

The costs and benefits of early interventions for vulnerable children and families to promote social and emotional wellbeing: economics briefing

Madeleine Stevens, Personal Social Services Research Unit (PSSRU) London School of Economics and Political Science

Purpose

This briefing aims to provide an overview of economic evidence relating to the impact of early interventions designed to promote the social and emotional wellbeing of vulnerable children. The briefing aims to give a context and commentary to the economic reports by ScHARR, relating to NICE guidance on *Promoting the social and emotional wellbeing of vulnerable children (under 5s): through home visiting; and early education and childcare*. It draws mainly on literature not covered in the ScHARR reports, as well as commenting briefly on the ScHARR reports.

Quality of the economic evidence relating to early interventions

The following particular issues need to be considered with respect to the quality of the economic evidence.

Lack of primary economic evidence

Drawing clear evidence-based conclusions from existing economic studies is problematic due to the small number of primary studies and controlled long-term follow-ups from intervention trials. A wide variety of methods, interventions and measures of costs and outcomes make it difficult to compare results across studies.¹ Part of this complexity reflects the nature of children's services, with multifaceted interventions involving multiple agencies and a plethora of possible objectives and outcomes. Common failings in existing studies are a lack of clarity in key assumptions and a lack of sensitivity analysis to address uncertainty in the results.²

The only primary economic evaluations with long-term follow-ups seem to be the US preschool studies discussed in the ScHARR review (most famously Perry/Highscope) and the David Olds study which sparked the interest in Nurse Family Partnerships(NFP).³

While not a substitute for well-designed RCTs, simulation models can help to fill the gap, and can be produced relatively quickly. Although dependent on the quality and transferability of existing effectiveness evidence these models *can* draw on a significant evidence base to identify the early childhood factors associated with longer term outcomes, to estimate the possible longer-term effects of interventions.

Measurement of economic benefits

There are many potential economic impacts of early intervention but not all are straightforward to measure; estimates are therefore mainly based on crime, education, employment and earnings.^{4,5} The evidence linking these to early childhood problems is particularly strong for behaviour problems.⁶⁻⁸ There is also evidence of continuities in emotional difficulties⁶ and the substantial current and projected future costs of mental health problems in adulthood have been shown.⁹ Most studies in clinical samples showing persistence of childhood social and emotional disorders, such as depression, deal with ages over five (e.g.¹⁰).

Relationship between mental wellbeing in childhood and adult economic outcomes

Studies looking retrospectively at childhood precursors of problems in adults tend to find stronger evidence of continuities from early childhood to early adulthood than prospective studies which look forward; So for example the large majority of young adults with a psychiatric disorder will have had diagnosable problems in youth, but most children with anxiety and depression in childhood do not have these disorders in childhood.¹¹ Nevertheless, using the BCS70 Feinstein and colleagues have shown that high cost/harm adult outcomes can be predicted from family context and child development data up to age 11.¹²

There is mounting evidence of the strong association between early behaviour problems and later delinquency and criminality,¹³⁻¹⁷ even after controlling for family characteristics.¹⁸ There are also links between conduct problems at ages 10 and 16 and poor education⁷ and unemployment.⁶ There is contradictory evidence on links from age 10 to adulthood earnings in the British Cohort Study (BCS70),¹⁹ possibly due to differences in the population considered as having conduct problems. Childhood mental ill health has also been found to independently predict adult health outcomes and is identified as a key pathway through which inequality affects health.²⁰

Type of economic analysis approach

The type of analysis used and the economic perspective taken, particularly with respect to what costs and benefits are included, is critical to the estimation of the economic impact of early interventions,.

