Score of 0; one in six individuals had an ACE Score of 4 or more, and one in nine had an ACE Score of 5 or more. Women were 50% more likely than men to have experienced 5 or more categories.

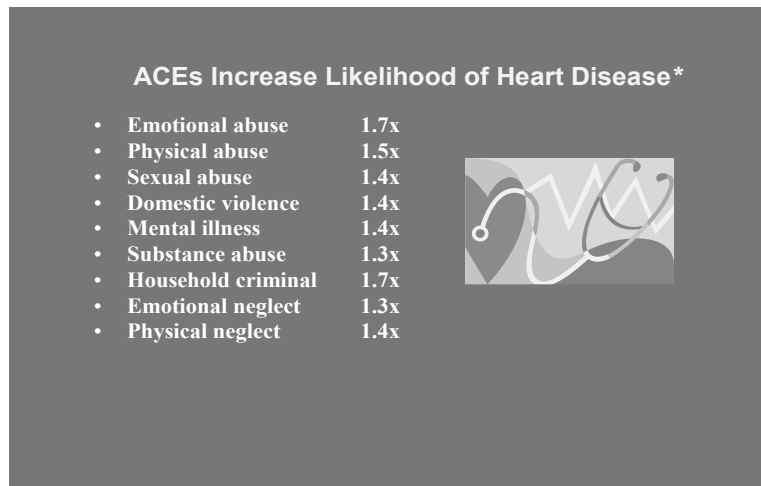
The ACE Study matches retrospectively an individual's current state of health and well-being against the ACE Score, and then follows the cohort forward to match ACE Score prospectively against:

- doctor office visits,
- casualty visits,
- hospitalisation,
- pharmacy costs, and
- death.

The prospective study has been running for fourteen years. Findings include:

- A proportionate relationship between ACE Score and depression (prescription rates for antidepressant medications), fifty to sixty years after the ACEs occurred. An analysis of population-attributable risk shows that 54% of current depression and 58% of suicide attempts in women can be attributed to adverse childhood experiences.
- Strong, proportionate relationships between ACE Score and the use of various psychoactive materials or behaviours. Self-acknowledged current smoking, self-defined alcoholism and self-acknowledged injection drug use were strongly related in a proportionate manner to ACEs.
- The relationship of ACE Score to intravenous drug use was particularly striking. Male children with ACE Score of 6 or more had a 4,600% increased likelihood of later becoming an injection drug user, as contrasted with an ACE Score 0 male.
- ACE Score was also related to the decades-later use of anti-psychotic and anxiolytic medications
- Poor self-rated job performance correlates with ACE Score.
- Teen pregnancy and promiscuity (more than 50 sexual partners) were also proportionally related to ACE Score
- Miscarriage of pregnancy was related to ACE Score.
- Four examples of the links between childhood experience and adult biomedical disease were the relationship of ACE Score to liver disease, lung disease, coronary artery disease and autoimmune disease





The researchers observe that while it might be thought that the relationship with lung or heart disease might simply reflect the links of ACE Score to levels of smoking, in fact the actual situation is more complex. For example, the study found a strong relationship of ACE Score to coronary disease, *after* correcting for all the conventional risk factors like smoking, cholesterol, etc. They hypothesised that this is likely to reflect the long-term effects of childhood stress, an assumption supported by recent research findings on the long-term health effects of maternal stress in pregnancy, where it has been found that this can have life-long adverse effects on children's health and development through alterations to gene expression (epigenetics).

The ACE authors have begun a prospective analysis of adult death rates and their relationship to ACE Scores. However, there is already striking evidence. Between the ages of 19 to 34 participants in the medical exam, who had an ACE Score of 0, outnumbered those with an ACE Score of 4, by just over 3 to 1. By age 50 to 64 the participants with a Score of 0 outnumbered those with a Score of 4 by just over 7 to 1. For participants in the medical exam aged 65 and over those with an ACE Score of 0 outnumbered those with a Score of 4 by over 17 to 1. The researchers surmised that, quite simply, far more of those with a Score of 4 or more are dead. (The researchers looked for alternative explanations but the data did not support these.) The progression seems to be: ACE Score is strongly related first to health risks; then to disease; then to death.

The implications of the ACE Studies for national health policies are huge. They indicate that large cost savings can be made over time by reducing the number of children suffering Adverse Childhood Experiences.

We know from much of our other research that the most effective time to intervene in a child's life, or in the progression of a family, to prevent ACEs, is before birth and in the first few years of life. The peak age for child abuse in the UK is 0-1 (DCSF, 2009; Welsh Government, 2012), and abuse and neglect are also significantly higher for 1-4 year olds than for older children (DCSF, 2009; Scottish Government, 2012; Welsh Government, 2012).

To take just one example of the potential benefits by preventing ACEs from pre-birth onwards, the criminal justice system and National Health Service spend huge sums dealing with drug abuse, which is reported to cost the UK over £15 billion per annum (House of Commons Public Accounts Committee, 30th Report of Session 2009-10). In the ACE studies, the one sixth of individuals with 4 or more ACEs had 11 times higher levels of intravenous drug abuse than those with an ACE Score of 0. The researchers propose that alcohol and drugs are often used as self-medication by people who have suffered adverse childhood experiences. The ACE Studies indicate that a far more effective way to reduce drug abuse in society is to reduce ACEs rather than to wait for the misuse of drugs to emerge and then address those symptoms of a deeper malaise.

However, the work of the ACE researchers also indicates the potential for much shorter-term savings. At Kaiser Permanente's high-volume Department of Preventive Medicine they have used what they learned to expand radically the nature of their Review of Systems and Past History questionnaire.

Examiners were trained to ask questions relating to prior ACEs in medical exams and an impact was found: compared to the year before, a 35% reduction in visits to doctors' surgeries was found in the year following the evaluation, visits to Accident and Emergency departments showed an 11% reduction and hospitalisations dropped by 3%. The researchers believe patients respond positively when doctors recognise the true underlying causes rather than simply alleviating symptoms and, crucially, still 'accept' the patient.

F) Econometric analysis of where spending should be focused

Another approach to determining the value of investment in the early years is based on econometrics. The main proponent of this approach is the Nobel Laureate Professor James Heckman. Essentially, his analysis states that structures (including knowledge and skills) are based on foundations and the stronger the foundations the more solid the structure.

In financial terms, he argues that investment early in getting the foundations of knowledge and social skills right in a young child creates compound benefits. A child who is confident, emotionally stable and interested in learning learns (much) faster and more effectively than a child who is fearful or depressed, or who cannot control his emotions. It follows that when you spend money on children in later interventions (and Heckman says we must) then the rate of return on such later interventions is much higher for those children on whom you first spent early (but much lower from those you allowed to slip through that part of the net). He produces tables, figures and calculations which show how this would work, and validates this with evidence showing much higher returns for early years' than for later intervention programmes.

In 'The Case for Investing in Disadvantaged Young Children' (Heckman 2008) he states his argument in 15 points:

