Early Childhood Health Promotion and Its Life Course Health Consequences

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Objective.—To explore whether health promotion efforts targeted at preschool-age children can improve health across the life span and improve future economic returns to society.

Methods.—We selected 4 health topics to review—tobacco exposure, unintentional injury, obesity, and mental health—because they are clinically and epidemiologically significant, and represent the complex nature of health problems in this early period of life. The peer-reviewed literature was searched to assess the level of evidence for short- and long-term health impacts of health promotion and disease prevention interventions for children from before birth to age 5. This review sought to document the monetary burden of poor child health, the cost implications of preventing and treating child health problems, and the net benefit of the interventions.

Results.—The evidence is compelling that these 4 topics—tobacco exposure, unintentional injury, obesity, and mental health—constitute a significant burden on the health of children and are the early antecedents of significant health problems across the life span. The evidence for the cost consequences of these problems is strong, although more uneven than the epidemiological data. The available evidence for the effectiveness of interventions in this age group was strongest in the case of preventing tobacco exposure and injuries, was limited to smaller-scale clinical interventions in the case of mental health, and was least available for efforts to prevent obesity among preschoolers.

Conclusions.—Currently available research justifies the implementation of health interventions in the prenatal to preschool period—especially to reduce tobacco exposure and prevent injuries. There is an urgent need for carefully targeted, rigorous research to examine the longitudinal causal relationships and provide stronger economic data to help policy makers make the case that the entire society will benefit from wise investment in improving the health of preschool-age children and their families.

KEY WORDS: child health; early intervention; investing in children; life course; mental health; obesity; tobacco exposure; unintentional injury


The case for investing in early child health promotion must include evidence that such investments will result in health benefits to young children, health improvements across the life span, and economic returns to society in the form of reduced health care costs and increased economic productivity. Such scientific evidence is now beginning to emerge, and it is a necessary—but not sufficient—component of redirecting public policy toward a focus on early child health. We believe that reviewing such evidence now is timely for the following reasons: 1) there is increasing recognition that the earliest period of life forms the foundation for a healthier life course; 2) some interventions are now available to address important health problems presenting in early life; and 3) there are parallels between the argument for investments in early child health and the more established arguments for investments in early child development and education.

Children are the most vulnerable and dependent members of society, and their well-being is an important measure of the overall health of a society. Disparities in health are often shaped early in life and sustained across the life span. The social class gradient in birth weight, for example, begins with maternal health and has implications for future health consequences as well as for high school graduation.1 Health is also an important determinant of economic productivity across the life span. Adults’ ability to be productive members of society is influenced by their health status.

The factors that shape fetal and child health and development have implications for adult health 5 and 6 decades later. Although these observations from Barker2 and others are now well supported, their mechanisms are just beginning to receive needed research attention. The intrauterine environment—including malnutrition, inflammation, and infection—appears to interact with the genetic makeup of the fetus, influencing organ development and potentially creating vulnerability to later environment-genotype interactions. These early influences and subsequent environmental exposures increase the risk of chronic diseases in adulthood. Health is shaped by a broad set of determinants...
including socioeconomic status, physical and socioemotional environments, genetic endowment and biological influences, and access to preventive and curative medical technologies. In the case of young children, these forces act on them both directly and through the circumstances confronted by their families.

The overall goal of this paper is to explore whether health promotion efforts targeted at preschool-age children can improve health across the life span and yield future economic returns to society. Specifically, we examined the magnitude of 4 health problems including their prevalence during this age period, their cost implications across the life span, the availability of preventive interventions in this period of life, and the evidence that preventing these problems in early life will pay off or save costs (such as medical care, loss of productivity, and early mortality) in the future.

**METHODOLOGY**

**Selection of Topics**

This project set out to review the availability of evidence to support policies of societal investments in early child health by selecting health topics that would be meaningful to a policy audience. In order to limit the scope of the study, we selected 4 health problems (tobacco exposure, unintentional injury, obesity and mental health) that reflect the following rationale: The topics comprise priorities set in *The Year 2010 Objectives for the Nation* by including both physical and mental health issues. Each of the 4 health problems has a significant prevalence among children, thereby assuring their relevance to population health. Finally, the selected topics demonstrate the need to combine a wide range of clinical, public health, and public policy approaches to effectively address their social and environmental determinants.

**Review of the Literature: Search Strategies and Inclusion Criteria**

To be able to comprehensively and systematically identify relevant literature and to minimize selection bias, we established searching strategies in advance, including using keyword searches, setting inclusion/exclusion criteria, and manually checking data.

The search included 5 databases for early childhood interventions: PubMed, PsycINFO, National Health Service Economic Evaluation Database, the National Bureau of Economic Research working paper database, and EconLit. A set of keywords such as *intervention, program, prevention,* or *evaluation* was selected to combine with specific keywords for each topic. The search was restricted to studies that satisfy each of the following inclusion criteria: child focused, English language, publication dates January 1996 to June 2007, experimental or quasi-experimental design, and measuring outcome changes (such as overweight rate) or behavioral changes (such as installation of smoke detectors). For completeness, we manually checked publications of key authors in each field and bibliographies of key review articles.

We present the findings in 2 ways. Here, we present synopses of the findings from each of the 4 literature reviews. In general, as a result of space limitations, only the most recent citations are provided. Before reporting financial results, we used the Consumer Price Index to translate dollar amounts presented to the value of the US dollar in 2006. We also present a Table that summarizes effective interventions at all levels that is based on our review.

In addition, each synopsis is supported by an Evidence Table (available online) that includes extensive details of the reviewed interventions, including first author’s name and publication year, study question, study design (eg, randomized controlled trial, quasi-experimental design), nature of the intervention (eg, components, length, intensity), targeted population, intervention settings, sample size and attrition rate, measure of outcomes, and results.

**RESULTS: SYNOPTES OF THE LITERATURE REVIEWS**

**Tobacco Exposure**

There is a positive net economic benefit from prevention of tobacco exposure, and cessation of smoking at home and in public can improve health in childhood and throughout the life span. Smoking impacts young children through prenatal exposure and environmental tobacco smoke (ETS). Almost a half million US babies are born annually to mothers who smoke during pregnancy, and an estimated 25% of children are exposed to ETS by household members. Prenatal exposure to cigarette smoking is associated with many risks, including preterm delivery, low birth weight, sudden infant death syndrome, and attention-deficit/hyperactivity disorder. ETS exposure among young children can lead to respiratory symptoms and infections, more frequent and severe asthma attacks, allergies, and ear infections.

The monetary burdens to society associated with smoking during pregnancy are substantial: annual maternal smoking attributable costs of neonatal medical care were estimated to be $148 million (in 2006 dollars) by the Centers for Disease Control and Prevention. In addition, the cost to treat childhood illnesses caused by parental smoking has been estimated at $7.9 billion per year. On the basis of these figures, a 15% reduction in parental smoking could save society up to $1 billion in direct medical costs for prenatal and neonatal care and into childhood. Making a conservative assumption that only 50% of the costs could be avoided by ETS exposure programs specifically aimed at reducing exposure during the time that children are 0 to 5 years old, the savings associated with such programs would still be $500 million.