The most common type of economic analysis in child and adolescent mental health is cost-effectiveness analysis.² This gives the cost of achieving a certain unit of outcome so can compare different programmes attempting to do the same thing (e.g. does this parenting behavioural programme or this early literacy programme better prepare children for school, according to a certain measure, per £ spent). Although the clearest evidence may result from primary RCT data with concurrent economic evaluation (on the same individuals, e.g.²¹), other approaches combine effectiveness and cost data from different sources. Greenwood²² compared interventions, including home visiting plus childcare, graduation

incentives, parenting programmes and imprisonment for repeat offenders, in terms of number of crimes averted per \$million spent. Home visiting/childcare came out as the least cost effective, probably because of an assumption that effectiveness would be lost over time, as well as the intervention being relatively expensive. The intervention was not specifically designed only to prevent criminal behaviour, illustrating the importance of considering all relevant areas of potential savings.

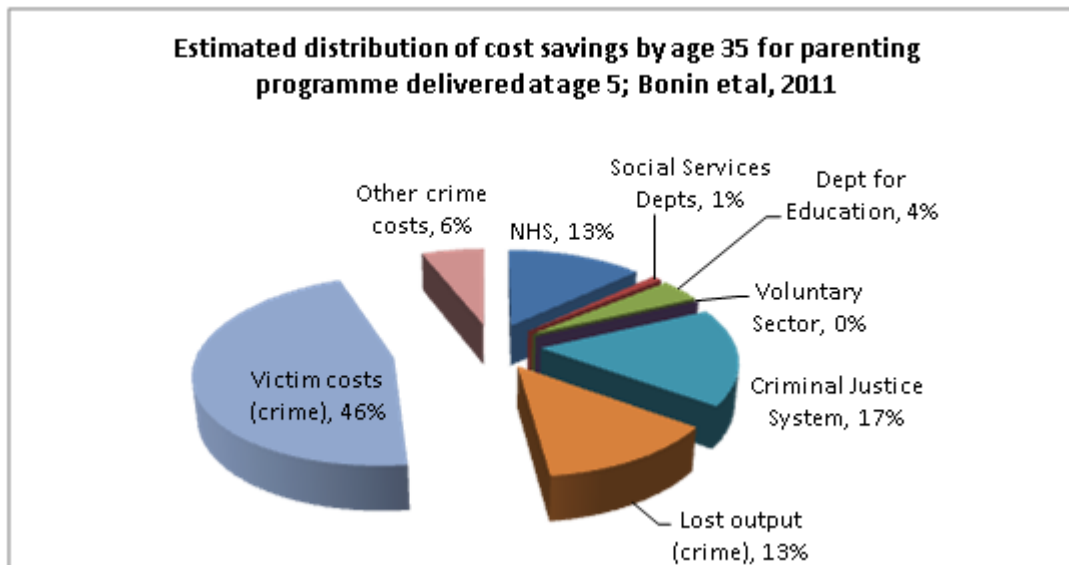
Other studies in the field have taken more of a cost-savings approach (sometimes described as cost benefit^{23p10}) putting a monetary value on selected impacts as well as costs allowing comparison between alternative uses of the same funds, even when discussing different outcomes (for example the economic value of increasing incarceration versus improving antenatal support.) AOs and colleagues' analysis takes an incomplete view of potential areas of cost savings; the early interventions which did not show savings were more expensive, but also had fewer areas of possible impact included.⁴ For Early Head Start, for example, only the finding of an effect on cognitive test scores was used. The treatment of Nurse Family Partnerships, on the other hand, included crime reduction in the mothers, and overall suggested much larger potential impacts.

Both techniques are reliant on estimates of programme effect - in short supply for UK programmes.^{1 24} Scrutiny of the validity of effectiveness data, and sensitivity analysis varying effectiveness parameters, are highly desirable. Threshold analysis (e.g. ²⁵) can answer questions about the level of effectiveness required for an intervention to be cost saving.