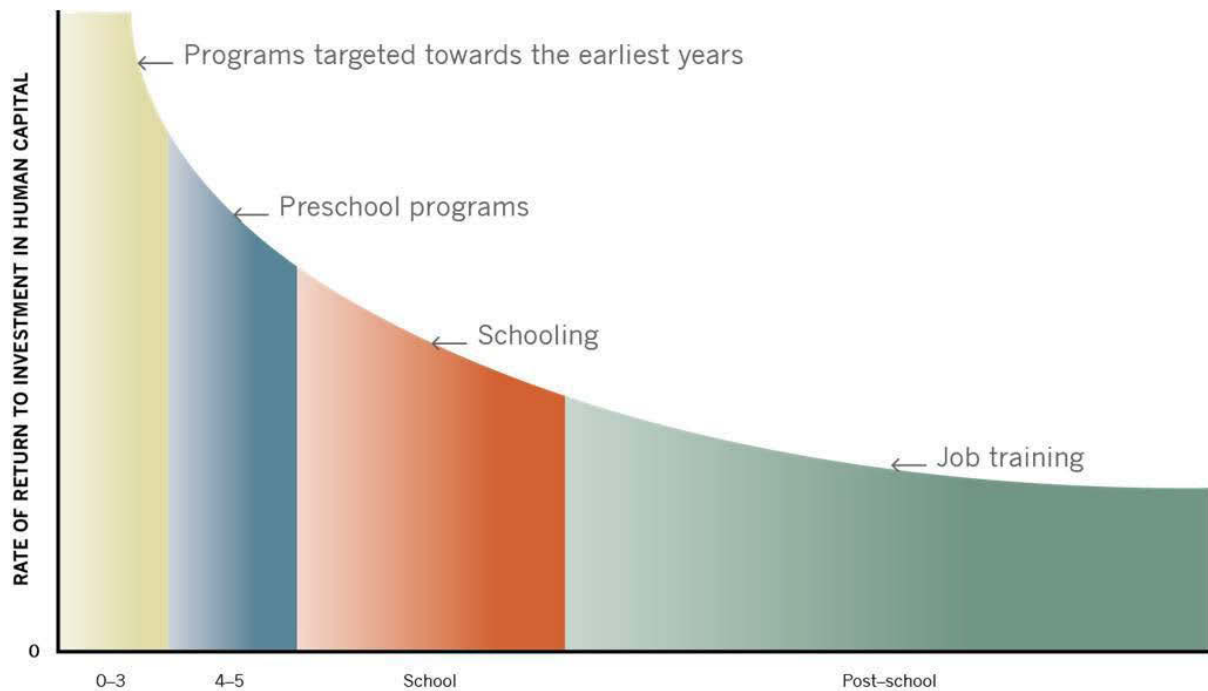
1. Many major economic and social problems such as crime, teenage pregnancy, dropping out of high school and adverse health conditions are linked to low levels of skill and ability in society.
2. In analyzing policies that foster skills and abilities, society should recognize the multiplicity of human abilities.
3. Currently, public policy in the U.S. and many other countries focuses on promoting and measuring cognitive ability through IQ and achievement tests. A focus on achievement test scores ignores important non-cognitive factors that promote success in school and life.
4. Cognitive abilities are important determinants of socioeconomic success.
5. So are socio-emotional skills, physical and mental health, perseverance, attention, motivation, and self-confidence. They contribute to performance in society at large and even help determine scores on the very tests that are commonly used to measure cognitive achievement.
6. Ability gaps between the advantaged and disadvantaged open up early in the lives of children.
7. Family environments of young children are major predictors of cognitive and socio-emotional abilities, as well as a variety of outcomes, such as crime and health.
8. Family environments in the U.S. and many other countries around the world have deteriorated over the past 40 years. A greater proportion of children is being born into disadvantaged families including minorities and immigrant groups. Disadvantage should be measured by the quality of parenting and not necessarily by the resources available to families.
9. Experimental evidence on the positive effects of early interventions on children in disadvantaged families is consistent with a large body of non-experimental evidence showing that the absence of supportive family environments harms child outcomes.
10. If society intervenes early enough, it can improve cognitive and socio-emotional abilities and the health of disadvantaged children.
11. Early interventions promote schooling, reduce crime, foster workforce productivity and reduce teenage pregnancy.
12. These interventions are estimated to have high benefit-cost ratios and rates of return.
13. As programs are currently configured, interventions early in the life cycle of disadvantaged children have much higher economic returns than such later interventions as reduced pupil-teacher ratios, public job training, convict rehabilitation programs, adult literacy programs, tuition subsidies, or expenditure on police. The returns are much higher than those found in most active labour market programs in Europe (See Heckman, LaLonde and Smith, 1999; and Martin and Grubb, 2001).
14. Life cycle skill formation is dynamic in nature. Skill begets skill; motivation begets motivation. Motivation cross-fosters skill and skill cross-fosters motivation. If a child is not motivated to learn and engage early on in life, it is more likely that in adulthood, he or she will fail in social and economic life. The longer society waits to intervene in the life cycle of a disadvantaged child, the more costly disadvantage is to remediate.
15. A major refocus of policy is required to capitalize on knowledge about the importance of the early years in creating [or reducing] inequality and in producing skills for the workforce.

Heckman points to the evidence that enriching the early environments of children in low income families produces significant financial returns, citing in particular the Perry Preschool and Abecedarian Programs because they use random assignment designs and collect long-term follow up data. Their findings are confirmed by data

from the Nurse Family Partnership (Karoly et al, 1998; Olds, 2002) and the Chicago Child-Parent Center's programmes (see above).

Commenting on the high reported rates of returns of Perry and other early years' programmes Heckman observes that these rates of return are likely to be understated because they ignore the economic returns from such investments in improving health and mental health. As mentioned earlier, this omission is a recurring source of underestimate of benefits in evaluations of early years' programmes, yet the ACE Studies referred to above (e.g. Felitti and Anda, 2010) show the very significant impact of early adverse experiences on a range of health outcomes including heart, liver and lung disease, diabetes, obesity, alcoholism, drug abuse, depression and attempted suicide, most of which are not included in the calculations of benefits referred to above.

Heckman contrasts the 14% return of the Perry Program with the (then) standard 7.2% stock market equity return. He also compares it favourably with published evaluations of the returns from public job training programmes, adult literacy services, prisoner rehabilitation programmes and education programmes for disadvantaged adults. Heckman is famous for his graph of estimated returns from investment in children at different ages.



Source: Heckman (2008)

Heckman's conclusion, like that of Rolnick and Grunewald, is that from a purely financial perspective, society is under-investing in early years.

Heckman also points out a particular characteristic of early years' investment, not found with investments in later years. It is very common in public investments to find a trade-off between equity (giving benefit to those who need it most) and efficiency (creating benefit where returns are highest). Heckman argues (Cunha and Heckman, 2007b; Heckman and Masterov, 2007) that because early years' interventions both promote economic efficiency and reduce lifetime inequality, they provide policy makers with a rare ability to spend money in a way which delivers both social and economic benefits at the same time.

G) Approach to early years' investment based on neurobiology

Drawing on the full breadth of intellectual resources available across Harvard University's graduate schools and affiliated hospitals, the Harvard Center on the Developing Child generates, translates, and applies, knowledge in the service of improving life outcomes for children in the United States and throughout the world.

The Center's goal is to promote healthy child development, economic prosperity, strong communities, and a just society, and their mission is to advance that vision by the use of science to inform policy making.

The Science of Early Childhood Development is one of a series of reviews by the Center. Focusing on the challenge of 'Closing the Gap Between What We Know and What We Do', this report states as one of its major conclusions that creating the right conditions for early childhood development is likely to be more effective and less costly than addressing problems at a later age.

The report explains that as the maturing brain becomes more specialised to assume more complex functions, it is less capable of reorganising and adapting to new or unexpected challenges. Once a circuit is 'wired', it stabilises with age, making it increasingly difficult to alter.

Plasticity is maximal in early childhood and decreases with age. Although 'windows of opportunity' for skill development and behavioural adaptation remain open for many years, trying to change behaviour or build new skills on a foundation of brain circuits that were not wired properly when they were first formed requires more work and is more 'expensive'. For the brain, this means that greater amounts of physiological energy are needed to compensate for circuits that do not perform in an expected fashion. For society, this means that remedial education, clinical treatment, and other professional interventions are more costly than the provision of nurturing, protective relationships and appropriate learning experiences earlier in life. Stated simply, the report says getting things right first time is more efficient and ultimately more effective than trying to fix them later.

The report draws the following conclusions from the study of the science:

Implications for Policy and Practice

- These findings direct our attention to the importance of informal family support and formal preventive services (when needed) for vulnerable children before they exhibit significant problems in behaviour or development. When policy makers ensure that all young children who are at high risk for poor outcomes are enrolled in high quality programs whose effectiveness has been documented, the returns are far greater than those achieved when only a subgroup of eligible children are served.
- The basic principles of neuroscience and the process of human skill formation indicate that early intervention for the most vulnerable children will generate the greatest payback. Although the large number of children and families who could benefit from additional assistance will require significant increases in funding, extensive research indicates that investment in high quality interventions will generate substantial future returns through increased taxes paid by more productive adults and significant reductions in public expenditures for special education, welfare assistance, and incarceration.
- Research indicates that policy makers can achieve greater return on investments in early childhood education for children from families with low incomes and limited parent education than from remedial programs for adults with limited workforce skills. In fact, long-term studies show that model programs for three- and four-year-olds living in poverty can produce benefit-cost ratios as high as 17:1 and annualised internal rates of return of 18% over 35 years, with most of the benefits from these investments accruing to the general public. While it is not realistic to assume that all scaled-up early childhood programs will provide such handsome returns, it is likely that benefit-cost ratios still will be considerably greater than 1:1.
- The essence of quality in early childhood services is embodied in the expertise, skills, and relationship-building capacities of their staff. The striking imbalance between the supply and demand for well-trained personnel in the field today indicates that substantial investments in training, recruiting, compensating, and retaining a high quality workforce must be a top priority for society. Responsible investments in services for young children and their families focus on benefits relative to cost. Inexpensive services that do not meet quality standards are a waste of money. Stated simply, sound policies seek maximum value rather than minimal cost.

H) Whole country approach to early years' prevention

Sweden

In UNICEF's 2007 *Report Card 7: An overview of child well-being in rich countries*, (UNICEF 2007), averaging rankings on 6 measures of child well-being shows the two countries leading the international league table of child well-being are the Netherlands and Sweden. Both countries have made a commitment to a preventive approach to child welfare.

The countries of Scandinavia have consistently led international comparisons in terms of welfare (Wilkinson and Pickett 2009). Recognising the value of prevention and early intervention programmes, in the last 20-30 years these countries have increased this type of investment (Killén 2000; Socialstyrelsen 1997).

A 2008 study by Heiervang, Goodman et al, investigating children's externalising and internalising problems in both Norway and Britain, discovered that Norwegian children scored lower on all problem scales (emotional, behavioural, hyperactive and peer relationship) on the Strengths and Difficulties Questionnaire, according to parents as well as teachers. The prevalence of externalising disorders (behavioural and hyperactivity) in Norway was about half that observed in Britain.