Even simple interventions targeting pregnant women can be effective both in increasing smoking cessation rate and in reducing negative birth outcomes. Although a review of 18 interventions aiming to reduce children’s exposure to household ETS reported a wide variation in both intervention components and impact, 3 randomized, controlled studies showed a statistically significant impact on parent-reported smoking at home or household air...
nicotine measures (a 25% to 30% total reduction, twice the reduction compared with the control groups).10 Evidence also supports the effectiveness of mass media campaigns, particularly when they are implemented concurrent with other interventions targeting youth and policy level interventions, such as increasing the price of tobacco products and enforcing age bans.11 In summary, there is considerable evidence that many antitobacco interventions, in particular those that use multifaceted approaches, are effective, can improve child health, and can save health care dollars.12

Unintentional Injury

Injuries are the leading causes of death, disabilities, and health care utilization for US children and teenagers between the ages of 1 and 19. Unintentional injuries left approximately 150 000 children and adolescents permanently disabled in 1996.13 Injuries are associated with environmental hazards, including poor-quality housing and playgrounds, and with family characteristics, including poor parenting, single parenting, alcohol and substance abuse, and neglect.14

Studies assessing the monetary burdens of child injuries generally take a societal perspective to estimate both immediate medical costs and longer-term costs as a result of productivity loss, including costs to victims, families, government, insurers, and taxpayers. One recent study15 concluded that both fatal and nonfatal injuries among children ages 0 to 4 resulted in $4.7 billion (in 2006 dollars) for lifelong medical costs and $14 billion for present and future productivity losses. In 1996, approximately 10% to 30% of children (depending on data sources) experienced unintentional injuries serious enough to require medical treatment or cause at least a half-day of restricted activity, at an estimated average cost per victim of $4626 (in 2006 dollars).13

Historical trends show that the occurrence of injuries can be reduced. Between 1985 and 2000, for example, the injury incidence rate decreased from 2259 to 1740 per 10 000 for children between 0 to 4.15 Many studies show that preventive interventions can effectively reduce the incidence of injuries in such areas as road, home, and community safety. A majority of interventions aimed at improving road and home safety found significant changes in desired behaviors and outcomes. For example, one incentive program that provided bilingual education materials and rewards for positive behaviors to a low-income Hispanic community significantly increased child rear seating from 33% to 49% in the intervention city.16 Another program that targeted elementary school children in Quebec and included persuasive communication and activities to facilitate bicycle helmet acquisition was found to significantly increase the use of helmets for the group, from 1.3% to 33%.17 In addition, a multifaceted community campaign including education, car seat training, and discount coupons for booster seats in Washington State considerably increased booster seat use.18 Among 7 home safety intervention studies, 6 found significant improvements in the intervention group for at least one safety measure, such as lowering tap water temperature.19–24 Finally, 8 studies concluded that the interventions reviewed were cost-effective, including 3 smoke alarm distribution programs,25–27 3 car-seat use programs,28–30 1 bicycle helmet program,31 and 1 study on home visits.22

In sum, unintentional injury prevention provides good examples of successful public health approaches, in which...
a majority of preventive interventions addressed engineering or environmental aspects, improved parents’ and children’s knowledge, safety behaviors, or/and used safety devices. The best strategies of preventing unintentional injuries for this age group seem to be improving the characteristics/engineering of home/road environment through law (such as requirement of use of car seat), regulation (such as car seat safety guideline), and design/engineering (such as application of safety devices at home).

Obesity

Consistent trends toward increased childhood obesity pose a significant and growing problem. Over the past 30 years, the obesity rate nearly tripled among preschool children, from 5% to 14%. Children and youth from certain ethnic minority groups have an even higher obesity rate. Both prepregnancy maternal weight and gestational weight gain are now implicated as factors in overweight in the preschool period and continuing into adolescence. However, the increase in overweight among young children in the past decades cannot be attributed simply to uninform ed parenting behaviors or bad genes. Instead, it is a result of a collection of societal phenomena that contribute to increasing calorie intake and decreasing physical activity: the rise of fast food, aggressive food marketing to children, suburbanization and dependence on vehicles, and the emergence of computer games and TV programs.

In the absence of an effective intervention, overweight persists for many children throughout the life span. Preschool children who were ever overweight have been found to be 5 times more likely to be overweight at age 12 than preschool children with normal weights. Furthermore, an estimated 50% to 80% of obese children and adolescents stay overweight in adulthood.

The physical health consequences of childhood overweight include metabolic disturbances, type 2 diabetes, disrupted sleep patterns, poor immune function, endocrine problems, impaired mobility, increased blood pressure and hypertension, and increased risk of coronary heart disease in adulthood. The psychosocial consequences include low self-esteem, social alienation, discrimination, lower self-reported quality of life, and depression. It is projected that pediatric obesity might shorten life expectancy by 2 to 5 years by midcentury in the United States.

In addition, obesity is associated with higher morbidity and mortality among pregnant women, who also have an increased risk for pregnancy complications regardless of their health before pregnancy, labor and delivery problems, and cesarean delivery.

Estimates of the economic costs of obesity in the United States are $109 billion per year in direct costs and $75 billion in indirect costs (in 2006 dollars). According to a French study, the average prenatal expenditure of mothers who were overweight was 5 times higher than those who were normal weight. The number would be even higher when considering other costs such as neonatal intensive care and postpartum hospital stays. Among children, the economic costs of overweight also are significant. Obesity-related hospital costs for children ages 6 to 17 increased almost fourfold between 1979 and 1999 from $44 million to $160 million in 2006 dollars, related in part to the twofold increase in discharges for diabetes.

However, because very few studies to date target preschool-age children, the overall effectiveness of interventions to prevent or treat overweight in early childhood remains unclear. A 2005 Cochrane review concluded that studies to prevent childhood overweight were “heterogeneous in terms of study design, quality, target population, theoretical underpinning, and outcome measures, making it impossible to combine study findings using statistical methods.” A recent systematic review of interventions for preschooler obesity identified only 5 interventions that target preschool children; two of them that were designed to increase physical activity in preschools reported a statistically significant reduction in weight status or body fat. The limited evidence available suggests reducing childhood obesity will require integrating effective educational, environmental, and structural components, rather than a single individual-based behavioral intervention.

Mental Health

In 1999, the US surgeon general estimated that 20% of children ages 9 to 17 had mental disorders causing at least mild functional impairments in a 6-month period. Younger children are not immune to mental health concerns; a significant minority of infants, toddlers, and preschoolers manifest some form of problematic behavior with cost implications that are significant. For children between the ages of 1 and 6, a total of 3.4% to 6.6% exhibit externalizing behaviors—or acting out—and 3.0% to 6.6% manifest internalizing behaviors—withdrawal, depression or anxiety. The annual cost of treating children ages 1 to 5 nationwide was estimated at $864 million in 2006 dollars.

One UK study found that the average total societal cost for one individual with unsolved conduct disorder at age 10 was £70 019 by age 28 ($141 161 in 2006 dollars), 10 times higher than for those without such problems. The etiology of early childhood mental health problems is multifactorial, with important contributions made by genetic, dispositional, and environmental factors. Rates of early childhood behavior problems are associated with poverty, maternal depression, and insecure attachment to caregivers, as well as harsh, inconsistent discipline. Early disruptive and aggressive behavior tends to persist and develop into chronic and severe forms of antisocial behavior. As such, mental health problems are found to have a large negative effect on other outcomes, such as educational attainment, unemployment, and violent crimes committed.

