A systematic review of preventive interventions for children’s mental health: what would work in Australian contexts?

Jordana Bayer, research fellow and clinical psychologist,1,2,3 Harriet Hiscock, senior research fellow and paediatrician,1,2,3 Katherine Scalzo, research assistant,1,2 Megan Mathers, research assistant, 1,2 Myfanwy McDonald, project officer,1,2 Alison Morris, project manager,4 Joanna Birdseye, senior project manager,4 Melissa Wake, senior research fellow and paediatrician1,2,3

Institutions: 1Centre for Community Child Health, Royal Children’s Hospital, Melbourne, Australia

2Murdoch Childrens Research Institute, Melbourne, Australia

3Department of Paediatrics, University of Melbourne, Melbourne, Australia

4Portfolio Services and Strategic Projects Division, Department of Human Services, State Government of Victoria, Melbourne, Australia

Correspondence to:

Jordana Bayer

Centre for Community Child Health, Royal Children’s Hospital Melbourne, Flemington Road, Parkville, VIC 3052, Australia

Ph: +61 3 9345 7952

Fax: +61 3 9345 5900

Email: jordana.bayer@mcri.edu.au

Running title: Early interventions systematic review

Word count: Abstract 298, article 7,898 (including references)
ABSTRACT

Objective: In childhood, mental health problems primarily consist of behaviour and emotional problems. These affect 1 in every 7 children (ie 200,000 in Australia). Left untreated, up to 50% of preschool problems continue through the childhood years. Because of their high prevalence, population-based approaches will be needed to reduce their associated burden. We aimed to identify evidence-based preventive interventions for behavioural and emotional problems of children aged 0 to 8 years.

Method: We located randomised controlled trials of preventive interventions for behavioural and emotional problems by searching standard clinical databases and systematic reviews. We determined which programs were effective and ineffective, dividing the effective programs into those with high or low risk of trial bias. Among effective programs, we identified the most promising for delivery in Australian contexts, selected for their strength of evidence, sample comparability to Australia’s population, and program compatibility with Australia’s service system.

Results: Around 50 preventive interventions have been evaluated by randomised controlled trials. Most targeted children’s behavioural problems, and a few targeted emotional problems. Three United States programs have the best balance of evidence: In infancy, the individual Nurse Home Visitation Program; at preschool age, the individual Family Check Up; at school age, the Good Behaviour Game class program. Three parenting programs in England and Australia are also worthy of highlight: The Incredible Years group format, Triple P individual format, and Parent Education Program group format.
**Conclusions:** Effective preventive interventions exist primarily for behaviour and, to a lesser extent, emotional problems, and could be disseminated from research to mainstream in Australia, ensuring fidelity to original programs. Future research should develop programs targeting emotional problems, and replicate effective programs for behaviour problems in quality population translation trials. Randomised trial methods in staged roll-outs can determine population cost-benefits for children’s mental health without delaying dissemination.

**KEYWORDS:** Child behaviour disorders; Preventive health services; Systematic review; Intervention studies
INTRODUCTION

In childhood, mental health problems primarily consist of behaviour and emotional problems. Australia’s national youth mental health survey reported behaviour and emotional problems affect one in every seven children aged 4-17 years (around 200,000 in Australia).[1] Behaviour problems typically include oppositional defiance, hyperactivity and aggression. They are also known as ‘externalising’ problems, because children show outward manifestations of the problem. Emotional problems typically include anxiety, withdrawal and depression. They are also known as ‘internalising’ problems, because children experience inner emotional distress that may not be overt or obvious to others. Although children’s mental health problems cluster in children from low socioeconomic families, the bulk arises in children from middle class families, simply because these families make up numerically more of Australia’s population. For around 25% of children with problems, behaviour and emotional problems co-occur.[1]

Many serious problems we see in adulthood (depression, substance abuse, family violence, criminality) have their origins in pathways that begin much earlier in life, often with childhood behaviour and emotional problems.[2,3] Early childhood problems can establish developmental trajectories that become progressively more difficult to modify as children get older.[4,5] Left untreated, around 50% of preschool children grow out of behaviour problems.[6] For the 50% who do not, long term sequelae can include school drop out, family breakdown, and later adolescent and adult depression, drugs and alcohol abuse, and employment difficulty.[7] These sequelae have social and financial costs, such as clinical treatment services and suboptimal
workforce participation, imposing a considerable cumulative drain on society and undermining Australia’s productivity.[8]

Cost-benefit studies show that intervening earlier in the life course is cheaper and more effective than later treatment.[9] It is biologically and economically more efficient to get it right the first time, than to attempt to fix things later on when problems are entrenched. But what is the best way to intervene early in children’s behavioural and emotional trajectories? This review aimed to provide evidence for this question.

Children’s behaviour and emotional problems are in part inherited and in part due to the environment.[10, 11] Preventive intervention focuses primarily on optimising the environment, with a view to managing or preventing the child’s problem. Parenting style has been shown to be the single most important environmental factor to influence a young child’s behaviour.[10] Harsh and abusive parenting contributes to child behavioural problems, while over-involved and protective parenting contributes to child emotional problems.[10,12] Therefore, most preventive programs try to optimise parenting styles.[13] The main goal of parenting programs is developing parents’ skills to identify, define, observe, and respond to child behaviours in new ways. Parents are helped to identify problem behaviours. They are taught to use positive reinforcement to encourage desirable behaviour, and non-punitive discipline techniques (such as ignoring and time-out) to discourage undesirable behaviour. Interventions also focus on positive parent-child relationship strategies. These include active listening, helping parents understand the ways in which children think and the motives for their behaviour, and warm sensitive responding to child distress and requests for interaction. During parenting programs parents are encouraged to keep a record of their child’s behaviour changes and undertake homework to practise new skills.
Some preventive programs focus on different aspects of the child’s environment, other than parenting. These include relationship with peers, teacher responses to child behaviour, and anger or anxiety management for the child. Multi-systemic models incorporate a package of different intervention programs delivered across more than one service sector. This could include a child directed program in the school classroom accompanied by an outreach parenting program in the home.