A comparison of societal child welfare between the UK and Scandinavia shows marked differences in a range of factors. Maternity healthcare services in Sweden are accessed by the vast majority of pregnant women (99 per cent), who typically have 11 individual contacts, mostly with midwives. Ninety-eight per cent of all maternity healthcare clinics offer parenting education in groups to first-time parents, with 60 per cent allowing repeat parents to participate. Additional support in the form of specialised groups is provided to those mothers with particular needs, for example young mothers, single mothers and those expecting twins.

Ninety-nine per cent of all families make use of the child healthcare services in Sweden. They have an average of 20 individual contacts, primarily with nurses. Parents are invited to join parent groups when the child has reached the age of one to two months. In Stockholm County for example, 61 per cent of all first-time parents participated in at least five sessions in 2002 (Bremberg 2006). Parent education accounts for around 8-10 per cent of midwives working time; 65 per cent of midwives received regular professional training on the subject, and 72 per cent were instructed by a psychologist (Socialstyrelsen 1997).

At 2.5 per cent, the infant mortality rate in Sweden was the lowest in the EU in 2005 and half that in the UK. Sweden also performs well on a number of health indicators from later life; the country has the third lowest mortality rate in the EU from cancer and circulatory diseases, amongst the lowest rates for deaths due to chronic liver disease and smoking related causes, and has the highest life expectancy in the EU for men (and the third highest for women). In addition Sweden has the third-lowest rate of teenage pregnancies in the European Union at 1.6 per cent, compared to 7.1 per cent in the UK (only several Eastern European countries have a greater number than Britain). Given the poor relative life prospects for children of teenage mothers, this also contributes to better long-term outcomes in Sweden.

	SWEDEN (2005)	UK (2005)
% Of Live Births To Mothers Under 20 Yrs	1.6	7.1
Infant Mortality (rate per 1,000 live births)	2.5	5.1
Smoking (% daily smokers aged 15 and over)	15.9	25.0
Alcohol (annual pure alcohol litres per person)	6.9	11.4
Adult Obesity (% of population)	10.7	23.0
Smoking Related Deaths (age standardised per 100,000 pop'n)	195.5	244.9
Chronic Liver Disease Deaths, Under 65 Yrs (per 100,000 pop'n)	4.0	9.5
Cancer Deaths, Under 65 Yrs (age standardised per 100,000 pop'n)	56.0	67.5
Circulatory Disease Deaths, Under 65 (age standardised per 100,000 pop'n)	31.9	43.3

These figures strongly imply a well-resourced and professional healthcare service in Sweden, with a strong focus on prevention, and starting at the very beginning of life with emphasis on breast-feeding (55-60% of Swedish mothers are exclusively breastfeeding at 4 months, 7% in the UK). In addition long periods of maternity and parental leave support attention to the needs of the child in its earlier months. 100% of hospitals have BFHI (baby-friendly) status (less than 10% in the UK) and early parent training is provided for a high proportion of the population. From that strong beginning it is able to improve its user's quality of life through helping them to avoid many preventable illnesses, and enabling the country to save money on both the healthcare and non-healthcare costs of those illnesses.

The difference between the UK and Sweden is hard to explain by reference to different levels of spending on health. The countries spend almost identical proportions of their GDP on health, and while Sweden's GDP is higher the slightly greater spend per head of population is far short of that needed to produce such differences in

health outcomes. Sweden also spends much less on health, both as a percentage of GDP and per head than the United States, but with much better health outcomes, infant mortality and life expectancy. We suggest Sweden's success reflects how it spends its health money rather than how much it spends.

I) The approach of an American public policy advisory group

Washington State Institute for Public Policy (WSIPP)

The Washington State Institute for Public Policy (WSIPP) was created by the 1983 Washington Legislature to carry out non-partisan research assignments. The 2009 Legislature directed the Institute to 'calculate the return on investment to taxpayers from evidence-based prevention and intervention programs and policies.' The Legislature instructed the Institute to produce 'a comprehensive list of programs and policies that improve outcomes for children and adults in Washington and result in more cost-efficient use of public resources.'

For nearly 30 years WSIPP has been evaluating the payoffs from specific programmes and identifying those which produce the highest return. WSIPP uses a four step research approach:

1. Systematically assess evidence on 'what works' (and what does not) to improve outcomes.
2. Calculate costs and benefits for Washington State and produce a Consumer Reports-like ranking of public policy options.
3. Measure the riskiness of their conclusions by testing how bottom lines vary when estimates and assumptions change.
4. Where feasible, provide a 'portfolio' analysis of how a combination of policy options could affect state-wide outcomes of interest.

Their analyses produce two key bottom-line statistics: an expected value of overall benefits minus costs, and an estimate of the risk that a given strategy could produce negative net benefits. Since WSIPP was first set up they have conducted thousands of evaluations and identified many hundreds of programmes which produce positive outcomes. Their work has been extremely influential in driving Washington State towards a more evidence-based and rational set of investments, particularly for youth programmes, which has been their main area of focus.

In their evaluations of Child Welfare programmes WSIPP estimates the following returns (WSIPP, July 2011):

Topic Area/Program	Monetary Benefits	Cost	Benefit to Cost ratio	Return on Investment
Nurse Family Partnership for Low-Income Families	30,325	9,421	3.23	7%
Incredible Years: Parent Training and Child Training	15,571	2,085	7.5	12%
Other Home Visiting Programs for At risk Families	14,896	5,453	2.73	5%
Healthy Families America	13,790	4,508	3.07	7%
Parent-Child Interaction Therapy: Disruptive Behavior	9,584	1,302	7.37	31%
Parent-Child Interaction Therapy: Child Welfare	9,498	1,516	6.27	15%
Intensive Family Preservation (Homebuilders®)	10,995	3,224	3.41	4%
Incredible Years: Parent Training	8,488	2,022	4.2	12%
Triple P5: Level 4	7,237	1,790	4.06	19%
Triple P: Level 4	3,740	365	10.32	n/e
Parents as Teachers	7,236	4,138	1.75	5%
Triple P: (Universal)	1,277	139	9.22	8%

They estimate, on average, that 30% of benefits go to the taxpayer and 70% to the family.

The WSIPP evaluation approach is conservative, and likely to under-estimate the benefits of many early years' programmes. In setting up a rigorous evaluation system there is always a tension between a system which creates false negatives and one which creates false positives. The WSIPP system is strongly designed to avoid false positives. They do not include some significant areas of benefit in their calculations, and arguably under-

value others. Their policy of significantly reducing the reported benefits of many of the studies they utilise is prudent (avoiding potential optimistic bias due to studies carried out by the programme developer, or due to a weak evaluation design, for example). However they have no mechanism to increase reported benefits when a study evaluation omits known benefits. They are aware of the under-evaluation of economic benefits due to excluding ACE-type health savings, or ignoring the monetary value of breaking cycles of family violence or drug use, but prefer an approach with minimal risk of recommending a programme which might fail to deliver the projected benefits.

This rigorously 'safe' approach allows WSIPP to make recommendations with a high degree of confidence. Their top eight juvenile justice programmes, for example, have an average probability of delivering positive economic benefits of over 90%. Similarly, in adult criminal justice, they have identified 10 programmes with 100% probability of delivering economic benefits, and a further three with a 99% probability. The lack of risk in their policy recommendations makes them very popular with state legislators, and their many crime-focused efforts have paid off. Relative to national rates, juvenile crime has dropped in Washington State, adult criminal recidivism has declined, total crime is down, and taxpayer criminal justice costs are lower than alternative strategies would have required (Aos et al, 2011).

An inevitable feature of the ultra-safe WSIPP approach is that their age focus leans heavily towards later years, when the gap between intervention and financial benefit is shortest. A 2011 analysis of the age spread of a range of evaluations carried out by WSIPP between 1990 and 2011 found a ratio of more than 30 to 1 in number of evaluations of programmes related to school children or youths, compared with those related to infancy. This presumably reflects the focus of their political commissioners on the age groups which cause them most problems.

The innate caution in the WSIPP assumptions can be seen from the following (provisional) comparison of the benefits of preventing a case of child abuse, using three sources: WSIPP, Cohen, Piquero and Jennings; and an Australian estimate conducted at Monash University in Melbourne by Taylor, Moore et al (2008).

Lifetime costs of abuse (i.e. value of preventing one case of abuse) in US \$

Cost category	WSIPP	Cohen et al	Taylor, Moore et al
Child Health treatment	1,901	21,622	3,468
Additional educational assistance	<i>Not included</i>	<i>Not included</i>	3,397
Productivity losses of survivors	4,887**	<i>Not included</i>	1,690
Productivity losses due to premature death	<i>Not included</i>	<i>Not included</i>	905
Crime	169**	70,000	4,381
Government expenditure on care and protection	5,719	<i>Not included</i>	23,809
Costs of alcohol and drug abuse	13**	<i>Not included</i>	<i>Not included</i>
transaction costs of other costs	<i>Not included</i>	<i>Not included</i>	9,706
Sub-total: Costs to society exc. illness	12,689**	<i>Not included</i>	47,355
Depression, anxiety, suicide	<i>Not included</i>	<i>Not included</i>	60,767
Other long-term health costs	<i>Not included</i>	<i>Not included</i>	<i>Not included</i>
Sub-total: Costs to society	12,689**	91,622	108,123
Cost in terms of suffering of victim	22,948	178,378	<i>Not included</i>
Total Costs	35,637**	260,000	108,123

This table is highly provisional, as communication with the authors will be required to bring the cost estimates to a consistent basis. We could not find data for the items marked ** in the WSIPP column, but have estimated these from a WSIPP evaluation of the benefits of the Nurse Family Partnership. The figures may be overstated. None of the three approaches includes the long-term health costs for liver, lung, heart disease etc due to ACEs such as child abuse.