A variety of early intervention strategies having different targets and theoretical underpinnings have been tested in the past decades. Most studies examined here (34 of 59) used parent-focused training, in which parents learn from a psychologist or educator (or videotape) about effective behavior management skills. In general, more intensive versions yielded better results than less intensive ones. In short-term studies, effect sizes vary from small to
moderate; but very few studies document the long-term effects of these approaches.56

Other programs focus on improving the quality of the relationship between parents and children and providing parents with skills to manage disruptive behavior. Nearly all of the studies reported that such interventions improved infant/toddler-parent interaction,61 children’s security or behaviors,62 and/or maternal depressive symptoms.63 Again, meta-analysis of these types of interventions report small effect sizes in the short-term and limited long-term follow-up data.64 In addition, many studies—for example, Webster-Stratton and Hammond65—targeted various risk factors and provided family-level training programs, both parent- and child-focused, in group settings. It appears that child and parent training each made a unique contribution to improved outcomes for children, although characteristics of the child, parents, and the family context may moderate the effectiveness of parent training interventions on children’s outcomes.66

Although there has been much work done in the United States to build systems of care for children’s mental health,67 much less of this has focused on young children with emotional or behavioral problems.68 At the system level, the only randomized study of relevance was New Hope, an employment-based adult antipoverty program, with strong work support through extensive child care assistance and health care subsidies; the authors reported positive effects on children’s social behaviors of relocating families to neighborhoods with lower concentrations of poverty and providing social services for teacher-reported child behavior problems.69

Research data on the sustained impact of mental health interventions also come from the Carolina Abecedarian Project, a comprehensive early education program for preschoolers at risk. At age 21, individuals who received a full-time, high-quality educational intervention in a child care setting reported fewer depressive symptoms than those in the control group (26% vs 37%).70 These data have been used to make the case for the return on investment of high-quality early childhood programs; however, their generalizability is limited by the small sample size and selection of higher-risk children.

**DISCUSSION**

**Summary**

In sum, the evidence of effective preventive interventions is compelling yet uneven across the 4 health topics for this age group. The Table summarizes the identified effective interventions at their level of action: individual, family, community/neighborhood, and society/policy. These levels are defined by the primary target of the interventions rather than by the settings where the interventions take place. For example, if an intervention involved national-level campaigns or law enforcement, then we classified this intervention as national level, even if it incorporates family-level components. The available evidence for the effectiveness of preventive interventions in this age group was strongest in the case of tobacco exposure and unintentional injury, was least available for obesity.

**Inferences and Conclusions**

This project set out to review the evidence that would support a policy argument for increasing societal investment in early child health as a way to improve children’s health, improve health across the life span, and yield societal savings in health care and related costs. The logic of the argument is that the foundations of a healthy life course are formed during the earliest period of life—before conception, before birth, and in the first 5 years; that interventions exist to effectively prevent or treat early health problems; and that these early interventions will reduce costs later in life.

We selected 4 health topics that reflect national priorities, have significant prevalence, involve both physical and mental health issues, and have strong social and environmental determinants. We assessed 3 components of the argument: the magnitude of each of the problems, the cost implications of the problems both in childhood and later in adult life, and the availability of effective interventions that have monetary benefits.

**Overall Magnitude of Children’s Health Burden**

Estimating the overall magnitude of the burden of these 4 topics on the health of America’s children identified a limitation of this work. The compiled findings showed, first, that 25% of children are exposed to ETS by household members, and 10% of women giving birth in 2004 smoked during pregnancy. Second, the prevalence of childhood obesity has reached 14%. Third, 3 in 10 children experience an unintentional injury serious enough to require medical treatment or restrict activity. Finally, for children between the ages of 1 and 6, approximately 3% to 7% are estimated to have externalizing or internalizing mental health problems. There is no simple way, however, to arrive at a single estimate of the overall burden of these conditions on preschool children in the United States. Adding up the prevalence overestimates the total burden because these conditions can overlap in the population. It would not be unreasonable to estimate, however, that nearly all low-income/disadvantaged preschoolers are affected by one or more of these problems, and that the total prevalence declines among more affluent children. Although we expect some overlap among the 4 health issues for children, the correlations are unlikely to be 0% or 100%. As a result, we estimate approximately one-third to one-half of each US birth cohort children are affected by one or more of the 4 health issues.

**Economic Burden of Children’s Health Conditions**

The evidence for the economic costs and long-term consequences of these 4 health problems among preschool children is compelling. Because the economic data come from a wide variety of sources and types of studies, it is not possible to create an exact estimate for their total...
economic cost. However, it is likely that the lifetime societal burden of these problems, if untreated, runs into the hundreds of billions of dollars for each birth cohort. Assuming that the 4 health problems combined affect approximately a third to a half of each US birth cohort—about 1.3 to 2 million children each year—we calculate that as little as a total lifetime societal cost (including, for example, health care, special education, productivity loss, civil justice) of $50 000 per child will translate to $65 billion to $100 billion for the whole birth cohort.

**Availability of Effective and Cost-Effective Interventions**

The 4 children’s health topics selected demonstrate that the policy solutions needed to address them go well beyond the medical model of a doctor treating a sick child. Meeting the underlying health needs of American children will require decision makers and practitioners to understand complex multiple determinants of health and disease as well as public health approaches that involve family, community, and national interventions.

The review found the evidence from intervention studies across the 4 child health areas to be uneven; the strategies behind the interventions are different, and the effectiveness of programs is mixed. The best evidence for effective interventions is available for tobacco control and injury prevention; model programs are available for implementation at clinical and community levels, and both net and gross cost savings from their implementation would be considerable. To date, few interventions have targeted obesity prevention among preschoolers. Within early childhood mental health, many interventions have focused on symptom reduction and building parents’ skills to manage problem behaviors, but rigorous studies of effective population-based approaches to promoting social-emotional health in children under the age of 5 are lacking. Furthermore, some effective interventions targeted at prevalent problems may affect multiple domains of child health (eg, reducing maternal depression might lead to declines in both unintended injuries and children’s behavioral problems).

The evidence for the cost-effectiveness of interventions is also mixed. The best evidence, again, is available for tobacco control and injury prevention. This unevenness reflects the paucity of research on effective interventions that have long-term consequences. Data are absent at all points along the continuum, including cost data, effectiveness data, and links to long-term consequences. Economic evaluations of interventions to prevent early child obesity are particularly absent because this is a newly emerging area of research. Future studies of the economic consequences of obesity prevention must include a consideration of the length and time it will take to decrease even a fraction of the economic burden of this condition.

A significant limitation of the intervention literature is the lack of studies that followed populations long enough to demonstrate their full impact on the life course. This limitation reflects the failure of public and private research funders to support longitudinal research. Thus, the scientific evidence linking early childhood health policy to adult health outcomes remains observational. Although mathematical models can be constructed to link early childhood interventions with later outcomes, only well-designed longitudinal studies will substantiate these relationships and support the evaluations of interventions. We believe that longitudinal research beginning in this early, sensitive period of life is worth the investment. The cost of such research must be calculated against the potential costs of doing nothing and the promise for better societal outcomes and savings.

**Conclusion**

This review found convincing evidence that in early life, 4 issues—tobacco exposure, unintentional injury, obesity, and mental health—constitute significant burdens on the health of children and are early antecedents of health problems across the life span. The evidence for the cost consequences of these problems is strong, although more uneven than the epidemiological evidence.

In contrast, the review of the preventive intervention research and cost effectiveness/benefit literature in the prenatal and preschool period found considerable gaps in the evidence, making us more cautious about drawing policy implications. There is an urgent need for carefully targeted, specific, rigorous research to examine the longitudinal causal relationships between early childhood preventive interventions and health outcomes across the life course. Specifically, such new research must include preconceptional and prenatal interventions, testing hypotheses that arise from life course epidemiological studies. The research should be carried out in a broad range of socioeconomics, racial, and ethnic groups to assess its impact on health disparities. Finally, the most rigorous implementation studies and economic study designs are needed to convince policy makers to bring such research into the policy-making process. Such intervention research must address the complex clinical, environmental, familial, and public health dimensions of these problems. The recently launched National Children’s Study may be a good start to building such a body of knowledge, but the NCS is not an intervention study. Further, a recent review of the research plan indicates the challenges that remain.