In 1994, Mrazek and Haggerty[14] developed a theoretical model for mental health promotion conceptualising eight possible gradients of intervention, from prevention through treatment and continuing care. Preventive interventions are further divided into ‘universal’ (offered to the general public or a whole population group that has not been identified on the basis of individual risk); ‘targeted-selective’ (to individuals or a subgroup of the population whose risk of developing mental disorders is significantly higher than average); or ‘targeted-indicated’ (to high-risk individuals who are identified as having minimal but detectable signs and symptoms foreshadowing mental disorder, but who do not meet DSM-IV diagnostic levels at the current time). In reality these boundaries can overlap.

This systematic review aimed to identify evidence-based preventive interventions for behavioural and emotional problems of children aged 0 to 8 years, to inform policy planning for early childhood services. As noted above, behavioural and emotional problems are the primary mental health problems of childhood, affecting 1 in 7 Australian children (similar rates reported internationally) with cumulative personal, societal and economic ramifications. It is therefore essential to consider effective early prevention for children at the population level. The review findings have implications for developing effective public health systems for youth mental health in Australia and
New Zealand. In line with Mrazek and Haggerty’s theoretical framework,[14] for this review we defined prevention strategies as either universal programs (offered to a whole population group that has not been identified on the basis of individual risk) or targeted programs (offered only to ‘at-risk’ samples of children, either selective or indicated risks). Treatment trials for diagnosed child mental health disorders or children receiving clinical mental health services were not defined as early prevention.

METHOD

Identification of trials. We identified randomised controlled trials (RCTs) as the ‘gold standard’ methodology to assess a program’s effectiveness. RCTs were identified from a variety of sources including standard clinical databases, published systematic reviews, and hand searching of key articles. The following studies were included in the review: RCTs; sample with child mean age < 9 years; and outcomes of behaviour or emotional problems assessed by standard measures. The following studies were excluded as ineligible in the review: narrow behavioural or emotional outcomes (eg fire setting, specific fear of snakes); post intervention follow up length < 6 months; sample primarily consisting of children with a clinical diagnosis of a mental health problem, and/or trial taking place in tertiary/clinical setting.

Eligible RCTs were identified using the following search strategy (search terms provided in Appendix A). We searched published abstracts in the databases of Medline, PsychInfo and Cinahl from 1995-2007 via MESH search terms (defining populations, outcomes, interventions). This identified 3,827 abstracts. We next hand searched the abstracts to exclude non-RCTs (keywords randomis/ze or controlled), drug trials, samples of children primarily > 8 years, clinical treatment of diagnosed disorders, and
short follow up post intervention (< 6 months). We further hand searched 18 recent relevant reviews, published between 1996 and 2007 and incorporating trials from the 1960s onwards, for any RCTs meeting our review criteria.[13, 15-30]

Quality ratings. While RCTs are considered the ‘gold standard’ assessment of a program’s effectiveness, they can still have problems in design or analysis that weakens their findings. We therefore ranked the quality of each RCT using the Australian National Medical Health and Research Council (NHMRC) recommendations from their 2000 report[31] and guidelines of the 2006 Cochrane Handbook of Systematic Reviews.[32]

We assessed quality in four areas: method of treatment assignment; control of selection bias after treatment assignment; blinding of outcome assessment; and quality of outcome assessment. Bias can occur in any of these areas and can affect the interpretation of the study’s results. Random allocation of families to the intervention or control arm of a trial is essential, as parents of children with more problems may seek out the intervention if given a choice. Similarly, losing more than 15% of the study sample after treatment assignment, or failing to report the effectiveness of the intervention according to how the intervention was received, can artificially inflate an intervention’s effectiveness. If families of children with more behaviour problems tend to drop out of the intervention arm of a study, this will disproportionately leave families of children with relatively positive behaviour. The intervention can then appear more effective than it really is. An ‘intention to treat’ analysis means that the outcomes are analysed according to the way children were initially randomised (ie the way they were intended to be treated). Serious trial bias can occur if this does not occur. If some children from the intervention group do not receive the intervention (as often occurs in
‘real life’) but the trial reports only on those who did receive the intervention, then effectiveness can again be artificially inflated.

Unlike drug trials, outcome assessments for child behaviour intervention studies almost inevitably are not completely blinded. This is because most key outcomes are reported by parents. Parent report is the most appropriate, the most feasible, and the most common outcome source in preventive intervention trials for child behaviour and emotional problems. However parents are not blinded as they are usually aware whether or not they or their child have received an intervention. We therefore decided not to include this assessment criterion in our overall quality rating of each trial as it would not be discriminatory. Nevertheless we recorded whether trials had partial blinding (at least one outcome assessor was blind to the child’s group allocation, e.g., teacher or independent observer) or no blinding (no outcome assessors were blind to the child’s group allocation). Likewise since all studies included a standardised assessment of the child, we decided not to include this assessment criterion in our overall quality rating of each trial.