A lack of generalised outcome measures in existing primary studies is a limitation.² Cost-utility analyses assess outcomes in terms of the participants' quality of life but few exist in the child and adolescent mental health field (Kilian's 2010 review found a few pharmaceutical studies only.²) Despite the development of the EQ-5D-Y^{1 26} to measure health-related quality of life in children, such measures have not been validated for use in mental health and their applicability to childhood preventative interventions is doubtful. There are a few widely used measures of mental health symptoms (e.g. Strengths and Difficulties Questionnaire, Eyberg Child Behaviour Inventory, Child Behaviour Checklist); some interventions fail to show improvements on such measures despite being well liked by participants (e.g. ²⁷) raising questions about the relevant service outcomes. New work is developing measures of children's wellbeing.²⁸ However it is unclear whether this could be useful for cost-effectiveness analysis of preventative interventions, where economic impact might be expected only in the longer term.

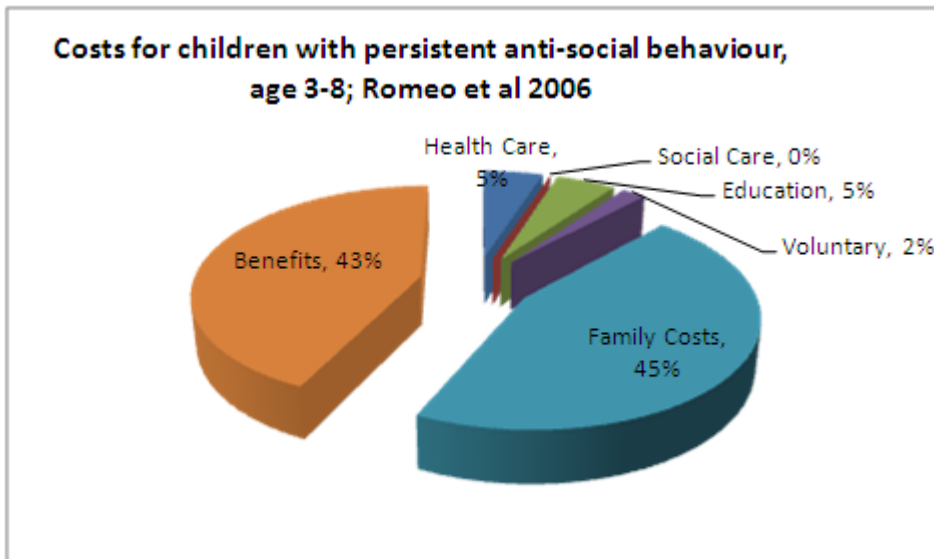
¹ This youth version of the EQ-5D tool for measuring health-related quality of life, often used as an outcome in economic analyses, was developed to enable children and young people to self-report their health.

A recent study modelling long-term outcomes of parenting programmes shows the proportions in which savings might be expected from early intervention in the UK to prevent behaviour problems:²⁹



The analysis excluded certain areas where savings might be expected, as the authors considered there was insufficient evidence to inform the size of parameters, or assume change due to the intervention. These included earnings, social security benefits, adult mental illness and disability. There are also likely effects on other family members and wider social networks and intergenerational effects.³⁰

UK analysis of the costs of behaviour problems at ages 3-8 (see also ³¹) has shown some of the areas where substantial costs could be averted with effective intervention, even in the medium-term.³² The mean annual total cost was £5960 per family (median £4597); the range was very large: £48-19,940 (2002-2003 prices). A cost-effectiveness analysis with a full societal perspective would attempt to account for the substantial costs borne by families themselves.