The United States has not invested adequately in children’s health for a long time. The Partnership for America’s Economic Success estimated that the federal government’s total investment spending for children of all ages in 2006 was 1.6% of GDP, and the share of the budget is projected to decline by 14% to 29% between 2006 and 2017. Now may be the time to reverse this trend of disinvestment, if the nation is to improve the health of children and avert future health and cost consequences. The failure to strengthen prevention research and practice in this young age group brings with it the risk that future researchers will still find an even greater magnitude of the poor health burden attributable to missed opportunities for early prevention. While waiting for new longitudinal research that
measures and catalogs outcomes of specific early child health interventions, we conclude that the currently available research justifies targeted investments in early childhood health promotion.

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REFERENCES
### Tobacco Use Prevention and Cessation—Economic Studies

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<td><strong>Adams et al 1997</strong>&lt;br&gt;Cost: 1987 and 1995</td>
<td>To derive estimates of the smoking-attributable costs for direct medical expenditures (ie, inpatient, physician, hospital outpatient, and emergency department costs) related to pregnancy outcomes</td>
<td>Societal</td>
<td>Cost estimate&lt;br&gt;Analysis of 1987 National Medical Expenditures Survey data&lt;br&gt;Cost estimates based on amounts paid by all insurers and by persons paying out-of-pocket for health care&lt;br&gt;The probability of pregnancy complications and expected expenditures were estimated based on socio-demographic factors, receipt and timing of prenatal care, and smoking status</td>
<td>Civilian, noninstitutionalized US population</td>
<td>- Medical-care expenditures attributable to smokers with complicated births (eg, hemorrhage from placenta previa, maternal infection, fetal distress, or malposition of the fetus) were an estimated $791 million, representing 11% of the total medical expenditures for all complicated births ($7 billion). When a smoking prevalence during pregnancy of 27% was used in the calculation, the estimated smoking-attributable costs were $1.1 billion (15% of total expenditures)&lt;br&gt;- Smoking-attributable costs of complicated births were updated to 1995 by accounting for medical-care cost inflation and the number of live-born infants in 1995 (3.9 million). The estimated smoking-attributable costs were $1.4 billion (11% of costs for all complicated births) in 1995 dollars, based on a smoking prevalence during pregnancy of 19%, and an estimated $2.0 billion (15%) based on a smoking prevalence of 27%</td>
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<td><strong>Aligne and Stoddard 1997</strong>&lt;br&gt;Cost: 1993</td>
<td>To determine the economic influence of pediatric disease attributable to parental smoking</td>
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<td>Cost estimate</td>
<td><strong>Total Costs:</strong>&lt;br&gt;- Direct medical: $4.6 billion; loss of life: $8 billion&lt;br&gt;  <strong>Cost Attributable to Low Birth Weight:</strong>&lt;br&gt;- Direct medical: $1.2 billion; loss of life: $3.7 billion&lt;br&gt;  <strong>Cost Attributable to Sudden Infant Death Syndrome:</strong>&lt;br&gt;- Loss of life: $2.7 billion&lt;br&gt;  <strong>Cost Attributable to Respiratory Syncytial Virus:</strong>&lt;br&gt;- Direct medical: $130 million; loss of life: $1.5 billion&lt;br&gt;  <strong>Cost Attributable to Otitis Media:</strong>&lt;br&gt;- Direct medical: $150 million&lt;br&gt;  <strong>Cost Attributable to Otitis Media With Effusion:</strong>&lt;br&gt;- Direct medical: $290 million&lt;br&gt;  <strong>Cost Attributable to Asthma:</strong>&lt;br&gt;- Direct medical: $180 million; loss of life: $19 million&lt;br&gt;  <strong>Cost Attributable to Burns:</strong>&lt;br&gt;- Direct medical: $24 billion; loss of life: $330 million</td>
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| Armour et al 2005  
Cost: 2001                   | To develop estimates of smoking-attributable mortality, years of potential life lost (YPLL) for adults and infants, and productivity losses for adults | Societal    | Used the CDC’s Adult and Maternal and Child Health Smoking-Attributable Mortality, Morbidity and Economic Cost (SAMMEC) software to estimate costs | Adult men and women and infants in the USA           | During 1997–2001, cigarette smoking and exposure to tobacco smoke resulted in approximately 438,14000 premature deaths in the USA, 5.5 million YPLL, and $92 billion in productivity losses annually (approximately $61.9 billion for men and $30.5 billion for women) |
| Bertera 1991  
Cost: 1988                   | To estimate the impact of behavioral risk factors on absenteeism and health care costs | Employer    | A cross-sectional design was used to evaluate health risk appraisal and physical examination data collected 1984–1988 | 45 976 employees of Dupont (a large, diversified industrial workforce in the USA) | Employees with any of 6 behavioral risks had significantly higher absenteeism (range 10%–32%) compared with those without risks (in particular, smokers had 30% more absenteeism than nonsmokers)  
These differences led to significantly higher illness costs (defined as compensation, health care, and non–health care benefits) for those with risks compared with those without risks. Annual excess illness costs per person at risk were smoking, $960; overweight, $401; excess alcohol, $389; elevated cholesterol, $370; high blood pressure, $343; inadequate seatbelt use, $272; and lack of exercise, $130. Only one factor, lack of exercise, was not significant after adjusting for age, education, pay category, and the 6 other behavioral risks. The total cost to the company of excess illness was conservatively estimated at $70.8 million annually |
| Centers for Disease Control and Prevention (CDC) 2002  
Cost: 1996                  | To provide national estimates of annual smoking-attributable mortality, years of potential life lost (YPLL), smoking-attributable medical expenditures for adults and infants, and productivity costs for adults | Societal    | Used the CDC’s Adult and Maternal and Child Health Smoking-Attributable Mortality, Morbidity and Economic Cost (SAMMEC) software to estimate costs | Adult men and women and infants in the USA           | During 1995–1999, the average annual mortality-related productivity losses attributable to smoking for adults were $81.9 billion. In 1998, smoking-attributable personal health care medical expenditures were $75.5 billion. For each of the approximately 46.5 million adult smokers in 1999, these costs represent $1760 in lost productivity and $1623 in excess medical expenditures. Smoking-attributable neonatal expenditures were $366 million in 1996, or $704 per maternal smoker ($8 per adult smoker). Maternal smoking accounted for 2.3% of total neonatal medical expenditures in 1996. The economic costs of smoking totaled $3391 per smoker per year |
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<td>DiFranza et al 2001</td>
<td>To estimate the cost-effectiveness of active enforcement of tobacco sales to minors on a national level</td>
<td>Societal</td>
<td>USA</td>
<td>• Primary outcome measures consisted of 4 levels of reduction in youth tobacco use ranging from 5% to 50%, with subsequent cost-effectiveness ratios ranging from $44 to $3100 per year of life saved&lt;br&gt;• Inspecting an estimated 543,000 tobacco outlets would cost up to $190 million annually. An enforcement program could save 10 times as many lives as the same amount spent on mammography or screening for colorectal carcinoma. A 1-cent per pack cigarette tax could fully fund enforcement</td>
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<tr>
<td>Fiore et al 2000</td>
<td>To identify effective, experimentally validated tobacco dependence treatments and practices</td>
<td>Societal</td>
<td>Various</td>
<td>Cost-effectiveness analyses have shown that smoking cessation treatments compare quite favorably with routine medical interventions such as the treatment of hypertension and hypercholesterolemia, and with other preventive interventions such as periodic mammograms. In fact, smoking cessation treatment has been referred to as the &quot;gold standard&quot; of preventive interventions. Smoking cessation treatment remains highly cost-effective, even though a single application of any effective treatment for tobacco dependence may produce sustained abstinence in only a minority of smokers&lt;br&gt;Mean average excess direct medical cost per live birth for each pregnant smoker was $511; total cost was $263 million. An annual drop of 1 percentage point in smoking prevalence would prevent 1300 low-birth-weight live births and save $21 million in direct medical costs in the first year of the program; it would prevent 57,200 low-birth-weight infants and save $572 million in direct medical costs in 7 years</td>
</tr>
<tr>
<td>Lightwood et al 1999</td>
<td>To estimate excess direct medical costs of low birth weight from maternal smoking and short-term cost savings from smoking cessation programs before or during the first trimester of pregnancy</td>
<td>Societal</td>
<td>USA</td>
<td>Mean average excess direct medical cost per live birth for each pregnant smoker was $511; total cost was $263 million. An annual drop of 1 percentage point in smoking prevalence would prevent 1300 low-birth-weight live births and save $21 million in direct medical costs in the first year of the program; it would prevent 57,200 low-birth-weight infants and save $572 million in direct medical costs in 7 years</td>
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</table>
### Tobacco Use Prevention and Cessation—Economic Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Perspective</th>
<th>Study Type and Design</th>
<th>Population and Setting</th>
<th>Results/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windsor 2003</td>
<td>To estimate the projected cost benefit of maternal smoking cessation</td>
<td>Societal</td>
<td>Meta-analysis/Cost-benefit analysis</td>
<td>USA, Norway, Canada, Sweden</td>
<td>Quitting methods most heavily influence lighter smokers • Exposing 800 000 smokers could result in 4% cessation rate • Estimated potential savings based on healthier mother and baby: $64 million • Cost-to-benefit ratio is $1:$12 • Costs only include medical costs during first year of life</td>
</tr>
</tbody>
</table>