Therefore our final quality rating for each RCT was based on the first two criteria scores (method of treatment assignment, control of selection bias after treatment assignment). A trial was designated as ‘low risk of bias’ if these first two criteria were fully met, ‘moderate risk of bias’ if the first two criteria were partly met, and ‘high risk of bias’ if the first and/or second criteria was not met.[32]

We next selected specific effective programs that we considered to have the most potential for application in Australia’s population context. Here we considered Biglan and colleagues’ guidelines on evidence to support program uptake.[33] Biglan recommends promoting adoption of programs that show effectiveness in two or more
RCTs ideally conducted by independent research teams. As very few programs meet these criteria, we rated each preventive intervention program as ‘effective’ if there was one or more RCT showing effectiveness on child behavioural or emotional outcomes, or ‘ineffective’ if the program’s sole RCT showed it was ineffective on child behavioural or emotional outcomes. We selected effective programs as applicable for the Australian context, by taking into account the number of trials demonstrating effectiveness, comparability of trial samples to Australia’s population, trial quality, length of follow up, and intervention duration/intensity as a broad indicator of cost and potential fit into Australia’s service system. Formal economic evaluations have rarely been conducted to provide extensive costings, and the few conducted are difficult to directly compare due to different metrics employed.

**REVIEW RESULTS**

Table 1 lists all programs evaluated in RCTs by child age and divided into effective and ineffective for children’s behaviour and emotional problems. The effective programs had an overall balance of evidence for positive child behaviour or emotional outcomes. In Table 1 these effective programs are further divided according to their trial quality (moderate versus high risk of bias). All trials contained some risk for bias in their design. Typically the trials rated as ‘high risk of bias’ did not report correct concealed randomisation procedure, had large (> 15%) loss to follow up, and/or only analysed outcomes from families who attended the whole program (not intention-to-treat analyses).

[Insert Table 1 here]
Table 2 provides detailed description of each effective prevention program that we considered had most potential for dissemination in the Australian context. These details include the program trials’ design limitations that contributed to their ratings of moderate or high bias.

[Insert Table 2 here]

Best preventive interventions for Australia’s context to reduce child behaviour problems

Infancy. The United States (US) based ‘Nurse Home Visitation Program’[34-36] has the best balance of long term evidence for reducing child behaviour problems. This is a targeted individual home visiting program delivered over two years to low-income, unmarried, first-time mothers. Two high quality RCT evaluations were conducted in the US, with large sample sizes and an extended follow up to 15 years. This program was effective for reducing adolescent behaviour problems as well as parenting abuse. Service requirements for delivery are screening for risk in obstetric clinics, followed by up to 60 x 90-minute home visits from pregnancy to age 2 years, by nurses receiving regular supervision. Cost-effectiveness was demonstrated at US $1,582 per family. We considered this program to be feasible for dissemination in the Australian context. However we caution that individual home visiting is likely to be more costly to implement than other effective programs we recommend that are delivered in groups. In addition, we caution that this home visiting program’s outcomes may be less effective in Australia than in the US, given higher US deprivation levels compared to Australian families, along with better existing universal services and resource infrastructure in Australia.
We did not recommend another US targeted-selective ‘Home-Based Nurse Intervention’[39] delivered over 1.5 years that was effective for child behaviour, since this trial had high risk of bias. We also point out that several other targeted-selective individual infancy home visiting programs delivered in Australia,[41] New Zealand,[37, 38] the United Kingdom (UK),[43] and the US[40,42] were found to be ineffective for child behaviour. These home visiting studies included a measure of child behaviour problems and found intervention was ineffective on that outcome.

**Preschool.** Commencing at preschool age, we recommend three targeted preventive interventions with the best balance of evidence for reducing child behaviour problems as most potentially applicable in the Australian context. First, the US ‘Family Check Up’[44, 45] is a brief (~3 sessions) targeted (selective/indicated) family support program offered individually at home or community centres to mothers with toddlers. Two high quality RCT evaluations were conducted in the US with high deprivation families (urban, suburban and rural communities). This program was effective in preventing preschool behaviour problems via improving parenting. Service requirements including screening for family risk when children are between 2-3 years of age. Those at risk are then followed by up to six contacts (20-60 minutes face-to-face or telephone) according to family need and desire (mean of 3 contacts), by psychologists with training and supervision. This program appears to be feasible for the Australian context, but requires 40 hours of training and ongoing supervision, and it has not yet been trialed in Australia.

Second, ‘Triple P’[54-58] is a targeted (indicated/selective) parenting program delivered over 1-4 months individually to parents of children with behaviour problems via a variety of formats (community centre, home, self-directed). Five RCT evaluations
have been conducted in Australia, although all have high risk of bias (detailed in Table 2). In addition, four trials used wait-list controls who were then offered the program within a few weeks, so that long-term efficacy beyond this time is difficult to determine. Nevertheless, this program appears to be effective for behaviour, parenting and stress outcomes. Service requirements are 8-10 weekly (30-90 minute) sessions with video/TV and workbook manuals, delivered (if not self-directed) by psychologists or nurses with extensive accredited training. This program is directly applicable to Australian contexts in that it was developed and evaluated in Australia. However limitations of the Triple P trials are their self-selected samples (meaning that parents volunteer interest, rather than being systematically recruited to ensure population representation), and waitlist control design that provides no comparison control data beyond a few weeks on program effectiveness.