Interpretation of economic analyses on the costs and benefits of early interventions

Economic modelling simulations in the US have pointed to large potential savings resulting from early intervention with vulnerable families.^{4 5} While interventions delivered in the pre-school years are thought most likely to have an effect, and Heckman and Masterov have shown that intervening in the 0-3 period is likely to be most cost-effective,³³ Loeber & Farrington^{34 35} found that it is never too early or too late to intervene to reduce criminal offending. A small number of long-term US follow-ups of early interventions have suggested that long-term change can be realised^{36 37}. Sinclair envisages that cost savings from early intervention in the UK would start to be felt at around age 12, initially in the criminal justice system, later in health with further impacts from lower drug and alcohol use and later first pregnancies. In adulthood there would be increased tax payments and lower demand on benefits.³⁸

Most of the evidence showing a positive effect of centre-based care or home visiting comes from the US and practitioners and others question its applicability to the UK. Deprivation and inequality are less extreme in the UK where we have universal health and social welfare (including midwife home visits after birth and health visitors). Some research has suggested that those in greater need benefit more than others³⁹ so it could be argued that the UK has less capacity to benefit. Foster, for example, in a 10-year follow-up of a multicomponent intervention for pre-schoolers at high risk of conduct disorder, found much lower costs per case of conduct disorder prevented, and per criminal act prevented, than for the low-risk group.²¹ Alternatively the argument has been put that existing social programmes could enhance intervention effects.⁴⁰ Although some trials show greater cost-effectiveness for higher-risk groups, it may be that those who are *most* expensive to society and who are experiencing the worst outcomes may be the hardest to reach. Although targeted in the most needy areas for example, the most needy were not those who benefited most from

Sure Start children's centres.⁴¹ Universal programmes may reduce stigma and improve access for those most in need.

Incarceration rates are far higher in the US, so cost-saving findings from reduced crime do not transfer easily to the UK. The Dartington Social Research Unit is, however, working on a UK translation of the Aos model.⁴²

The Perry preschool project's early finding of no difference between intervention and control groups underlines the importance of long-term follow-up. The strongest findings of short-term effect in early interventions tend to be on intermediate outcomes (on parents and environment rather than children).⁴³ Short-term cost-effectiveness analyses can show higher service use, but if this indicates more appropriate access of support and prevention, we could expect long-term substantial cost savings. It is generally argued that greater expenditure on response costs (interventions) will lead to lower morbidity costs (related to the broad range of possible poor longer-term outcomes).^{44 45} The current trial of the Family Nurse Partnership will provide valuable evidence regarding effectiveness in the UK; long-term follow-up will be crucial, alongside analysis of costs, which are currently higher than expected. It may be that more intensive intervention (implied by the higher costs) is crucial to effectiveness. One cost-effectiveness analysis of a family connection programme (ages 0-20 years) compared a home visiting intervention at different levels of intensity, three and nine months duration, at 6-month follow-up.⁴⁶ While the length made no difference to child safety outcomes, the 9-month group had much higher average improvement in behaviour and lower cost per unit of change.

Comparing the results of existing economic analyses is difficult because of differences in methods, breadth of cost measures, length of follow-up, type of intervention and outcomes (often a great many are measured but not all reported). However, the evidence on the long-term outcomes of childhood behavioural, social and emotional difficulties, and their associated costs suggests that effective early intervention with vulnerable families to reduce both externalising and internalising problems of children could not help but be cost-saving in the long term.

Comment on SchARR analysis

The economic review conducted by SchARR is an important contribution to work in this area and the analysis is very much the type of study that can help support policy decision-making in the absence of primary studies with long-term follow-up. However the utility of the model is limited by some of the difficulties alluded to above, in particular a lack of good quality relevant primary studies in the UK, as well as dependence on the BCS70 analysis, and, as above, many potential areas of benefits are not included. Further limitations are usefully discussed in the report.

As the authors point out, the findings are in the main reliant on the effects of improvements in cognitive scores and the resultant improvements in education, employment and longevity outcomes. Many of the interventions included would not have had improvements in cognition as a main aim.

The paper refers to the possibility that effects are overestimated because of a bias towards reporting of significant results in intervention studies. This may be true but some of the other limitations may lead to under-representation of long-term benefits due to the difficulty of measuring and estimating important outcomes such as the use of health, social and special education services and also knock-on effects on other family members, next generation, peers, school, and possible effects on future child-bearing. There is currently very little evidence for example on the use of special education services by children with conduct disorder but some of these children are receiving full time one-to-one support in school, while others attend pupil referral units where costs are many times higher than in mainstream education.