Karoly (2010), in a report calling for more standardised approaches to cost-benefit analyses, identifies the following benefits found by WSIPP in studies of Nurse Family Partnership (NFP) and Infant Health and Development Program (IHDP), but not valued by them:

NFP: Emergency room use; Earnings (and taxes); Welfare use (mother); Total births & birth-spacing (mother); Substance abuse (mother).

IHDP: Achievement tests, IQ scores, Mother-child interactions, Home environment.

Conclusion

As stated in the opening of this report, there is a great deal of massively compelling evidence in favour of the cost-effectiveness of primary preventive intervention at the earliest possible time in the life cycle. Whether programmes address maternal nutrition during pregnancy, promoting breastfeeding, understanding the cues of tiny babies or ensuring pre-schoolers develop social and emotional competence as well as the basic cognitive skills needed to learn, the strong message is that young life rewards early support. Such support must often be delivered via the prime caregiver(s) – typically the mother. If we want an affordable society that works well, we need to invest in the best possible, evidence-based early years' programmes to address this issue.

Table S.1
Early Childhood Intervention Programs Included in Karoly, Kilburn and Cannon (2005) Study
Home Visiting or Parent Education
Nurse-Family Partnership (NFP)
Developmentally Supportive Care: Newborn Individualized Developmental Care and Assessment Program (DSC/NIDCAP)*
Parents as Teachers*
Project CARE (Carolina Approach to Responsive Education)—no early childhood education
HIPPY (Home Instruction Program for Preschool Youngsters) USA
Reach Out and Read*
DARE to be You
Incredible Years
Home Visiting or Parent Education Combined with Early Childhood Education
Early Head Start*
Syracuse Family Development Research Program (FDRP)
Comprehensive Child Development Program (CCDP)
Infant Health and Development Program (IHDP)
Project CARE (Carolina Approach to Responsive Education)—with early childhood education
Carolina Abecedarian Project
Houston Parent-Child Development Center (PCDC)
Early Training Project (ETP)
High/Scope Perry Preschool Project
Chicago Child-Parent Centers (CPC)
Head Start
Early Childhood Education Only
Oklahoma Pre-K
NOTES: Programs marked with an asterisk are designated as having a <i>promising</i> evidence base because a substantial number of children were as young as age 2 or 3 at the time of the last follow-up. All other programs are designated as having a <i>strong</i> evidence base.

SECTION 2 – UK studies

The economics of UK-based early years' interventions

Having reviewed the international evidence-base for the economics of early years' intervention, this section is devoted specifically to UK-based evaluations. We examine these across a range of assessments:

While there is a significant amount of American research evidence for the cost-effectiveness of well-designed early years' interventions, there is much less data from the UK, where there has been a historical reluctance to fund early years' research because of its assumed long-term nature. This is one factor making such research (and especially Randomised Control Trials) relatively more expensive than studies for older age groups. As a result, few evaluations have been carried out in relation to UK-based early years' prevention and intervention programmes. Those which have been conducted have often been on low budgets and with a limited scope. Often such evaluations have been methodologically flawed.

Within these limitations there have been varied approaches to evaluating early years' interventions, including cost-benefit analyses (with or without randomised control trials), case studies and social return on investment studies. There have also been predictive studies, at both macro and micro level, which have compared the costs of comprehensive systems of intervention with projected savings from avoidance of the costs of dysfunction. Qualitative, quantitative and mixed method research studies all have useful information and insights about the success (and comparative value) of interventions during the early years.

The 'cost of inaction' approach

There have been UK-focused analyses that point to the very high costs of dysfunction (in individual/social terms) and the very low cost, by contrast, of interventions to prevent those high costs. These studies appeal to the common sense and judgement that early years' investment makes good sense in both economic and human terms. This 'ounce of prevention is better than a pound of cure' approach has been adopted by such countries as Sweden and the Netherlands, which top the UNICEF child wellbeing tables.

In the UK, such organisations as Action for Children, C4EO, the Centre for Social Justice and WAVE Trust, and such Government-commissioned reports as the Allen and Field Reviews, have produced persuasive analyses for the case that early years' investment makes good sense and would save substantial sums of public money.

Scotland: Christie Commission and the Scottish Parliament Finance Committee

In Scotland, the Christie Commission (Christie, 2011) has estimated that 40% of public spending is created by the failure to intervene early enough to prevent dysfunction.

The Scottish Parliament asked its Finance Committee to conduct a study of the merits of preventive spending, with a particular focus on the early years. After nine months of taking evidence, the Committee's work was summarised by former Health and Finance Minister Tom McCabe, who said:

'I will not spend time on the statistics that we heard about during the inquiry, because there are enough experts and committed individuals in the chamber who already know the basis of the evidence. They know that there is empirical evidence stacked from the floor to the sky that backs up our taking a different approach to preventative spending and investment in the early years.'

The Scottish Government, with cross-party support from the Scottish Parliament, has pressed ahead with an agenda to promote early years' preventive spending. In support of this it has declared that there has been a 'decisive shift' to preventive spending and 'a step change in the way in which we fund and deliver public services. To support this approach the Scottish Government introduced a new Early Years and Early Intervention Change Fund and, in partnership with Local Government, the NHS, the Police and the Third Sector, set up an Early Years Taskforce (and, most recently, the nationwide Early Years Collaborative) to 'take forward a significant change programme to help deliver the joint commitment to prioritising the early years of children's lives and to early intervention' (Scottish Government, 2012). Its objectives include to:

- Put Scotland squarely on course to shifting the balance of public services towards early intervention and prevention by 2016.
- Sustain this change to 2018 and beyond.

Study by GLA Economics for the Greater London Authority

This study provided evidence for, and analysis of, the case for investment in early years' interventions to address health costs and inequalities in London. The study highlighted the high costs (£13,000-£65,000 annually per child) of mental illness, emotional and behavioural disturbances, or antisocial behaviour, and cited the joint

LSE/Institute of Psychiatry study which estimated £70,000 per head direct costs to the public of children with severe conduct disorders versus £600 per child cost for parent training programmes. The report concludes:

'The evidence shows that well designed and implemented early years programmes can have significant benefits in terms of life-long health, educational attainment, social, emotional and economic wellbeing and reduced involvement in crime that far outweigh their costs... Programmes implemented in the critical pre-natal, post-natal and pre-school periods can have very high returns.'

The GLA Economics report recommends a series of pre-natal, post-natal and pre-school programmes from conception through to age 5, noting that the earliest years of a child's life provide the opportunity for the greatest benefits, with cumulative effects throughout the child's life. (Greater London Economics, 2011)

Evaluation of the Parenting Early Intervention Programme

Behaviour problems during early and middle childhood are associated with antisocial behaviour during adolescence and increased risk of negative outcomes in adulthood. The consequences of these can be very expensive for society and, on the assumption that successful parenting is a key element in preventing children developing behavioural difficulties, the Parenting Early Intervention Programme (PEIP, 2008-11) was set up to provide government funding to all 150 local authorities in England to deliver selected parenting programmes with proven efficacy in improving parent outcomes and associated reductions in children's behavioural difficulties. (Lindsay et al, 2011)

An evaluation report examined the effectiveness in everyday use in community settings across England of five parenting programmes initially selected by the government for use in the PEIP: Families and Schools Together (FAST); Positive Parenting Program (Triple P); Strengthening Families Programme 10-14 (SFP 10-14); Strengthening Families, Strengthening Communities (SFSC); and The Incredible Years.

All five programmes had an evidence base for improving parent and child outcomes when tested in small scale, controlled trials. The evaluation examined whether these outcomes could be maintained and replicated when the programmes were rolled out nationally and implemented in all local authorities in England.

The evaluation found that: Triple P, Incredible Years, SPF 10-14 and SFSC were effective in improving outcomes for parents and children; these outcomes were maintained one year on from the end of the programme; and the beneficial effects on parents' mental well-being and style of parenting, as well as children's behaviour, are all key protective factors for achieving positive long-term child outcomes.

Crucially, PEIP achieved comparable improvements in child behaviour (as reported by parents) to those achieved in the previous small scale studies. Costs were not large. For instance, reducing conduct problems and the total level of 'difficulties' measured using the Strengths and Difficulties Questionnaire required an average cost between £3,300 and £4,300. Parental gains were even more economical. For each measurable unit of improved parental mental well-being, reduced parenting laxness, and reduced parenting over-reactivity, the cost was between £2,000 and £2,600.