Third, the ‘Incredible Years Group Parenting Program’ [47-50] is delivered over 2-4 months at community centres targeted (indicated) to parents of children with behaviour problems. Two RCT evaluations at preschool age with high risk of bias (detailed in Table 2) and follow up to 1.5 years were conducted in the UK and US. In early childhood, this program was effective for some child behaviour, parenting and parent mental health outcomes. Service requirements are 10-16 weekly 2 hour parenting groups, delivered with a video-series manual, by nurses and teachers trained for 6 months and supervised by a psychologist. Cost to implement was £571 per child. Incredible Years is likely to be suitable for the Australian context because it has been shown to be effective in two similar modern Western countries (UK, US) and the available cost data indicate that wider implementation is likely to be feasible.
Triple P and Incredible Years are the most widely known and respected preventive interventions for child behaviour problems in the field. We recommend both of these programs as applicable for the Australian context for the following reasons. Triple P’s strengths are as an Australian developed and researched program that has been evaluated by five randomised trials. Triple P’s limitations regarding large-scale dissemination are that these trials had significant quality concerns, they lack strong long-term outcomes, and the parenting program was delivered individually using a different format in each trial. Incredible Years’ strengths are a parenting program delivered in groups, designed for well-child service systems, evaluated in four randomised trials, in two Western countries similar to Australia (UK and US). However, Incredible Years was more effective for school-age than younger children, and the trials also had quality concerns.

Two additional preschool age programs had promising effectiveness, but we would not recommend them strongly for the Australian context. ‘High/Scope Perry Preschool Program’[51] was a targeted-selective educational group program (child-initiated learning) delivered over two years in deprived US neighbourhoods. One RCT evaluation with high risk of bias but extended follow up to 27 years found this program was effective long-term for behaviour (arrests), increased life standards and reduced dependency on welfare services. Service requirements for fidelity of delivery are a preschool curriculum of 12 hours per week, delivered by trained early childhood educators with ongoing supervision. Cost-effectiveness has been demonstrated (and quoted very widely), with US $7 lifetime return for every dollar invested. However as the program was carried out in North America in the 1960s and findings may not hold for Australia in the 2010s.
‘Positive Parenting and Sensitivity Discipline’[59] is a targeted-indicated brief (3 month) individual program showing effectiveness for behaviour. We did not recommended this program strongly for the Australian context as the trial had high risk of bias, extensive training (170 hours) is required, and there were fewer effective outcomes.

School-age. Four early intervention programs had the best balance of evidence for reducing school age children’s behaviour problems. We considered the first two as most applicable for the Australian context. First, ‘Good Behavior Game’[77, 78] is a universal 2 year, whole of school, social skills curriculum. Two RCT evaluations with large sample sizes have been conducted in different countries (US, Netherlands; one high quality, one with risk of bias). This program effectively reduced aggression and oppositional/conduct problems. In recommending application in the Australian context, teachers would need to establish this program in their class via 2 months of weekly 30 minute sessions, and then maintain this curriculum for 2 years. Teachers require 12-40 hours training before commencement.

Second, the ‘Incredible Years Group Parenting Program’[47-50] (as reported above) is a brief (3.5 month) program targeted to children already showing behaviour problems. At school age, two RCT evaluations were conducted with low socioeconomic status families, both with high risk of bias, and using wait-list controls so effectiveness beyond a few weeks is uncertain. Nevertheless, this program appears effective for school age behaviour and parenting outcomes.

‘Johns Hopkins Prevention Program’[75, 76] was a targeted-selective 1 year class program for first grade school children, delivered to all classes within participating schools in high deprivation areas. One high quality RCT evaluation was conducted in
the US. This program reduced 6th grade conduct disorder, as well as teacher reports of behaviour problems, school outcomes (special education, suspensions) and some parenting. Although this intervention was effective, it has only shown effectiveness in US high deprivation areas, and considering the Australian context it would place high demands on teachers. Service requirements are that teachers deliver a 1 year class curriculum supported by school psychologists, including 60 hours training and ongoing supervision.

‘Parenting Through Change’[83, 84] is a brief (4 month) program targeted (selective) to separated mothers with boys. One RCT evaluation with 2.5 year follow up (but high risk of bias) found this program was effective for behaviour, parenting and maternal depression outcomes. The intervention was delivered in community centres, however providers and training were not described. We would not prioritise disseminating this program in Australia’s context because separated mothers with boys is a very narrow risk group and therefore this program would miss many other children in need in the community.

The following additional programs at school age also showed effectiveness but were not recommended for the Australian context. While the US targeted-selective ‘Fast Track’ program[79, 80] had a high quality trial showing effectiveness for some behaviour, social-emotional, and parenting outcomes, it is an intensive 5 year intervention evaluated only in high deprivation areas of one country. Similarly, ‘Linking the Interests of Family and Teachers’[85] appears a relatively brief (2.5 month) teacher delivered group program at targeted schools, showing effective behaviour and social outcomes. We steered away from recommending this program in
Australia, as the trial with deprived US families had high risk of bias, and intensive participation from families is required (20 child and 6 parenting sessions).

**Best preventive interventions for Australia’s context to reduce child emotional problems**

In this review relatively few preventive interventions specifically attended to emotional problems. The first three were considered most applicable for the Australian context.