### Tobacco Interventions—Preconception and Prenatal Periods

<table>
<thead>
<tr>
<th>Study Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Albrecht et al 2006  | To evaluate the short and long-term effects of smoking cessation strategies tailored to the pregnant adolescent to attain and maintain abstinence | Design: • Randomized controlled trial (RCT) Intervention: • 3 arms: Teen FreshStart (TFS, a program modeled after the American Cancer Society’s educational and motivational FreshStart for adults), Teen FreshStart Plus Buddy (TFS-B, which added the support of a female nonsmoking peer), and a control group receiving usual care and education (UC) measured at baseline, 8 weeks after randomization, and 1 year after study entry | Pregnant adolescents ages 14–19 years | 142 | 31 did not complete 1-year follow-up • There were no significant differences among the 3 treatment groups at baseline in terms of the racial distribution, age, gestational age, age of menses initiation, number in family household, number of family members who smoked, or tobacco use. A significant difference between the UC group and the TFS-B group ($P = .010$) was seen in smoking behaviors measured 8 weeks after treatment initiation. At 1 year after study entry, however, there were no differences between the groups in smoking behaviors • The TFS-B intervention was more effective in attaining short-term smoking cessation in the pregnant adolescent than TFS or UC. Findings suggest that the peer-enhanced...
programming had a limited effect but could not sustain the participant beyond postpartum (1 year after study entry). Future studies should include relapse prevention to sustain smoking abstinence into the postpartum period.

### Aveyard et al 2005

**To examine effect of smoking cessation programs on pregnant women’s partners**

**Design:**
- RCT

**Intervention:**
- 3 arms: (1) standard smoking cessation, (2) midwife trained in smoking cessation, or (3) midwife plus questionnaire giving feedback on stage of change
- Follow-up at 30 weeks’ gestation

**Setting:**
- West Midlands, UK

**Inclusion:**
- Pregnant women aged 16 or older

71

18.6%

Partners quitting at 30 weeks’ gestation: (1) 3.3%, (2) 4.1%, (3) 5.2%

- Probability of quitting did not differ by trial arm
- More studies looking at mobilization of social support of smoking partners should be considered

### Campbell et al 2006

**To assess effectiveness of 2 methods of delivering smoking cessation materials**

**Design:**
- Group randomized trial

**Intervention:**
- “Simple dissemination” (SD) clinics received written information and staff training materials
- “Intensive dissemination” (ID) received written information, offer of staff training visit, sample clinic policy, and support from study facilitators

**Setting:**
- New South Wales, Australia

**Inclusion:**
- Clinics: All prenatal clinics in New South Wales, Australia
- Women: all women attending clinic over age 16, speaking English, and in good health

**Wave 1:**
- SD: 2900, ID: 4211
- Wave 2:
  - SD: 1813, ID: 2001

**Wave 1:**
- SD: 6%, ID: 4%
- Wave 2:
  - SD: 7%, ID: 8%

Patient smoking status assessed by cross-sectional analysis before and after surveys

- No difference was found between groups
- Within groups, no difference was found before and after dissemination of materials
<table>
<thead>
<tr>
<th>Study</th>
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<th>Outcomes/ Comments</th>
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</thead>
<tbody>
<tr>
<td>Coleman et al 2007</td>
<td>To determine whether nicotine replacement therapy is effective, cost-effective, and safe when used for smoking cessation by pregnant women</td>
<td>Design:</td>
<td>Setting:</td>
<td>1050</td>
<td>NA</td>
<td>• The primary outcome measure is biochemically validated, self-reported prolonged and total abstinence from smoking between a quit date (defined before randomization and set within 2 weeks of this) and delivery. At 6 months after childbirth, self-reported maternal smoking status will be ascertained, and 2 years after childbirth, self-reported maternal smoking status and the behavior, cognitive development, and respiratory symptoms of children born in the trial will be compared in both groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td></td>
<td></td>
<td></td>
<td>• Results not yet available because recruitment will begin in 2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review of</td>
<td>Inclusion:</td>
<td></td>
<td></td>
<td>• Understanding obstacles and pathways for pregnancy and postpartum smoking cessation can guide implementation of effective existing programs and development of new ones</td>
</tr>
<tr>
<td></td>
<td></td>
<td>epidemiological data, extant reviews of the literature, and current original research reports</td>
<td>Not specified</td>
<td>Pregnant women attending antenatal care at 12–24 weeks pregnant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DiClemente et al 2000</td>
<td>To review the literature regarding the process of smoking cessation in the context of pregnancy and the postpartum periods</td>
<td>Review of</td>
<td>Setting:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>epidemiological data, extant reviews of the literature, and current original research reports</td>
<td>Not specified</td>
<td>UK</td>
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Tobacco Interventions—Preconception and Prenatal Periods
### Donatelle et al 2000

To determine whether the combination of bolstered social support and financial incentives had an effect in significantly reducing smoking behavior among low-income, high-risk pregnant and postpartum women

<table>
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<tr>
<th>Design:</th>
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<tr>
<td>RCT</td>
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<tr>
<th>Intervention:</th>
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<tr>
<td>A theory-based 3-pronged approach: positive incentives, “bolstered” social supports, and community participation</td>
</tr>
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</table>

- Participants were followed through 2 months postpartum (for a maximum of 10 intervention months)
- Women enrolled in Oregon’s Women, Infants, and Children (WIC) program, age 15 years or older; self-reported smoker (“even a puff in the last 7 days”); English speaker/reader; and 28 weeks’ gestation or less
- Recruitment occurred between June 1996 and June 1997

<table>
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<tr>
<th>Treatment:</th>
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<tr>
<td>32% at 8 months’ gestation and 36% at 2 months postpartum</td>
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<th>Control:</th>
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<tr>
<td>51.5% at 8 months’ gestation and 52% at 2 months postpartum</td>
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</table>

Significant differences existed between treatment and control groups in percentages of smokers who were biochemically confirmed as quit at 8 months’ gestation

\[ \chi^2 = 18.4 \quad (P < 0.0001) \]

and also at 2 months postpartum

\[ \chi^2 = 11.0 \quad (P < 0.0009) \]

### Ershoff et al 1989

To test the effectiveness of a prenatal self-help smoking cessation program that consisted predominately of printed materials received through the mail