Over the PEIP as a whole, the cost of a parent training intervention, including infrastructure, was £1,658 per parent, with one local authority sustaining a three-year average cost of only £534.

Thames Valley Partnership

Thames Valley Partnership carried out an evaluation (Ball, 2001) of eight early intervention programmes targeted at children in areas of multiple disadvantage and high levels of crime. Some of the programmes worked with pre-school children and families, some with children in the first years at primary school. The researchers found all the programmes, at low cost, had some beneficial effect on children, their parents and their schools, or on all three together. The younger the child, the more pronounced the effects on behaviour. While the study did not include a formal cost-benefit analysis, the authors stated:

'These interventions have had an effect on parenting and the behaviour of the children involved, and they are not expensive.'

Case study approach

Both North-East London Foundation Trust (NELFT) and the University of Salford have carried out case study analyses of early years' interventions in practice.

NELFT

In the NELFT cases, the main costs were for the time of a Consultant Perinatal Psychotherapist.

In their Case 1, a suicidally depressed 17-year-old mother was living in an environment of domestic violence with a 6-week-old baby who was becoming hypervigilant, depressed, thwarted and dissociated. The treatment cost £8,208.

Following perinatal mental health intervention, the child is now 8 years old and thriving; the mother is with a new and stable partner, has had 3 more baby boys and experienced no difficulties with them. There is no domestic abuse. The intergenerational transmission of trauma has been broken. The estimated costs to health and social services alone, if treatment had not taken place, would have far exceeded the cost of the intervention, without even taking account of predictable extra expenditures on the children's schooling, criminal justice and physical health costs in the long term, or inter-generational effects.

NELFT Case 2 was of a 23-year-old mother, referred when 6 months pregnant suffering from escalating aggression and anti-social tendencies with a diagnosis of Borderline Personality Disorder. She had lost custody of two previous children. Treatment cost £5,265.

In Case 2, the baby is now securely attached to both mother and father and the mother is now studying 3 'A' levels with a plan to seek employment.

In both examples the absence of intervention was reliably projected to have resulted in highly expensive consequences in terms of the costs of lasting damage to parent and child and the costs to health services of dealing with these.

University of Salford

The University of Salford (UoS) carried out two case study analyses (Livesley et al, 2008) of an intervention to provide a budget-holding leading practitioner to families with very young children or babies. The project promoted more effective early intervention through earlier identification of, and response to, unmet needs.

In UoS Case 1 there were children aged 6 years, 5 years, 2 years and 6 months. Previous family history had included sexual abuse of two of the girls by the mother's previous partner. Neither mother nor current partner was working, and they were in debt. The property was sparsely furnished, uncarpeted and partially fire-damaged. Concerns were raised by the family health visitor about the home environment and the social and emotional development of the children. Intervention in this case cost £6,768.

In UoS Case 2 there were 4 children aged 4 and 3 years and twins of 18 months. The mother was pregnant. Their house was cramped, in poor condition, unsafe and too small. The father was unemployed and could be volatile following the effects of a traumatic motoring accident. The children and the mother were all showing signs of stress and the twins and 3-year-old were displaying developmental delay and behaviour problems. Intervention in this case cost £16,868.

In the UoS Cases, costs were a mixture of (mainly) providing professional support through midwives, health visitors, lead practitioners and others, and (at a lower level) such practical help as provision of beds and carpets, or payment for Montessori sessions for some of the children.

Professionals engaged with the families projected the likely cost consequences if the support had not been provided. The benefits (i.e. future costs avoided) exceed the intervention costs in Case 1 if there is a 9% or higher probability of realising the professionals' projections; in Case 2 benefits exceed the costs if there is a 16% or higher probability of realising the projections. The judgement of the practitioners is that the costs avoided significantly exceed the costs of the interventions.

Social return on investment (SROI) approach

SROI is a form of adjusted cost-benefit analysis that puts a value on some less tangible outcomes, such as improved family relationships. It considers the benefits that accrue from services to a range of stakeholders, children, families and communities.

C4EO analyses of Social Return On Investment (SROI)

Early years' intervention to increase breastfeeding

Blackpool Children and Young People's Department developed Children's Centres that welcomed breastfeeding, ensured staff directed queries about breastfeeding to both professional and voluntary sources, and set up support groups. The Primary Care Trust (PCT) provided training to staff and the Children's Centres promoted the 'Be a Star' campaign aimed at increasing the perceived value of breastfeeding to young women. The PCT and Children's Centres worked in partnership to reach out to mothers in disadvantaged areas who were predictably less likely to breastfeed.

Breastfeeding support groups were developed, breastfeeding training was made available to frontline staff and the first satellite breast milk bank centre in the UK was set up, as was a signposting service to breastfeeding mothers and their partners.

Breastfeeding initiation rates rose from 42% to 56% over a 2-year period, an increase sustained over the following two years. 903 vulnerable young mothers received targeted support at a cost of £29,811, or £33 per mother. The SROI reported by C4EO was £1.56 for every £1 invested, and the estimated savings to local health services were £57,500, e.g. from reduced GP and A&E visits, over a two-year period (C4EO, 2010).

I CAN Early Talk, Kent

Concern about the number of children with severe speech, language and communication needs requiring a specialist unit place in a primary school led to a joint partnership agreement with I CAN to develop Kent's first specialist Early Talk centre. The aim was to offer a targeted, multi-agency approach to supporting young children with severe speech, language and communication needs, so that they could participate in everyday activities and attend their local primary school – empowering parents as co-educators in a programme that could be delivered in a nursery, children's centre or home.

The Ashford Better Communicators Service established a virtual team including a Speech and Language Therapist (SLT), a Learning Support Assistant, a children's centre teacher, an Early Years Special Educational Needs Coordinator and staff from a nursery based in a children's centre. A referral pathway was established and targets set in partnership with the parents. Parents received regular support from both the virtual team and a dedicated parents' support group.

Four years after the programme was designed 92% of the children supported attended their local primary school and made good progress, rather than requiring specialist language provision; 70-80% had increased their understanding and use of language to an extent greater than was predicted without this intervention. The success of the programme led to its roll-out to other areas of Kent.

The programme was delivered to 37 children at a project cost of £46,300, with an SROI of £1.37 for every £1 invested. This translates into estimated savings of £17,131 over the anticipated extra costs for these children in the absence of this intervention.

New Economics Foundation (nef) / Action for Children

As part of the Backing the Future study for Action for Children, the New Economics Foundation (nef) conducted Social Return on Investment (SROI) analyses on three Action for Children projects (Nef, 2009). Two of these interventions, one in Doncaster and one in East Dunbartonshire, impacted the early years:

Wheatley Children's Centre, Doncaster

Wheatley Children's Centre (WCC) in Doncaster has aims geared towards achieving the goals of 'Every Child Matters' by promoting the following outcomes:

1. Be healthy
2. Stay safe
3. Enjoy and achieve
4. Make a positive contribution
5. Achieve economic well-being

WCC has developed theories of change for all their activities to explain how their children's activities achieve the above outcomes, and the Centre provides a mixture of universal and targeted services to children aged 0-5.

Nef calculated an SROI ratio for WCC of 4.6:1, i.e. an estimated £4.60 worth of social value was generated for every £1 spent on the programme. Nef carried out a number of sensitivity analyses on the results. These suggested the conclusions were robust; for example, for the most significant outcomes (by value) of education, mental health and family relationships, a halving of the unit proxy values resulted in a reduction in the SROI to no lower than 3.7.

The Doncaster analysis provides interesting data for those reflecting on the relative merits of universal services vs. those targeted at high-need children alone. High Need children at WCC represented only 8% of the number of children being supported and gained 27% of the benefit from the service while 73% of the financial benefit came from the 92% of children categorised as Low Need. Despite the projected benefits lasting for a shorter period of time for the latter group, the group size (over 800) offset the shorter benefits period.

East Dunbartonshire Children's Centre

This service provided short-term, focused and flexible support for children, young people and families in crisis. Its goals were to reduce the number of children being looked after and accommodated; assess more accurately children's needs; support parents better to meet their children's needs; and help children and young people address issues that may be affecting their lives and well-being.

Project staff worked intensively with families for a period of 8 to 12 weeks. Referrals were made by social workers with the permission of families.

The SROI calculated by nef was £9.20 return for every £1 invested. The most significant value (34%) was obtained by the state, which recouped its investment by the end of one year. This was primarily through the reduction in need for foster care and its associated costs. Children and families also derived significant benefits. Parents benefited from the changes in behaviour and social skills of their children, and from their own improvements in confidence, self-esteem and anger management, as well as broader parenting skills and knowledge. Children benefited from the improved parenting skills of their parents, and better behaviour of their siblings. Most of the value was delivered within the first three years, but there is significant value to both children and the state in the longer term.

Barnardo's – 4 early years' services

A set of SROI evaluations on early years' services provided by Barnardo's was carried out by the international consultancy firm, ICF GHK (Mason et al, 2012).