**Infancy.** ‘Early Start’[37, 38] had the best balance of evidence for reducing emotional problems from infancy; a 2-3 year targeted-selective individual home visiting program in New Zealand for at risk and stressed mothers. One high quality RCT evaluation with 3 year follow up was conducted, effectively improving child internalising problems, parenting (including abuse) and preschool attendance. Services in primary care screened all families for risk, and then coordinated weekly home visits by family support workers given five weeks training. This individual home visiting program is more costly than group programs, but could be directly applied to Australian and New Zealand contexts (more so than the above US Nurse Home Visitation Program[34-36]), given comparable maternal and child health systems and deprivation levels.

**Preschool.** Two targeted-indicated programs had the best balance of evidence for reducing emotional problems. ‘Parent Education Program’[52, 53] is a 3 month group program for parents with shy/inhibited preschool children. Two RCT evaluations with 6 month and 1 year follow up (but high risk of bias) were conducted in Australia, and effectively prevented child anxiety disorders. This program requires screening in
community preschool settings for shy/inhibited children, followed by fortnightly 1.5 hour parenting groups, delivered by a clinical psychologist at a community centre.

‘Brief Psycho-educational Group-Based Program’[46] is a 2 month group program for parents of children with behaviour problems. One high quality RCT evaluation was conducted in Canada with a self-selected sample. Though targeting behaviour problems, this program also reduced child anxiety and improved parenting. However the waitlist control design means that effectiveness beyond a few weeks is uncertain. Service provision comprises three 2-hour sessions delivered weekly with a booster one month later, delivered by trained community staff facilitators. While this community program could be feasible in Australian contexts, longer term effectiveness needs to be established.

School-age. ‘Fast Track’[79, 80] was a US program evaluated in a high quality trial that showed some impact on children’s social-emotional skills. However this was an intensive 5 year targeted-selective intervention delivered in high deprivation US areas. Further, the improved social-emotional skills documented may not actually translate into less child internalising problems. For these reasons we would not recommend this program for child emotional outcomes in the Australian context.

CONCLUSIONS

Effective preventive interventions exist for young children’s behaviour and emotional problems. Around 50 programs have been evaluated by randomised controlled trials. Most programs were targeted to at-risk children, with selective environmental and/or indicated behavioural risks. Most programs focused on children’s behavioural problems,
and only a few attended to emotional problems. Three United States programs have the best balance of evidence as well as potential applicability for the Australian context: In infancy, the targeted (selective) individual Nurse Home Visitation Program;[34-36] at preschool age, the targeted (selective/indicated) individual Family Check Up;[44, 45] at school age, the universal Good Behaviour Game class program.[77,78] Three targeted (indicated) parenting programs in England and Australia are also worthy of highlight as applicable in Australia: The Incredible Years group format;[47-50] Triple P individual format;[54-58] and Parent Education Program group format.[52, 53]

The results if this review could inform a ‘whole of early childhood’ framework for effective early intervention that assists policy development. Via universal screening, families under significant stress could be identified at birth and offered a home-based support program to supplement existing universal primary care services through infancy and toddlerhood. At age 2-3, further universal screening/surveillance could identify families who could benefit from a targeted program of individualised family support or a group parenting program. At age 5-7, children could receive a classroom child directed program, with links to parenting groups in the local community for families identified as in need.

Cost and implementation. Few studies have reported economic evaluations for early intervention programs. The few that have do not use comparable assessment metrics. This makes it difficult to directly compare the cost of one program with another. Typically evaluations focused on implementation service costs, such as training, program materials and salaries for program providers. Costs to families (eg time off work, transport costs) are often not included. A minority of projects have calculated the health and welfare service costs saved from implementing a targeted
intervention (eg ‘Perry Preschool Program’[51], ‘Nurse Home Visitation’[34-36])
whilst others have reported on the costs of implementing the program only (eg ‘Incredible Years’[47-50]). Overall considering the available cost data, for high risk families, there seems to be a good return on investment.[9,34-36,47-51] Cost and implementation are likely to be similar in Australia and New Zealand, given comparable maternal and child health systems and deprivation levels. In this systematic review, noting cost data that has been reported to date in studies offers policy makers some information. In addition, emphasising in this review the limited amount and comparability of cost data across studies highlights the need for all future trials of preventive programs to build in formal economic evaluation procedures from the outset.

Preventive interventions in this review took place in a variety of settings (family homes, community health centres, child care centres, schools) and were delivered by a range of providers (community health workers, nurses, psychologists, psychiatrists, teachers). Multi-systemic approaches with a package of different interventions delivered by more than one service sector are likely to be most costly to implement (eg teachers delivering social skills training to children at school, plus psychologists delivering parenting education at home). Individual approaches delivered one-on-one by a professional to each family (eg nurse home visiting) are likely to be moderately costly to implement, given that families are seen separately and sometimes over substantial time periods. Group approaches (delivered to parents or children) are likely to be the least costly (estimates indicate 8x less).[13,69] However the reach of group programs might be lower, as it is unlikely that all parents in the population are willing to attend groups. In a recent trial of a prevention program offered to all families attending their
maternal and child health nurse in nine socioeconomically diverse area of Melbourne [73], 69% of parents consented to taking part in group parenting programs.