However the included studies have small effect sizes and short follow-ups- a serious gap in the UK literature-, so it is inevitable that long-term modelling based on these would not produce very large cost savings. Given the limitations and the small effect sizes, the cost savings estimated in some of the scenarios seem like a good start for early intervention preventative intervention.

Recent modelling work at PSSRU, LSE,⁴⁷ found much higher returns for parenting interventions delivered at age 5, although we faced the same problems of lack of evidence in many areas. The programmes in the PSSRU model would not have met the inclusion criteria for this study, and had bigger effect sizes, but differences may also stem from the methods of estimating long-term consequences. The SchARR model identifies individuals in BCS70 at age 5 and follows them to adulthood, whereas the PSSRU model draws on estimates of the proportion likely to develop conduct disorder, and results from the literature on the trajectories of conduct disordered populations, and estimates the costs associated with these. Both approaches are attempts to deal with the lack of sufficiently sensitive available longitudinal data.

The SchARR paper refers to a possible link between early intervention with parents and child outcomes via post-natal depression (PND) but there were no effects found for this from the included interventions. A Cochrane review, and UK trials not included here, *have* shown effects of early intervention with parents on PND⁴⁸ and this could be a key mechanism, via parent-child interaction⁴⁹, or via later depression and child outcomes^{50 51}, for subsequent benefits. Work in progress at PSSRU is exploring these pathways, building on modelling work on a health visitor intervention for PND⁵². Given these limitations it seems likely that the SchARR model significantly underestimates the potential economic benefits of early intervention.

References

1. Stevens M, Roberts H, Shiell A. Research Review: Economic evidence for interventions in children's social care: revisiting the What Works for Children project. *Child & Family Social Work* 2010;15:145-54.
2. Kilian R, Losert C, Park A, McDaid D, Knapp M. Cost-effectiveness analysis in child and adolescent mental health problems: An updated review of literature. *International Journal of Mental Health Promotion* 2010;12(4).
3. Olds DL, Henderson CR, Phelps C, Kitzman H, Hanks C. Effect of prenatal infancy nurse home visitation on government spending. *Medical Care* 1993;31(2):155-74.
4. Aos S, Lieb R., Mayfield, J., Miller, M. and Penucci, A. Benefits and Costs of Prevention and Early Intervention Programs for Youth. In: Washington State Institute for Public Policy, editor. Olympia, Washington: Washington State Institute for Public Policy, 2004.
5. Aos S, Miller M, Drake E. Evidence based public policy options to reduce future prison construction, criminal justice costs, and crime rates. . Olympia, WA: Washington State Institute for Public Policy 2006.
6. Richards M, Abbott R, Collis G, Hackett P, Hotopf M, Kuh D, et al. Childhood mental health and life chances in post-war Britain: Insights from three national birth cohort studies. 2009.
7. Colman I, Murray J, Abbott R, Maughan B, Kuh D, Croudace T, et al. Outcomes of conduct problems in adolescence: forty year follow-up of a national cohort. *British Medical Journal* 2009;338(a2981).
8. Murray J, Irving B, Farrington DP, Colman I, Bloxson CAJ. Very early predictors of conduct problems and crime: results from a national cohort study. *Journal of child psychology and psychiatry* 2010;51(11):1198-207.
9. McCrone P, Dhanasiri S, Knapp M, Lawton-Smith S. Paying the price: The cost of mental health care in England to 2026, 2008.
10. Harrington R, Fudge H, Rutter M, Pickles A, Hill J. Adult Outcomes of Childhood and Adolescent Depression: I. Psychiatric Status. *Arch Gen Psychiatry* 1990;47(5):465-73.
11. Maughan B, Kim-Cohen J. Continuities between childhood and adult life. *The British Journal of Psychiatry* 2005;187(4):301-03.
12. Feinstein L, Duckworth K, Sabates R. A model of the intergenerational transmission of educational success. *Wider Benefits of Learning Research Report*, 2004.
13. Moffitt T, Arseneault L, Jaffee S, Kim-Cohen J, Koenen C, Odgers C, et al. Research review: DSM-V conduct disorder: research needs for an evidence base. *Journal of child psychology and psychiatry* 2008;49:3-33.
14. Tremblay RE, Masse B, Perron D, Leblanc M, Schwartzman A, Ledingham J. Early disruptive behaviour, poor school achievement, delinquent behaviour, and delinquent personality: Longitudinal analyses. *Journal of Consulting and Clinical Psychology* 1992;60(1):64-72.
15. Caspi A, Moffitt T, Newman D, Silva P. Behavioural observations at age 3 predict adult psychiatric disorders: longitudinal evidence from a birth cohort. *Archives of General Psychiatry* 1996;53:1033-9.
16. Broidy LM, Nagin DS, Tremblay RE, Bates JE, Brame B, Dodge KA, et al. Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site, cross-national study. *Developmental Psychology* 2003;39(2):222-45.
17. Farrington D. The development of offending and antisocial behaviour from childhood: key findings from the Cambridge study in delinquent development. *Child psychology and psychiatry* 1995;36:929-64.
18. Fergusson D, Horwood J, Ridder E. Show me the child at seven: the consequences of conduct problems in childhood for psychosocial functioning in adulthood. *Journal of child psychology and psychiatry* 2005;46(8):837-49.