Stay and Play, Bournemouth

Stay and Play groups are delivered weekly, for families with children under the age of 2, with weekend groups on a bimonthly basis and some groups targeted at families with such particular needs as English as an Additional Language. Stay and Play sessions offer parents opportunities to: build networks of support with their peers; receive parenting and childcare advice and guidance; and receive signposting to other services.

Benefits identified included improved confidence of parents; improved knowledge of parenting strategies; improved English language skills for children with English as an Additional Language; improved diet; increased access to physical activities; parents' promoting children's play and learning; improved progress in children's learning and development; reduced social isolation; reduced obesity; and improved parenting. ICF GHK calculated an SROI of £2 for every £1 invested.

Family Support Workers, Warwickshire

Family Support Workers (FSWs) at Evergreen Children's Centre in Warwickshire provide families with children under 5 who have additional needs with intensive one-to-one support.

Referrals to the service are made by health, education, voluntary and community sector organisations, and statutory services. Following referral an initial assessment takes place to assess the specific needs of families. These families are then matched with an FSW. FSWs discuss and agree a package of tailored support responding to the families' needs, taking account of the families' views. Support is discussed with families on an on-going basis and closed with their agreement.

Benefits identified included improved parenting skills; improved confidence of parents; reductions in the level of risk / harm to children; safer home environments; improved access to information on housing, health, benefits, rights or support needs; reduced numbers of families accessing high level services; reduced social isolation of families; improved family relationships; and carers promoting children's play and learning. The consultancy firm calculated an SROI of £4.50 for every £1 invested.

Tiny Toes: Hazlemere and Loudwater Children's Centres

The Tiny Toes service supports expectant teenage and young mothers and their babies. It brings mothers together in a safe, fun and educational environment, allowing Tiny Toes to address a range of complex issues experienced by mothers.

The service is intensive; Tiny Toes staff make it as easy as possible for the expectant mothers to attend. This includes providing very strong encouragement and even picking mothers up and taking them to appointments. A wide range of support includes cooking and preparing food; supported play; training towards accredited qualifications; trips to events and attractions; and specific issues delivered by expert professionals.

Benefits identified included improved parenting skills; improved parental confidence; reduced social isolation; improved family health; reduced levels of risk / harm to children; improved resource management by parents; and parents' accessing employment, education and /or training. Tiny Toes was judged to deliver an SROI of £3.50 for every £1 invested.

Triple P: Brock House, Somerset

At Brock House Children's Centre in Somerset, parents attending the Triple P parenting programme are in need of additional support to manage their child's behaviour but are not amongst those at risk of having their children taken into care. Families are referred to the service by a range of agencies and a crèche is provided to support attendance.

Four weekly group sessions are delivered by a Project Worker and a Parenting and Family Support Advisor (PFSA), plus two further weeks of telephone support. If additional support is required, home visits are provided. On completion of the programme, parents are encouraged to build relationships with their peers and continue to access such universal services as Stay and Play.

Benefits identified included improvements in parental confidence; social networks; knowledge of parenting; family relationships; and child behaviour. Triple P was estimated to deliver an SROI of £2.50 for every £1 invested

In commenting on their methodology, ICF GHK state that in valuing outcomes they have taken a conservative approach, and where they have been unable to establish a plausible financial valuation for specific benefits have said so and excluded them from the final ratio. They conclude: 'This means that the results presented are, if anything, an underestimation.' Sensitivity analyses suggested the results were stable when key variables were modified.

Cost-benefit analyses

Commissioners frequently need to make difficult choices between alternative investments. In making such choices it is valuable to know not only which spending decisions deliver the desired results, such as improved mental health or improved parenting, but also what (if any) economic benefits flow from different decisions. Cost-benefit analysis compares these factors for specific programmes or policies and adds to the information available to commissioners.

NICE (The National Institute for Health and Clinical Excellence) and other organisations use a standard and internationally recognised method to compare clinical effectiveness: the quality-adjusted life years measurement (the 'QALY'). Although one intervention might help someone live longer, it might also have serious side effects. Another treatment might not help someone to live as long, but it may improve their quality of life while they are alive (for example, by reducing pain or disability). The QALY method gives an idea of how many extra months or years of life of a reasonable quality a person might gain as a result of treatment.

NICE Assessment Group evaluation of parent-training/education programmes

A NICE Assessment Group evaluation of Parent-training/education programmes in the management of children with conduct disorders (NICE 2009) concluded there was evidence of effectiveness for such programmes. The costs of conduct disorder were found to be high: £63,000 higher per child than for those with no problems, and £24,324 per child higher than for children with the less serious diagnosis of conduct problems.

The Assessment Group concludes that, for children with conduct disorders, these programmes are cost-saving, with the majority of the savings accruing to education and health services. The Assessment also noted possible additional savings, beyond those in their evaluation, from youth justice, adult healthcare and social services. The report states:

'The Committee was persuaded therefore that a wide variety of public services stood to benefit from the appropriate implementation of parent-training/education programmes.'

Morrell et al (post natal depression)

Morrell et al (Morrell et al, 2009) carried out a randomised cluster trial to estimate any differences in outcomes for women with post-natal depression, (and their families and infants) who received two different forms of psychologically informed treatment in intervention groups (IGs), delivered at GP practice (cluster) level, compared with the health visitors' usual care as the control group (CG). The secondary aim was to establish the relative cost-effectiveness of the intervention from an NHS perspective.

While there were weaknesses in the study (e.g. missing data) the authors concluded:

'The results show a consistent pattern of psychological approaches being cost-effective at funding levels used by NICE. This was achieved by lower mean costs and higher mean QALYs [Quality Adjusted Life Years] gained in the Intervention Group. Although these aggregate differences are not statistically significant in isolation, in combination they produce a high probability of the intervention being good value for money.'

London School of Economics study for the Department of Health

Mental health promotion, prevention and early intervention

This study was set up to identify and analyse the costs and economic pay-offs of a range of interventions in mental health promotion, prevention and early intervention. The approach and assumptions were conservative – i.e. designed to under-state rather than over-state benefits - across all areas investigated. (Knapp et al, 2011) We include here two interventions, one addressing post-natal depression in the first year; the other addressing parenting programmes for conduct disorder when children were aged 5. Although this is outside the 0-2 age range which is the focus of our report, it does give an indication of the economics of a parenting intervention at age 5, and NICE itself recommends addressing conduct disorder at as early an age as possible, stating:

'Prognosis is particularly poor in early-onset conduct disorders, reinforcing the importance of early effective treatment. More than 60% of 3-year-olds with conduct disorders still exhibit problems at the age of 8 years if left untreated, and many problems will persist into adolescence and adulthood. Approximately half of children diagnosed with conduct disorders receive a diagnosis of antisocial personality disorders as adults, with others being diagnosed with psychiatric disturbances including substance misuse, mania, schizophrenia, obsessive-compulsive disorder, major depressive disorder and panic disorder'.

<http://www.nice.org.uk/nicemedia/pdf/TA102guidance.pdf>

1. Post-natal depression

An evaluation of a health visiting intervention to reduce post-natal depression was compared with routine care after childbirth. The authors found that, over a one-year time horizon, and excluding benefits to fathers or infants, there were no cost savings, because lower treatment costs and reduced workplace productivity loss were outweighed by increased training and higher staff costs. Over the longer term, however, the model predicted cost savings from reduced treatment costs and productivity losses (where depression persists) together with savings in costs of negative behavioural, emotional and cognitive consequences for the children of mothers who suffered from post-natal depression. The authors comment that their methodology is likely to produce conservative estimates of benefits, both because of conservative assumptions and because no monetary value was put on the health and quality of life gains for the beneficiaries, i.e. the children of these mothers.

2. Parenting programmes for conduct disorders

An evaluation of parenting programmes targeted at parents of 5-year-old children with, or at risk of, conduct disorders found parent training to have positive effects on children's behaviour, and that the benefits persist. The study's economic model calculated total gross savings over 25 years of £9,288 per child, exceeding the cost of the intervention by a factor of 8 to 1. No benefits were assumed from such wider impacts as improved employment prospects, reduced adult mental health issues and improved outcomes for the child's family and peers, which the authors suggest are likely to be substantial. If accurate, then this would make the intervention an even better investment than reported. As noted above, the earlier in the child's life such parenting programmes for conduct disorder are delivered, the earlier their benefits will begin to accrue.

Randomised control trials (RCTs)

While there are numerous RCTs of early years' interventions showing good evidence for economic value from other countries, few RCTs assessing economic benefit have been conducted in the UK. We found two: the Social Support and Family Health Study; and the Oxfordshire Home Visiting Study. Findings were very mixed; this is not surprising in view of the particular intervention designs chosen. Despite the caveats, both offer valuable learning.

Social Support and Family Health Study

The Social Support and Family Health (SSFH) study began 14 years ago and ran for 3 years. It was delivered to women in deprived districts of Camden and Islington.

Two initiatives were assessed: home-based listening support by health visitors, and the services of community support organisations. Both were compared with routine services. The primary outcomes of interest were child injury, maternal smoking and maternal psychological well-being; with secondary interest in health, health service use and changes in household resources.