<table>
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<tr>
<td>RCT</td>
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<th>Intervention:</th>
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<tr>
<td>Brief health educator discussion of risks (3–5 minutes); advised of a free smoking cessation class; and pregnancy-specific self-help materials mailed weekly for 7 weeks</td>
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- Socioeconomically and ethnically diverse group of pregnant women enrolled in a large health maintenance organization who reported they were smoking at the time of their first prenatal visit

<table>
<thead>
<tr>
<th>Treatment:</th>
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<tr>
<td>6% of treatment group and 8% of control group</td>
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- Biochemical confirmation of continuous abstinence achieved before the 20th completed week of pregnancy and lasting through delivery revealed 22.2% of the women in the 8-week serialized program quit vs 8.6% of controls with usual care. The adjusted OR was 2.80 (95% confidence interval [95% CI] 1.17, 6.69)

- A low-cost prenatal self-help intervention can significantly affect the public health problem of smoking during pregnancy and its associated risks for maternal and child health
<table>
<thead>
<tr>
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<th>Outcomes/Comments</th>
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<tbody>
<tr>
<td>Fang 2004</td>
<td>To review existing research, current strategies, and directions for future research on smoking cessation relapse and relapse prevention in pregnancy and postpartum</td>
<td>Medline/PubMed search in 2002 and 2003 for articles containing the keywords &quot;smoking,&quot; &quot;pregnancy,&quot; &quot;cessation,&quot; and &quot;cessation relapse prevention&quot; and references of retrieved papers yielded a review of &gt;500 articles</td>
<td>To be included in this review, articles had to address pre- or postnatal relapse prevention or treatment. Articles were also included if they allowed comparisons of women who relapsed versus those who remained smoke free. Of the 146 articles that contained references to postpartum relapse, only 14 specifically described strategies to increase cessation among pregnant women through relapse prevention programs (2 of these 14 articles discussed the same program)</td>
<td>14 studies</td>
<td>NA</td>
<td>- Although there is much information on the rationale and strategies for smoking cessation for pregnant women, fewer studies exist on how to prevent relapse. Maintaining and accelerating progress in cessation during pregnancy and postpartum requires more research that focuses on relapse prevention and cessation. Programs should incorporate stresses particular to postpartum women, should be part of routine health care, and should involve the woman’s social support network, including her partner, to maximize effectiveness</td>
</tr>
<tr>
<td>Fiore et al 2000</td>
<td>To identify effective, experimentally validated tobacco dependence treatments and practices</td>
<td>Review</td>
<td>Abstinence data were included only if they were biochemically confirmed as a result of reports of high levels of deception regarding smoking status found in</td>
<td>7 studies</td>
<td>NA</td>
<td>- Research is needed that examines how the following optimally influence relapse prevention: stages of change, confidence level, perception of level of ease of quitting, and support systems. Interventions that involve the woman’s partner need further exploration</td>
</tr>
</tbody>
</table>

- A “usual care” intervention with pregnant smokers typically consists of a recommendation to stop smoking, often supplemented by provision of
To evaluate the effect on quitting smoking at 18 months postpartum of smoking cessation interventions based on the Transtheoretical Model (TTM) delivered in pregnancy compared to current standard care.

**Design:** Cluster randomized trial

**Intervention:** 100 general practices were randomized into three arms. Midwives in these practices delivered 3 interventions: A (standard care), B (TTM-based self-help manuals), and C (TTM-based self-help manuals plus sessions with an interactive computer program giving individualized smoking cessation advice).

**Population:** Pregnant women

**Setting:** Antenatal clinics in general practices in the West Midlands, UK

**Outcome:** Self-reported continuous and point prevalence abstinence since pregnancy

When combined together, there was a slight and not significant benefit for both TTM arms compared to the control, with an odds ratio (OR) of 1.20 (95% CI 0.29–4.88) for continuous abstinence. For point prevalence abstinence, the OR was 1.15 (95% CI 0.66–2.03). Seven (13%) of 54 women who had quit at the end of pregnancy were still quit 18 months later, and there was no evidence that the TTM-based interventions were superior in preventing relapse compared to the control, with an odds ratio (OR) of 1.20 (95% CI 0.29–4.88) for continuous abstinence.

The TTM-based interventions may have shown some evidence of a short-term benefit for quitting in pregnancy but no benefit relative to standard care when followed up in the longer term.
<table>
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</thead>
</table>
| Lumley et al 2004     | To evaluate the impact of smoking cessation programs implemented during pregnancy | Searched the Cochrane Pregnancy and Childbirth Group trials register, Cochrane Tobacco Addiction Group trials register, MEDLINE, EMBASE, PsychLIT, CINAHL, and AUSTHEALTH | Setting:                            | 64 studies | NA        | • Significant reduction in smoking in intervention groups (relative risk 
RR 0.94; 95% CI 0.93–0.95)  
• Interventions reduced low birth weight (RR 0.81; 95% CI 0.7–0.94)  
• Interventions reduced preterm birth (RR 0.84; 95% CI 0.72–0.98)  
• Interventions increased birth weight by 33 g (95% CI 11–15 g)  
• No differences found for very low birth weight infants, stillbirths, and perinatal or neonatal mortality |  |
| Melvin et al 2000     | To review the evidence base underlying recommended cessation counseling for pregnant women who smoke | Not specified                                                                 |                                      | 16 studies | NA        | A brief cessation counseling session of 5–15 minutes, when delivered by a trained provider with the provision of pregnancy-specific self-help materials, significantly increases rates of cessation among pregnant smokers. This low-intensity intervention achieves a modest but clinically significant effect on cessation rates, with an average risk ratio of 1.7 (95% CI 1.3–2.2). There are 5 components of the recommended method—“ask, advise, assess, assist, and arrange.” |  |
| Mullen 2004           | To review accumulated knowledge about factors that influence                    | Literature review                                                             |                                      | 6 trials, 6 multivariate predictor studies, supplemented by | NA        | Recommendations: (1) Partner smoking must be addressed in |
restarting smoking and the effectiveness of interventions to decrease it predicts, intensity, and timing of interventions, theory, designs, and measures of quitting, and maintenance postpartum qualitative and more focused quantitative studies interventions with cessation messages. (2) Intervention studies should include women of lower socioeconomic status and black women. (3) Program developers and researchers should adopt a consistent standard for cessation. (4) Communication laboratory methods should test ways to increase intrinsic reasons for abstinence and success attributions to stable, internal causes. (5) Staging for postpartum smoking should supplant relapse prevention alone. (6) Among those whose intention it is to maintain nonsmoking postpartum, standard relapse prevention treatment is insufficient to combat environmental cues that also have been suspended for the pregnancy and typical problems of sleeplessness, stress, depression, and weight concern. (7) Interventions ideally should begin in late pregnancy, when postpartum smoking goals can be revised and plans made to manage postpartum issues. (8) Innovative methods for reducing postpartum problems should be tested. (9) Study of incentives for pregnancy cessation should include varying patterns, carryover to early postpartum months, and focus on their impact on long-term change. (Continued)
## Electronic Table 1. (Continued)