19. Knapp M, King D, Healey A, Thomas C. Connections between Conduct Problems in Childhood and Economic Outcomes in Adulthood. *forthcoming* 2010.
20. Friedli L. Mental health, resilience and inequalities: World Health Organisation, 2009.
21. Foster EM. Can a costly intervention be cost-effective? An analysis of violence prevention. *Archives of General Psychiatry* 2006;63(11):1284-91.
22. Greenwood P, Model K, Rydell C, Chiesa J. *Diverting children from a life of crime*. Santa Monica, Calif: RAND, 1996.
23. Sefton T, Byford S, McDaid D, Hills J, Knapp M. Making the most of it: Economic evaluation in the social welfare field. York: Joseph Rowntree Foundation, 2002.
24. London Economics. Cost Benefit Analysis of Interventions with Parents. London, 2008.
25. Mihalopoulos C, Sanders MR, Turner KMT, Murphy-Brennan M, Carter R. Does the triple P- Positive Parenting Program provide value for money? *Australian and New Zealand Journal of Psychiatry* 2007;41(3):239-46.
26. Wille N, Badia X, Bonsel G, et al. Development of the EQ-5D-Y: a child-friendly version of the EQ-5D. *Quality of Life Research* 2010;19:875-86.
27. McAuley C, Knapp M, Beecham J, McCurry N, Slead M. Young families under stress: outcomes and costs of Home-Start support. York: Joseph Rowntree Foundation, 2004.
28. Rees G, Bradshaw J, Goswami H, Keung A. Developing an index of children's subjective well-being in England. London: The Children's Society, 2010.
29. Bonin E, Stevens M, Beecham J, Byford S, Parsonage M. Longer-term costs and benefits of parenting programmes for the prevention of persistent conduct disorders. *forthcoming*.
30. Thornberry TP, Freeman-Gallant A, Lovegrove PJ. Intergenerational linkages in antisocial behaviour. *Criminal Behaviour and Mental Health* 2009;19(2):80-93.
31. Scott S, Knapp M, Henderson J, Maughan B. Financial cost of social exclusion: follow up study of antisocial children into adulthood. *BMJ* 2001;323(7306):191.
32. Romeo R, Knapp M, Scott S. Economic cost of severe antisocial behaviour in children - and who pays it. *British Journal of Psychiatry* 2006;188:547.
33. Heckman JJ, Masterov DV. The productivity argument for investing in young children, 2007:98.
34. Loeber R, Farrington D. Never too early, never too late: Risk factors and successful interventions for serious and violent juvenile offenders. *Studies on Crime and Crime Prevention* 1998;7:7-30.
35. Loeber R, Farrington D, editors. *Transitions from juvenile delinquency to adult crime*. New York: Oxford University Press, 2011.
36. Heckman JJ, Moon SH, Pinto R, Savelyev P, Yavitz A. The rate of return to the High/Scope Perry Preschool Program *NBER Working Papers*: national Bureau of Economic Research, Inc, 2009.
37. Olds DL, Henderson CR, Cole R, al. E. Long-term effects of nurse home visitation on children's criminal and anti-social behavior: Fifteen year follow-up of a randomized trial. *JAMA* 1998;280(14):1238-44.
38. Sinclair A. 0-5: How small children make a big difference. London, 2007.
39. Karoly L, Greenwood P, Everingham S, Hoube J, Kilburn R, Rydell P, et al. Investing in our children: What we know and don't know about the costs and benefits of early childhood interventions: RAND, 1998.
40. Shiell A, Guenette P, McIntosh K, Stevens M. Early Child Development: Quality of the Economic Evidence. *forthcoming*.
41. Belsky J, Melhuish E, Barnes J, Leyland A, Romaniuk H. Effects of Sure Start local programmes on children and families: early findings from a quasi-experimental, cross sectional study. *BMJ* 2006;332:1476-8.
42. Dartington Social Research Unit. An Economic Model to Inform Investment Decisions made by Central and Local Government, 2011.