In essence, the home visiting arm tested the value of providing non-intrusive listening support of about 7.5 hours in total length, over a 12-month period, for new mothers. Although the service was primarily a listening one, health visitors did provide advice if asked. The service was very popular with most mothers, especially because of its focus on what the mother wanted to talk about, with a minority of mothers finding the visits to be pointless.

Fewer than 20% of mothers allocated to community support groups used the services. Home visiting organisations had a higher uptake than those requiring the mother to drop in.

At 12 months post-randomisation the study found slightly lower levels of depression, child injuries and maternal smoking in the intervention groups, and higher levels of reported good health for children. However, none of these results were at a sufficient level to eliminate chance as an explanation. Both intervention groups reported better health than control group women. Overall, 18% of women in the health visitor group and 19% of community group women said they had poor health, compared with 26% of control group women.

The study found no evidence that the interventions produced economic benefits; on the other hand they cost no more than routine services, small savings matching their low costs.

The modest results of the experiment were not a surprise to the service providers. The researchers stated in their summing up:

'The apparent inability of either intervention significantly to improve major health outcomes is consonant with the views stated in the process evaluation by the providers of both interventions. The view was expressed that social support alone, whether given by health visitors or by community services, is unlikely to be able to counteract the health-damaging effects of social and material disadvantage, including the stresses and difficulties that are a normal part of many mothers' lives in countries such as the UK today.' (Wiggins et al, 2004)

Given that approximately 40 minutes per month of extra 'listening' took place, it is difficult to imagine the benefits originally anticipated accruing from such a modest intervention.

Oxfordshire Home Visiting to reduce child abuse

The Oxfordshire Home Visiting Study evaluated the effectiveness of a professionally delivered, intensive home visiting programme beginning during the antenatal period and continuing for one year after birth. It thus lasted approximately 18 months, compared with 30 months for the Family Nurse Partnership programme (Barlow et al, 2008).

It was designed to improve parenting and child outcomes, including the prevention of abuse and neglect. Its recipients were 131 high risk women, with children who were not necessarily the first for those parents – again a contrast with Family Nurse Partnership, which focuses on first-time mothers (as they tend to be more malleable in their parenting behaviours).

This is a complex study to interpret. Some of the benefits it delivered – greater maternal sensitivity and greater infant cooperativeness in the first 12 months – were not repeated at 3-year follow-up. However there is research evidence that it is sensitivity in the first 12 months of life that is most crucial to child outcomes (Martin, 1981, Shaw and Winslow, 1997)

In addition, children in the intervention group who suffered maltreatment were more likely to be detected, and more likely to suffer maltreatment for shorter periods of time. These findings were not at a level of statistical significance, due largely to the small numbers involved. The authors comment that the findings may be clinically significant, in particular because of the benefits of identifying abuse at as early an age as possible, and might have reached statistical significance in a larger trial. These findings could be of very significant economic value.

On some subsidiary measures, the control group performed better than the experimental group. It is perhaps worth looking at the findings on detection of abuse in detail, as these bear heavily on the economic evaluation:

	Intervention Group	Control Group
Number of Participants	66	60
Children re whom concern registered by health or social services professionals	19 (28.8%)	13 (21.7%)
Physical abuse concern	1 (1.5%)	1 (1.7%)
Neglect concern	11 (16.7%)	8 (13.3%)
Emotional abuse concern	7 (10.6%)	4 (6.7%)

There was marginally more concern and proactive engagement in the intervention group, while child deaths were higher in the control group.

	Intervention Group	Control Group
Number on Child Protection Register	6	4
Children removed from home long-term	6	4
Children who died	0	2

One child removed long-term from home, in the control group, had had their name placed on the Child Protection Register twice in the preceding years, and was finally removed from home due to neglect at age 4.

Of the two children who died, the coroner recorded an open verdict on one with child protection concerns; in the other case, a paediatrician involved had a high level of concern about non-accidental bruises on the child, but the child died before a child protection investigation could take place.

Economic evaluation

In the three-year follow-up report, Barlow et al state that the results suggest that intensive home visiting improved maternal sensitivity at 12 months and better enabled health visitors to identify infants in need of further protection at an incremental cost of £3,985 per woman over 36 months, and conclude:

'The extent to which these potential benefits are worth the costs, however, is a matter of judgment.'

The following remarks address that judgement – tentatively, because the numbers in the study are too small to exclude the possibility of the results merely reflecting chance.

Cohen, Piquero and Jennings (Cohen et al, 2010) have identified the present value lifetime cost of child abuse and neglect in the United States as being US \$250,000-285,000. This equates at a November 2012 exchange rate to £166,864 in UK money. A UK professor with experience in this field suggested that UK costs of abuse and neglect are unlikely to vary much from those in the US, with some components being higher and some lower. Thus the detection of even one additional case of abuse or neglect would provide an economic payback on the cost of detection indicated in the Oxfordshire study provided that only one additional child was saved from harm for every 41.9 mothers (i.e. £166,894 divided by £3,985) receiving the intensive health visiting service.

The tables above show two fewer child deaths in a cohort of 66 mothers receiving the home visiting intervention, and six more children (7%) about whom concern has been registered. While the numbers involved are too small to eliminate chance as an explanation of these figures, at face value the intervention is protecting children at significantly above the level needed to break-even and deliver a financial benefit. Again, at pure face value, assuming just two were saved from abuse or neglect by the intervention (not implausible given four more children were placed on the risk register or removed from home, two fewer died, and many others received more sensitive parenting), the cost would have been:

$$66 \times £3,985 = £263,010$$

And the saving would have been

$$2 \times £166,984 = £333,788$$

This represents a 27% return on investment – in line with the assertions of both Professor James Heckman and the Federal Reserve Bank of Minnesota that early years' investments far exceed stock market returns. Further, this apparent pay-off does not factor in any benefit from improved maternal sensitivity (i.e. it ignores the benefits to all other children from improved quality of parenting, or of the value of the health benefits of reducing ACEs in the children's lives). Given that a single form of abuse (e.g. neglect or emotional abuse) has been shown by Felitti and Anda (2009) to result in between a 30% and 70% higher rate of heart disease in the victims, and Cohen et al (2010) have estimated that a single case of heart disease costs about \$150,000 (£93,750), the 27% ROI calculation could be quite conservative. However, to repeat, these are very tentative conclusions given the small numbers involved.

Subsidiary measures

On a number of subsidiary measures the outcomes for the control group were better than those for the intervention group (12 vs 18). This study was of a very high risk sample of mothers – the average number of risk factors (such as mental health problems, domestic violence, drug and alcohol abuse) in the intervention group was 5.4 for each mother (4.8 in the control group). The designer of the intervention, Professor Hilton Davis, believes that to be truly effective with families suffering such severe and multi-faceted problems would involve:

*a support team of experts to provide the health visitors with easy access for relevant referral (e.g. to housing and/or psychiatric support), and
more extensive training in the 'partnership', rather than the 'expert', model of interaction between parents and health professionals.*

Given the conditions, the cut-off point of the support might have been too early, but might be effective with less complex families, or where there was a circle of expert support available for referral, or both.

Predictive studies

Finally we look at three predictive studies, two at a macro and one at a micro level, each of which compared the costs of systems of prevention or early years' intervention with projected savings from avoiding the costs of dysfunction in the lives of children.

At a macro level, two UK charities, Action for Children and WAVE Trust, have recommended a conscious switch of policy in the UK from remedial interventions after harm has occurred to investment in preventing harm from happening in the first place. Using quite different costing methodologies, both of these third sector organisations have projected major benefits to society – including financial ones – from such a preventive strategy.

Both studies assumed a national commitment to transformational change in levels of disadvantage and adverse outcomes for society. At a micro level, Croydon NHS Trust and Croydon's local authority conducted a joint study, the Croydon Total Place report, with the more modest aim of simply improving the outcomes of the most disadvantaged children and families in their borough. The following table summarises the costs and benefits predicted by the three studies, with the Croydon figures uplifted (pro rata to population) to national (UK) scale for comparison:

£ billion

	Predicted Costs	Predicted Benefits	Return per £ invested
Action for Children	£619.7	£1,499.9	£ 2.42
WAVE Trust	£ 97.0	£ 686.1	£ 7.07
Croydon NHS & LA uplifted to national scale	£ 12.7	£ 144.8	£11.44

On a Net Present Value basis, the Croydon returns fall to £9.82 per £ invested. On the basis of these comparisons, the Action for Children predictions look quite conservative, which they claim to be.

The Action for Children model assumes the need for much higher universal costs than the WAVE Trust model, while the Croydon Total Place approach includes neither the costs of targeted interventions, as recommended by both WAVE and Action for Children, nor the comprehensive investment in improved universal services proposed by the latter.

Macro Studies

Action for Children / New Economics Foundation

In *Backing the Future: why investing in children is good for us all* (Action for Children and New Economics Foundation, 2009), a joint report by Action for Children and the New Economics Foundation, the authors cite the extensive evidence of the harmful effects that social problems such as drug use, crime, inequality, family breakdown, and poor mental health can have on children's well-being and their future life chances, and observe that these negative outcomes are being transmitted from generation to generation, perpetuating and deepening cycles of inequality and disadvantage. They then calculate the costs of doing nothing to improve social problems in the UK over the next 20 years and project these to be almost £4 trillion.