<table>
<thead>
<tr>
<th>Study</th>
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</tr>
</thead>
</table>
| Park et al 2004 | To evaluate the impact of partner support on smoking cessation programs | Searched Cochrane Tobacco register, CDC, and prevention-Tobacco Information and Prevention Database, Cancer Lit, EMBASE, CINAHL, PsychINFO, ERIC, PsychLIT, Dissertation Abstracts, and Healthstar | Setting:  
- Not specified  
Inclusion:  
- Randomized trials comparing interventions with partner support to identical intervention with no partner support  
- Follow-up of 6 months or more | 8 studies | NA | - Definition of partner varied between studies  
- OR for self-reported abstinence at 6–9 months: 1.08; 95% CI 0.81–1.44  
- 12-month OR 1.0; 95% CI 0.75–1.34  
- Only 2 studies found increased partner support at follow-up |
| Rigotti et al 2006 | To evaluate the effectiveness of telephone counseling to help pregnant women quit smoking | Design:  
- RCT  
Intervention:  
- All women received a smoking cessation booklet and phone counseling  
- Intervention group received follow-up calls and additional materials  
- Participants were followed up immediately postpartum and 3 months postpartum | Setting:  
- Prenatal care clinics in MA  
Eligibility:  
- Gestation 26 weeks or less  
- Aged 18 or older  
- Smoking in last week  
- Commitment or intention to quit not required | Intervention (I), 220; control (C), 222 | Intervention, 31%; control, 36% | No significant differences were found among participants receiving additional phone support and standard care |
| Stanton et al 2004 | To evaluate the impact of smoking cessation targeted at men during wife’s pregnancy | Design:  
- RCT  
Intervention:  
- Video on effects of smoke on infants, informational packet with nicotine patches, audiotape, stickers, phone intervention with general practitioner  
- Controls sent brochure with contact information for available | Setting:  
- Men with partners attending public antenatal clinics in metropolitan Australian city  
Inclusion:  
- Not stated | 561 | I: 23%  
C: 16% | - Intervention group had significantly higher quit rate than control at 6 months’ follow-up (16.5% vs 9.3%; OR 0.52; 95% CI 0.31–0.86)  
- The number of smoking men who had to be treated to achieve one stopping smoking during their partner’s pregnancy was 13 to 14  
- Women consented to partners being
To determine whether motivational interviewing helps pregnant smokers quit smoking.

**Design:**
- RCT

**Intervention:**
- All received standard health promotion to stop smoking.
- Intervention received standard care plus motivational home interviews.

**Setting:**
- Antenatal clinic in Glasgow.

**Inclusion:**
- All smokers attending clinic at \( \leq 24 \) weeks’ gestation.

**Participants:**
- I: 351
- C: 411
- I: 4%
- C: 3%

Similar percentage of people in each group quit smoking (4.8% intervention, 4.6% control).

Overall motivational interviews did not have a significant effect on quit rates.

To review the evidence for effectiveness of smoking prevention and cessation programs among pregnant and postpartum women.

**Literature review**

Among women, biopsychosocial factors such as pregnancy, fear of weight gain, depression, and the need for social support appear to be associated with smoking maintenance, cessation, or relapse.

A higher percentage of women stop smoking during pregnancy, both spontaneously and with assistance, than at other times in their lives.

Using pregnancy-specific programs can increase smoking cessation rates, which benefits infant health and is cost-effective. Only about one-third of women who stop smoking during pregnancy are still abstinent 1 year after the delivery.

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</thead>
<tbody>
<tr>
<td>Van’t Hof et al 2000</td>
<td>To examine the effectiveness of a provider-delivered smoking-relapse prevention strategy</td>
<td><em>Design:</em> • RCT&lt;br&gt; <em>Intervention:</em> • Smoking history obtained at delivery, and transmission of the history to infant’s care provider</td>
<td>All women delivering babies at 6 participating Portland, OR, metropolitan area hospitals who received an in-hospital screening, reported smoking during the 30 days before the pregnancy and quitting during pregnancy, and were willing to speak with a nurse about having quit smoking</td>
<td>287 (I: 141; C: 146)</td>
<td>• I: 133 &lt;br&gt; • C: 144</td>
<td>• Communicating a new mother’s smoking status from the delivery service to the infant’s care provider can be done quickly and effectively, and leads to increased rates of provider-delivered smoking relapse prevention advice &lt;br&gt; • There was no difference in the relapse rate between women in the intervention (41%) and control (37%) groups. Even when all those lost to follow-up were considered to have relapsed, differences between intervention (42%) and control (38%) groups did not vary significantly</td>
</tr>
<tr>
<td>Wahlgren et al 1997</td>
<td>To examine the long-term maintenance of a previously reported behavioral counseling intervention to reduce asthmatic children’s exposure to environmental tobacco smoke (ETS)</td>
<td>Participants were randomized to 1 of 3 groups: behavioral counseling to reduce ETS exposure, self-monitoring control, and usual medical care control. Counseling concluded at month 6, and the original trial ended at month 12. Two follow-up interviews occurred at months 20 and 30</td>
<td>Families of children with asthma (aged 6–17 years), including at least one parent who smoked in the home, recruited from 4 pediatric allergy clinics</td>
<td>91 families</td>
<td>67 families</td>
<td>• The originally reported analysis of baseline to 12 months was reanalyzed with a more robust restricted maximum likelihood procedure. The 2-year follow-up period was analyzed similarly. Significantly greater change occurred in the counseling group than the control groups and was sustained throughout the 2 years of follow-up. Further exploratory analyses suggested that printed counseling materials</td>
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given to all participants at month 12 (conclusion of the original study) were associated with decreased exposure in the control groups.

- Such long-term maintenance of behavior change is highly unusual in the general behavioral science literature, let alone for addictive behaviors. We conclude that ETS exposure can be reduced and that a clinician-delivered treatment may provide substantial benefit.

Walsh et al 1997

To evaluate the impact of a smoking cessation program implemented at a public antenatal clinic.

**Design:**
- RCT

**Intervention:**
- Physician advice regarding risks (2–3 minutes); videotape with information on risks, barriers, and tips for quitting; midwife counseling in one 10-minute session; self-help manual; and follow-up letters.

Women attending the antenatal clinic of an urban teaching hospital in Australia

252
(I: 127; C: 125)

At midpoint, 10%; end of pregnancy, 10%; postpartum, 25%.

- Except for the postpartum self-report, self-report and biochemically validated quit rates in the experimental group were significantly higher than in the control group at all 3 points, whether point prevalence or consecutive cessation measures were used.

- The experimental program cost more per patient than the control intervention (US$13.95 vs US$1.83). The cost per end-of-pregnancy validated abstainer was US$121.41 in the experimental group, compared with US$37.88 in the control group.