To widely disseminate effective preventive interventions, Giesen and colleagues note the following important principles.[93] Programs should have staff who are properly trained and adhere to the program content. Intervention dosage (such as attendance at sessions) should be maximised by providing ‘out-of-hours’ sessions for working parents and on-site childcare where possible. Program delivery should be sensitive to different cultures and at risk populations. Programs are more likely to be accepted by service providers and taken up in the ‘real world’ when they: have proven effective or cost-effective outcome data; synchronise with the adopter’s values, past experience and perceived needs; are simple to understand; are easy to adapt into the organisation; have transferable knowledge to other contexts; and supply training and a help desk. When prevention programs are adapted into new settings, it is essential that a professional consultant who is experienced with the program works closely with the new providers, to ensure components essential for effectiveness are maintained while minimal aspects of the program are being tailored to local needs.

This systematic review has the following strengths. The review process was a detailed, systematic search of key databases for preventive programs, throughout early childhood (birth to 8 years), across broad behaviour and emotional outcomes, directly relevant to childhood mental health. Only evaluation trials with a rigorous prevention evaluation (RCTs with at least 6 month follow up) were included. Service delivery aspects of evidence-based programs were highlighted in the review for policy makers in Australia and countries with similar primary care systems. The review also has the following limitations. It was not a meta-analysis, which calculates comparative effect
size statistics for each trial to make direct outcome measure comparisons. The review did not follow a formal (ie Cochrane) procedure, in which two reviewers cross-evaluate a pre-set proportion of articles and unpublished research reports may also be sought.

**Further research.** Over 30 years a large evidence-base has accumulated for at-risk targeted intervention/prevention for children’s behavioural problems. Since the 1990s, recognition has grown that childhood emotional problems exist and can be very debilitating, and a small evidence-base has developed in response. We believe further research is urgently needed on early prevention for emotional problems, as there is a paucity of effective programs. As a priority we suggest a population-level RCT for the Australian ‘Parent Education Program’. This program has advantages of being brief (3 months) and the first program to target shy/inhibited preschool children in the community and prevent later anxiety disorders. For behaviour problems, we recommend pairing an independent replication trial in Australia or New Zealand with population dissemination of programs having the best balance of evidence and potential applicability in these countries’ existing service systems. We suggest prioritising dissemination trials of the following briefer programs with promising effectiveness: ‘Family Check Up’; ‘Triple P’; ‘Incredible Years’; and ‘Parenting Through Change’. Briefer programs are less demanding on families to facilitate uptake, as well as more cost efficient to deliver.

Dissemination trials in Australia and New Zealand should be careful to recruit at-risk groups as part of their population samples when taking a universal primary care approach to children’s mental health (ie parents with mental health and substance use problems, indigenous families, housing vulnerable families). Long term effectiveness data needs to be collected for all the brief targeted programs recommended and this
requires sufficient research funding (5+ years). Although wait-list control designs may be palatable to families, they hamper building knowledge capacity of unbiased long term data. Wide-scale and necessarily costly implementation of new programs will be more sustainable over time when backed by data on long term outcomes comparing intervention with control groups. In dissemination RCTs families remain free to access existing services in their community. In dissemination research new preventive programs should demonstrate effectiveness over and above existing services to justify their wide translation. To assist policy makers with resource management and decision making it is critical that future dissemination research builds in economic evaluation to accompany measured mental health outcomes for children and their families.

ACKNOWLEDGEMENTS

This work was carried out for the Strategic Projects branch of the Victorian Department of Human Services, under project “Growing the Evidence Base for Early Intervention for Young Children with Social, Emotional and Behavioural Problems”. Copyright © State of Victoria, Australia. Reproduced with Permission of the Victorian Minister for Mental Health. Unauthorised reproduction and other uses comprised in the copyright are prohibited without permission. We are particularly grateful for the assistance and advice of Joanna Birdseye and Alison Morris of this branch. We also thank Poh Chua for assistance with the development of literature search strategies.

REFERENCES

1. Sawyer M, Arney F, Baghurst P et al. The mental health of young people in Australia: key findings from the child and adolescent component of the national


42. Goodson B, Layzer J, St. Pierre R, Bernstein L, Lopez M. Effectiveness of a comprehensive, five-year family support program for low-income children and
their families: Findings from the comprehensive child development program.  


Table 1 Overview of effectiveness for all programs in review and child outcome measured (Behaviour B, Emotional E), by child age.

<table>
<thead>
<tr>
<th>Effective Programs:</th>
<th>Effective Programs:</th>
<th>Ineffective Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT moderate bias</td>
<td>RCT high bias</td>
<td></td>
</tr>
<tr>
<td><strong>Infancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse Home Visitation Program [34-36] * (USA†; B)</td>
<td>Home-Based Nurse Intervention [39] (US; BE)</td>
<td>Infant Health and Development Program [40] (US; BE)</td>
</tr>
<tr>
<td>Early Start Program [37-38] (NZ; BE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Toddler/Preschool</strong></td>
<td>Family Check Up [44, 45] (US; BE)</td>
<td>Incredible Years Group Parenting Program [47-50] (UK &amp; US; BE)</td>
</tr>
<tr>
<td>Brief Psycho-educational Group-based Program [46] (Canada; B)</td>
<td>Incredible Years Group Parenting Program [47-50] (UK &amp; US; BE)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High/Scope Perry Preschool Program [51] (US; B)</td>
<td>Group Cognitive Behaviour Therapy [72] (UK; BE)</td>
</tr>
<tr>
<td></td>
<td>Parent Education Program [52, 53] (Aust; E)</td>
<td>Toddlers Without Tears [73] (Aust; BE)</td>
</tr>
<tr>
<td></td>
<td>Triple P Parenting Program [54-58] (Aust; B)</td>
<td>Mother Child Home Program [74] (US; BE)</td>
</tr>
<tr>
<td></td>
<td>Positive Parenting and Sensitivity Discipline [59] (Netherlands; B)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Head Start [60, 61] (US; BE)</td>
<td></td>
</tr>
</tbody>
</table>
Houston Parent-Child Development Program [62] *(US; BE)*