43. Bull J, McCormick G, Swann C, Mulvihill C, Health Development Agency. Ante- and post-natal home-visiting programmes: a review of reviews, 2004.
44. Knapp M. Economic evaluations and interventions for children and adolescents with mental health problems. *Journal of Child Psychology, Psychiatry and Allied Disciplines* 1997;38(1):3-25.
45. McDaid D, Park A, Knapp M, Losert C, Kilian R. Making the case for investing in child and adolescent mental health: How can economics help? 2010;12(4).
46. DePanfilis D, Dunowitz H, Kunz J. Assessing the cost-effectiveness of Family Connections. *Child Abuse & Neglect* 2008;32(3):335-51.
47. Bonin E, Stevens M, Beecham J, Byford S, Parsonage M. Parenting interventions for the prevention of persistent conduct disorders. In: Knapp M, McDaid D, Parsonage M, editors. *Mental health promotion and mental illness prevention: The economic case*. London: Personal Social Services Research Unit, London School of Economics and Political Science, 2011.
48. Dennis C-L, Hodnett Ellen D. Psychosocial and psychological interventions for treating postpartum depression. *Cochrane Database of Systematic Reviews*. Chichester, UK: John Wiley & Sons, Ltd, 2007.
49. Poobalan AS, Aucott LS, Ross L, Smith WCS, Helms PJ, Williams JHG. Effects of treating postnatal depression on mother infant interaction and child development: Systematic review. *The British Journal of Psychiatry* 2007;191(5):378-86.
50. Murray L, Halligan S, Cooper P. Effects of postnatal depression on mother-infant interaction, and child development. In: Bremner JG, Wachs TD, editors. *Wiley-Blackwell Handbook of Infant Development, The, Volume 2 (Second Edition)*: Blackwell, 2010.
51. Gunlicks ML, Weissman MM. Change in child psychopathology with improvement in parental depression: a systematic review. *J Am Acad Child Adolesc Psychiatry* 2008;47(4):379-89.
52. Bauer A, Knapp M, McDaid D. Health visiting and reducing post-natal depression. In: Knapp M, McDaid D, Parsonage M, editors. *Mental health promotion and mental illness prevention: The economic case*. London: Personal Social Services Research Unit, London School of Economics and Political Science, 2011.