The authors then propose a twin-track approach to minimise this cost, and its associated waste of human capital and quality of life. First, to break the vicious cycle of inter-generational disadvantage, they propose a series of targeted interventions for the most 'at risk' children, young people and families. Second, to make these improvements permanent and to consolidate deeper structural change, they propose a set of universal interventions, the phasing in of a more holistic approach to children's services along the lines of the most successful European countries, with access to universal high-quality childcare and properly funded parental leave, coupled with proven support services and delivery models.

The study uses data from the Washington State Institute for Public Policy both to cost the targeted programmes, and to estimate their effectiveness in reducing negative outcomes such as drug abuse, crime, teenage births and mental illness. Effectiveness was assumed to be half that found by evaluations, to avoid over-claiming. In estimating the effectiveness of the projected increase in preventative universal services, the authors identified the top performing countries in terms of child well-being and social outcomes and assumed a switch to social policies

that appear to produce better outcomes in these countries, such as high-quality universal child care, well-funded parental leave and attention to improving the quality of early interactions between children and their parents. These were costed assuming both the need for fixed costs such as building facilities and training staff, and the running costs of delivering the improved services. Returns from investment in universal services were assumed in two forms: reduced spending on existing measures such as cash transfers to reduce child poverty (which international comparison suggests are less effective than improved universal services), and savings from improved positive outcomes after children reach 10 years of age. The assumption is that without significant investment in universal services, the improvements in outcomes from the targeted interventions will not be sustained.

It should be noted that while the increased investments in universal services proposed are essentially early years and prevention focussed, the targeted interventions include several which are not early years.

This very detailed and carefully reasoned approach produces forecasts of total new spending of £620 billion (£428.3 universal and £191.4 targeted), and savings of £1.5 trillion (£1,039.84 billion from universal and £460.7 billion from targeted). The calculations of benefits produce predicted returns on investment of £2.43 per £1 invested for improved universal services, £2.41 per £1 invested for targeted services (the similarity of these figures being coincidental), and £2.42 per £1 invested overall.

WAVE Trust

Operating with a much smaller budget for evaluation, the approach of WAVE Trust produced similar conclusions. In this case an Excel-based computer model was set up to predict changes in levels of child maltreatment (physical abuse and neglect) as part of WAVE's campaign to reduce child maltreatment by 70% in the UK by 2030 – i.e. its 70/30 strategy. While the economic evaluation is much less sophisticated than the nef/Action for Children approach, the model's operational assumptions led to it being described by the Centre for Social Justice as the leading-edge computer model of its kind when created in 2010, and it was used by the Cabinet Office, also in 2010, as input to its studies.

The computer model explores one possible way (not necessarily the recommended way) in which the challenge of reducing child maltreatment by 70% by 2030 might be approached. The model, designed by Brojo Pillai, takes this shape:

1. It begins with the cohort of children born in the first year of this comprehensive intervention and assumes a certain proportion of families are vulnerable - i.e. their children are at risk of being maltreated.
2. It uses validated screening instruments to identify families at different levels of vulnerability (Level 1 = no concern, Level 4 = grave concern).
3. Families identified to be vulnerable (Levels 2, 3 and 4) are encouraged to participate in a set of evidence-based interventions. Some families may require a strong incentive to participate in the interventions; for some, who are severely maltreating their children, participation may be mandatory.
4. The interventions proposed were selected as part of an international review of best practice. They have proven to be effective in preventing child maltreatment, or addressing its consequences.
5. Over the course of the year, these vulnerable families are exposed to a number of interventions. Each intervention has a certain effectiveness in terms of its likelihood to have a particular positive impact on a family's vulnerability. Effectiveness is measured by a set of values that are representative of both the intervention and the level of vulnerability of the family.
6. At the end of each intervention, a certain number of families would have become less vulnerable to maltreatment. Some families will move from the highest level of vulnerability (Level 4) to a lower level (Level 3). Some may even move out of the radius of vulnerability (to Level 1).
7. The goal is to move at least 70% of families who would otherwise be within the radius of vulnerability (Levels 4, 3 or 2) outside of that radius (to Level 1).
8. At the end of the first year, and a set of interventions later, a number of families would have made that move to Level 1.

9. At the start of the second year, the whole cohort is screened again, using a screening instrument appropriate to that age group (the one-year-olds). Once again, families at different levels of vulnerability are identified (Level 1 to Level 4). The number of families at Level 1 would be higher this time, because of the previous year's interventions.
10. Families who are still at Levels 2, 3 and 4 are offered another set of interventions, appropriate for this age group (one-year-olds). Again, these interventions were carefully selected as part of an international review of best practice.
11. This process of screening and offering interventions to the families who need them, continues until the child turns age 16. A number of universal interventions are also included, and these are offered to children and families at all Levels (1, 2, 3 and 4).
12. Interventions assumed include First Steps in Parenting, Front Pack Baby Carriers, Video Interactive Guidance, Family Nurse Partnership, Circle of Security, Triple P, Incredible Years, Mellow Parenting, Roots of Empathy, the Dorset Healthy Alliance and a domestic violence reduction programme.
13. Unit costs for each intervention were calculated, typically through discussion with the intervention creators, such as Dr David Olds for Nurse Family Partnership. Costs of running these interventions at the scale required were calculated at each stage.
14. As the first cohort moves into the second year of the 16-year schedule, a new cohort is born, and they move through the first year of the 16-year schedule. In the third year there is a new cohort moving through the first year of the schedule, another cohort moving through the second year, and a cohort moving through the third year of the schedule. This process continues until, 16 years later, there are 16 cohorts simultaneously experiencing the programme. An estimate of the cost of doing this, and the likely result of doing this, was then calculated. The model followed a narrative laid out in the Excel worksheet.
15. To summarise its results, the model suggests we can reduce the risk of child maltreatment in the UK by 84% within 16 years, at a total cost of £97 billion. Further, we can reduce the risk of maltreatment for a single birth cohort by 79% over the next 4 years, at a cost of £5.1 billion. The computer model was driven by a number of assumptions, and was designed to allow users to see, instantly, the impact of changing any or all of these assumptions.
16. The author comments that the possible cost of £97 billion over 16 years may, at first glance, seem high, or unaffordable. However, against this may be set the costs being incurred as a result of adverse early childhood experiences. These were estimated more conservatively than in the nef/Action for Children model, at £429 million. The author concludes that if just 10% of these costs can be avoided as a result of the interventions, it would repay the investment seven times over. Moreover the £97 billion is mainly a one-off cost over a 16-20 year period, whereas the benefits would flow for a much longer time scale (Pillai, 2010).

Micro Study

Croydon local authority and Primary Care Trust, after an exhaustive study through the Treasury-initiated Total Place analysis of all money spent in their area, concluded (NHS Croydon and Croydon Council, 2010) that the introduction of an early years' preventive strategy with a particular focus on preparation for parenthood, beginning with maternity services, would lead to a return on investment of more than £10 per £1 invested.

The Croydon approach planned to focus service redesign on 4 wards in the borough, approximately 15% of the overall population, identified on the basis of high levels of need and poor outcomes. An improved early years' infrastructure and a limited set of universal propositions were to be implemented borough-wide.

A key assumption arising from the Croydon study was that it was possible to make very substantial savings over time. The report stated:

'We believe it is possible to achieve radical efficiency: innovations which both release significant cost savings as well as improvements in outcomes. At the same time as increasing the volume and effectiveness of prevention and early intervention work, we have calculated the savings that we will make over time: short term savings in specific service areas and medium term savings particularly in reducing our spending on cost of failure – services dealing with poor outcomes in older children and

young people. In both cases these cut across service providers, with a focus particularly on NHS Croydon and Croydon Council.

In keeping with HM Treasury finance, we have applied discounted rate over time (Net Present Value) to our figures. We anticipate savings on an NPV basis of over £8.4m during the spending period 11/12 - 13/14, £25m by the end of the next spending period (ending 16/17) and more than £63m by the time our current 4 year olds turn 18 in 23/24. These calculations are net of up-front investment costs as well as new revenue costs, and are based only on implementing our main propositions in 4 of our wards: we therefore believe our estimations are conservative.'

The report goes on to forecast savings outside the borough, and to recommend investment in early years' prevention approaches across public bodies more widely:

'It is clear that we will also deliver substantial long term savings to the public purse, as we reduce the number of young people who end up in the justice system and in prison, and increase the number of children who grow up to be economically active, net contributors to society, capable of parenting effectively themselves. We have not sought to estimate these long term savings at this stage, but they are likely to be very significant, and accrue to public bodies beyond the boundaries of Croydon. A systems thinking approach would suggest a strong case for these services to invest in early years' intervention as part of their own preventative agendas.'

Croydon Total Place echoes the financial findings of Action for Children, RAND and Reynolds, and supports the recommendations of the Federal Bank of Minnesota, Heckman and the Harvard Center on the Developing Child (see international economics section), that investment in early years' prevention is worthwhile, and far exceeds the returns of stock market investments, but from a uniquely English and local-based perspective.

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