Pathways to Prevention Program [63] *(Aust; B)*

First Step to Success Program [64] *(US; BE)*

Turkish Early Enrichment Program [65] *(Turkey; BE)*

Eastern Health Board Parent Training Program [66] *(Ireland; B)*

ABC Sequence [67] *(UK; B)*

The Scott Program [68] *(UK; B)*

Community-based Parenting Program [69] *(Canada; BE)*

Incredible Years Individual Parenting Program [70] *(USA; B)*

<table>
<thead>
<tr>
<th>School</th>
<th>Age</th>
<th>Incredibile Years Group Parenting Program [47-50] <em>(UK &amp; US; BE)</em></th>
<th>Early Risers’ Skills for Success [91] <em>(US; BE)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Johns Hopkins Prevention Program [75, 76]</td>
<td><em>(US; BE)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Behaviour Game [77, 78] <em>(US &amp; Netherlands; B)</em></td>
<td></td>
<td>Parenting Through Change [83, 84] <em>(USA; BE)</em></td>
<td>Child Behavior Modification Program [92]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LIFT [85] <em>(US; B)</em></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>Reference</td>
<td>Country of the Intervention</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-----------</td>
<td>----------------------------</td>
<td></td>
</tr>
<tr>
<td>Fast Track [79, 80] (US; BE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montreal Program [81] (Canada; BE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brief Family Intervention [82] (US; B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directive Parental Counselling [86] (UK; B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seattle Social Development Program [87] (US; BE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioural and Client-Centred Parenting Program [88] (US; B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attribution and Self-Control Training [89] (US; B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triple P - Indigenous adaptation [90] (Aust; B)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Reference numbers, † Country of the intervention.
Table 2: Effective preventive interventions for child behaviour and emotional problems, considered applicable for Australia’s context.

<table>
<thead>
<tr>
<th>Child Age</th>
<th>Program</th>
<th>Description</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infancy</td>
<td>Nurse Home Visitation [34-36]*</td>
<td>Individual home visiting program for first time mothers screened as single or low income. 60 x 1.5h visits from pregnancy to 2 years. Nurses regularly supervised.</td>
<td>2 RCTs: 2 &amp; 15y FU†. Bias risk: moderate (concealed randomisation stated but method not described or suspect technique; analysis intention to treat with up to 15% loss to follow up; outcome assessment partially blinded). Context: US, 400 and 1,139 children recruited from obstetric clinics. Effective: Child abuse, mother successive pregnancies and work force involvement, adolescent delinquency (15y FU). Ineffective: child cognitive development and behaviour (2y FU).</td>
</tr>
<tr>
<td>Early Start</td>
<td>Early Start Program [37, 38]</td>
<td>2-3 year weekly home visiting program for ‘at risk’ families. Delivered by family support workers with 5 weeks training.</td>
<td>1 RCT: 6m &amp; 3y FU. Bias risk: moderate (randomisation claimed but not described and not concealed; analysis intention to treat with up to 15% loss to follow up; outcome assessment not blinded). Context: NZ, MCH screening of 427 infants. Effective: child internalising problems, positive and non-punitive parenting, parent-report of severe assault, improved preschool attendance. Ineffective: child externalising problems, maternal health, family functioning and economics.</td>
</tr>
<tr>
<td>Toddler/Preschool age</td>
<td>Family Check</td>
<td>Brief family support program offered in the home or community centres for ‘at risk’ families. Up to 6 x 20-60 minute sessions. Psychologists with 40h training and regularly supervised.</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 RCTs: 1 &amp; 2y FU. Bias risk: moderate (analysis intention to treat with up to 15% loss to follow up; outcome assessment partially blinded). Context: US, 120 and 731 children (2y old) recruited from Women, Infant and Children Nutritional Supplement program sites. Effective: proactive and positive parenting skills - correlated with changes in child disruptive behaviour. Ineffective: negative parenting and child internalising behaviour.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 RCTs: 6m to 3y FU (FU effectiveness uncertain as all but one WL controls). Bias risk: high (randomisation claimed but not described and not concealed; analysis by treatment received and &gt;15% loss to follow up or no mention of withdrawals; outcome assessment partially or not blinded). Context: Australian, self-selected samples of 2-6 year old children with behaviour problems (n = 30, 47, 56, 63, 305). Effective: child behaviour problems, parenting practices, parent confidence, anxiety and stress. Ineffective: some parent-child interaction and parent distress/conflict measures.</td>
</tr>
</tbody>
</table>

<p>| Incredible            | Parenting program over 2-4 months at | 4 RCTs: 6m, 1y &amp; 1.5y FU (FU effectiveness uncertain as 2 WL controls). Bias risk: |</p>
<table>
<thead>
<tr>
<th>Years [47-50]</th>
<th>Community centres for children with behaviour problems. Weekly 2h groups with a video-series manual. Nurses/teachers 6 months training and regularly supervised.</th>
<th>High (randomisation claimed but not described and not concealed; analysis intention to treat with up to 15% and &gt;15% loss to follow-up; outcome assessment partially or not blinded).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context: UK &amp; US, samples of children aged 2 to 8 years with behaviour problems recruited from primary care settings (n = 76, 96, 116, 264). Effective: behaviour problems, positive and negative parenting practices, maternal mental health (more effective for older children's behaviour problems). Ineffective: some measures of parenting stress and mental health, parenting, and child social, emotional, and behavioural problems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High/Scope Perry Preschool</td>
<td>Group program over 2 years for preschool children in deprived neighbourhoods. Curriculum of 12h per week, delivered by trained early childhood educators, regularly supervised.</td>
<td>1 RCT: annual FU from 3-11y, 14-15y and 27y. Bias risk: high (randomisation claimed but not described or concealed; &gt;15% loss to follow up; outcome assessment not blinded). Context: US, 123 children (1.5 to 5 years old). Effective: fewer arrests, higher IQ, higher earnings, increased rate of school completion, increased rate of home ownership, less dependency on social services and use of mental health services by age 27.</td>
</tr>
<tr>
<td>Parent</td>
<td>3 month program for parents with 2 RCTs: 6m and 1y FU. Bias risk: high (concealed randomisation stated but method</td>
<td></td>
</tr>
<tr>
<td>Education Program [52, 53]</td>
<td>shy/inhibited preschool children.</td>
<td>not described or suspect technique; &gt;15% loss to follow up; outcome assessment partially blinded).</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>Brief Psycho-Educational Group-Based Program [46]</td>
<td>2 month parenting program, 3 weekly 2 hour group sessions and a booster session 1 month later. Delivered by trained community staff facilitators.</td>
<td>1 RCT: 1y FU (FU effectiveness uncertain as WL control). Bias risk: moderate (randomisation claimed but not described and not concealed; analysis intention to treat with up to 15% loss to follow up; outcome assessment not blinded).</td>
</tr>
<tr>
<td>Ineffective: hyperactive behaviour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>School age</strong> Good Behaviour Game [77, 78]</td>
<td>2 year whole school social skills curriculum. Teachers with 40h training provide 2 months of weekly 30 minute sessions, and maintain curriculum for 2 years.</td>
<td>2 RCTs: 1 &amp; 2y FU. Bias risk: high (randomisation claimed but not described and not concealed; analysis by treatment received only, &gt;15% loss to follow up; outcome assessment partially or not blinded).</td>
</tr>
<tr>
<td>Context: US, Netherlands, 2,311 and 666 children (7y old) across numerous school districts.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Effective: less aggression (RCT 1). Improved attention, concentration and less oppositional and conduct behaviour problems, predominantly in children with moderate levels of initial inattention (RCT 2).

<table>
<thead>
<tr>
<th>John Hopkins Prevention [75, 76]</th>
<th>1 year class program for first grade children. Teachers deliver a class curriculum supported by school psychologists. 60h training and ongoing supervision.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 RCT: 1 &amp; 5y FU. Bias risk: moderate (concealed randomisation stated but method not described or suspect technique; analysis intention to treat with up to 15% loss to follow up; outcome assessment not blinded). Context: US, 657 children (6y old) from 9 public schools in high deprivation areas. Effective: teacher reports of problem behaviours, conduct disorder diagnosis at 6th grade, parent reinforcement/rejection, school suspension, special classroom placement and medication. Ineffective: parent/peer report of behavioural problems, achievement overall and parent monitoring/discipline.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incredible Years [47-50]</th>
<th>See Toddler/preschool age Parenting through Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 month group program for separated mothers, delivered in community</td>
</tr>
<tr>
<td></td>
<td>1 RCT: 30m FU. Bias risk: high (randomisation claimed but not described and not concealed; analysis by treatment received and no mention of loss to follow up;</td>
</tr>
</tbody>
</table>
[83, 84] centres (providers and training were not described). Outcome assessment not blinded).

Context: US, 238 boys (8y old) recruited from community advertisements.

Effective: parenting, child externalising behaviour and maternal depression.

*Reference numbers; † Follow up; ‡ Wait-list control.
Appendix A  MESH Search Terms (Medline)

Note: equivalent MESH terms run for PsychINFO and CINAHL

Populations
“(humans and english language and ("newborn infant (birth to 1 month)"
[Or "infant (1 to 23 months)", "preschool child (2 to 5 years)", "child (6 to 12
years)"

Outcomes
neurotic disorders
aggression
anxiety
separation
Child Behavior Disorders
Mood Disorders
Social Behavior Disorders
Antisocial Personality Disorder
"Attention Deficit and Disruptive Behavior Disorders"

Interventions
primary prevention
intervention studies
"Early Intervention (Education)"
preventive health services
treatment outcome
parents or parenting
health education/or family therapy
parent-child relations
child rearing

Subgroups at risk
Parents with mental illness or drug/alcohol problems
child of impaired parents/

Homeless/housing vulnerable/poverty
homeless persons
poverty

Chronic Illness
chronic disease

Culturally and Linguistically Diverse (including refugees)
culturally and linguistically diverse
refugees
culture
ethnic groups
minority groups
language

Aboriginal or Torres Straight Islander
    aborigines or "torres strait islander"
    oceanic ancestry group
    australia

Rural
    rural population
    rural health
    rural health services

Language/learning difficulties
    language disorders
    learning disorders
    developmental disabilities

Autism and Spectrum Disorders
    asperger syndrome/ or autistic disorder