- This study demonstrates that a smoking cessation program conducted by usual care providers in a public antenatal clinic can produce significant increases in sustained quit rates.
<table>
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</table>
| Windsor et al 1985    | To evaluate the effectiveness of low-cost, self-help smoking cessation methods for public health clinic populations initiated at the first prenatal visit | Design:  
* RCT  
* Pregnancy-specific self-help materials *(Pregnant Woman’s Self-Help Guide To Quit Smoking)* and one 10-minute counseling session with a health educator | Women (<7 months pregnant) attending 3 of 5 high-volume public health maternity clinics of the Jefferson County Health Department in the metropolitan area of Birmingham, AL | 309  | 15%       | • The evidence from this trial indicates that the smoking behavior (cessation and/or significant reduction) of approximately 1 of 5 smokers was changed as a result of exposure to the methods used  
• Beyond the observed behavior change, the cessation methods applied in this study demonstrated a high degree of feasibility and acceptability among pregnant women and public health maternity clinic staff |
| Windsor et al 1993    | To evaluate the behavioral impact of smoking cessation health education among pregnant smokers | Design:  
* RCT  
* Cessation skills and risk counseling in a 15-minute session by a counselor; education on how to use pregnancy-specific self-help materials; a follow-up letter; and social support with a buddy letter, a buddy contract, and a buddy tipsheet | Population:  
* Pregnant smokers who entered prenatal care before 7 months  
* 4 highest census maternity clinics of the Jefferson County Health Department in Birmingham, AL | 814 (I: 400; C: 414) | 15%       | • The treatment group (E) exhibited a 14.3% quit rate and the control group had an 8.5% quit rate. An historical comparison (HC) group exhibited a 3.0% quit rate. Black E and HC group patients had higher quit rates than white E and HC group patients  
• A cost-benefit analysis found cost-to-benefit ratios of $1:$6.72 (low estimate) and $1:$17.18 (high estimate) and an estimated savings of $247 296 (low estimate) and $699 240 (high estimate) |
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</thead>
<tbody>
<tr>
<td>Abdullah et al 2005</td>
<td>To examine whether telephone counseling based on the stages of change component of TTM of behavior change together with educational materials could help nonmotivated smoking parents of young children to cease</td>
<td>Participants were randomly allocated into 2 groups: the intervention group received printed self-help materials and 3-session telephone-based smoking cessation counseling delivered by trained counselors; the control group received printed self-help materials only. A structured questionnaire was used for data collection at baseline and at 1-, 3-, and 6-month follow-up.</td>
<td>Hong Kong Special Administrative Region, PR China Smoking fathers and mothers of Chinese children aged 5 years</td>
<td>952 (I: 467; C: 485)</td>
<td>49 lost by end of study</td>
<td>Outcomes: 7-day point prevalence quit rate at 6 months determined by self reports, self-reported 24-hour point prevalence quit rate and self-reported continuous quit rate and biochemically validated quit rate at 6 months. Results: The 7-day point prevalence quit rate at 6 months' follow-up was significantly greater in the intervention group (15.3%; 68/444) than the control group (7.4%; 34/459) (P &lt; .001). The absolute risk reduction was 7.9% (95% CI 3.78%–12.01%). The number needed to treat to get one additional smoker to quit was 13 (95% CI 8–26). The adjusted OR was 2.1 (95% CI 1.4–3.4) (adjusted for age, number of years smoked, and alcohol dependency). Proactive telephone counseling is an effective aid to promote smoking cessation among parents of young children.</td>
</tr>
<tr>
<td>Emmons et al 2001</td>
<td>To determine whether a motivational intervention for smoking parents of young children will lead to reduced household passive smoke exposure</td>
<td>Design: RCT Intervention: Motivational intervention (MI) group received a 30- to 45-minute MI session with a trained health educator, 4 follow-up calls, feedback from household air nicotine assessments and the participant’s CO₂ level. Self-help (SH) group received a smoking cessation manual, passive smoke reduction tip sheet, and resource guide in the mail. Low-income smoking parents/caregivers (N = 5291) who had children who were younger than 3 years and who were recruited through primary care settings.</td>
<td></td>
<td>5291</td>
<td>MI: 26 nonresponders at 6 months' follow-up SH: 18 nonresponders at 6 months' follow-up</td>
<td>The 6-month nicotine levels were significantly lower in MI households. Repeated measures analysis of variance across baseline and 3- and 6-month time points showed a significant time-by-treatment interaction, whereby nicotine levels for the MI group decreased significantly and nicotine levels for the SH group increased but were not significantly different from baseline.</td>
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<td>Study</td>
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| Hovell et al 2002 | To test the efficacy of coaching to reduce ETS exposure among asthmatic Latino children | **Design:**  
- RCT | Latino children (ages 3–17 years) with asthma in San Diego, CA | 204 | 16 lost | - Parents in the coached condition reported their children to be exposed to significantly fewer cigarettes than parents of control children by 4 months (postcoaching). Reported prevalence of exposed children decreased to 52% for the coached families, but only to 69% for controls. By month 4, mean cotinine levels decreased among coached and increased among control children. Cotinine prevalence decreased from 54% to 40% among coached families, while it increased from 43% to 49% among controls. However, cotinine levels decreased among controls to the same level achieved by coached families by the 13-month follow-up.  
- Asthma management education plus coaching can reduce ETS exposure more than expected from education alone, and decreases in the coached condition may be sustained for about a year. The delayed decrease in cotinine among controls is discussed. |
| Hovell et al 2000 | To test the efficacy of behavioral counseling for smoking mothers in reducing young children’s exposure to ETS | **Design:**  
- RCT | Ethnically diverse mothers living in low-income homes in San Diego County, CA, who exposed their children (aged <4 years) to tobacco smoke in the home | 108 | 14 lost | Mothers’ reports of children’s exposure to their smoke in the home declined in the counseled group from 27.30 cigarettes per week at baseline, to 4.47 at 3 months, to 3.66 at 12 months, and in the controls from 24.56, to 12.08, to 8.38. The differences between the groups by time were significant ($P = .002$). Reported exposure to smoke from all sources showed similar declines, with significant differences between groups by time ($P = .008$). At 12 months, the reported exposure in the counseled group was 41.2% that of controls for mothers’ smoke (95% CI 34.2%–48.3%) and was 45.7% (38.4%–53.0%) that of controls for all sources of smoke. Children’s mean urine cotinine concentrations decreased slightly in the counseled group from 10.93 ng/mL at baseline to 10.47 ng/mL at 12 months but increased in the controls from 9.43 ng/mL to 17.47 ng/mL (differences between groups by time $P = .008$). At 12 months, the cotinine concentration in the counseled group was 55.6% (48.2% to 63.0%) that of controls. |
### Hovell et al, 1994

**To test a behavioral medicine program designed to reduce asthmatic children’s exposure to ETS in the home**

**Design:**
- RCT

**Intervention:**
- Experimental group: a 6-month series of counseling sessions designed to decrease ETS exposure, monitored smoking, exposure, and children’s asthma symptoms.
- Monitoring group: did not receive counseling
- Usual treatment control group received outcome measures only

Families with at least one parent who smoked cigarettes and a child (6–17 years) with asthma were recruited from 4 allergy clinics in San Diego, CA

91 families  Not specified

Parents reported the daily number of cigarettes children were exposed to during the week before the interviews. A nicotine air monitor and construct validity analysis confirmed the validity of exposure reports. Exposure to the parent’s cigarettes in the home decreased for all groups. The experimental group attained a 79% decrease in children’s ETS exposure, compared with 42% for the monitoring control and 34% for the usual treatment control group. Repeated-measures analysis of variance resulted in a significant $F_{10}^{350}(1.92, P < .05)$ group-by-time effect. After 12 months, only the experimental/counseling group sustained a decrease in children’s exposure to cigarettes in the home from $44\%$, while the monitoring control increased 14% and the usual treatment group increased exposure 22% from preintervention.

### Roseby et al, 2003

**To evaluate interventions aimed at reducing exposure of children to second-hand smoke**

**Search:**
- Tobacco Addiction Group studies, Medline, EMBASE, bibliographies, plus other databases and specialists

18 studies  NA

- 3 interventions aimed at population level, 7 studies conducted in well-child visits, 8 studies in ill-child visit
- 4 studies found statistically significant reduction in parent reported cigarette smoking or household nicotine levels; 3 of these used intensive patient counseling
- The fourth study involved children in China writing letters to their fathers; it is not clear how generalizable this is
- 5 studies trended toward significance
- No clear difference was noted in effect of setting (well-child, peripartum, school)
- Insufficient evidence exists regarding effect on child health indicators

### Wahlgren et al, 1997

**To examine long-term maintenance of a previously reported behavioral counseling intervention to reduce asthmatic children’s exposure to ETS**

**Design:**
- RCT

**Intervention:**
- Participants randomized to 3 groups: behavioral counseling to reduce ETS exposure, self-monitoring control, and usual medical care control

Families of asthmatic children (6–17 years), including at least one parent who smoked in the home, recruited from 4 pediatric allergy clinics in San Diego, CA

84 families  20 families lost by end of study

The original analysis (baseline–12 months) was reanalyzed with a more robust restricted maximum-likelihood procedure. The 2-year follow-up period was analyzed similarly. Significantly greater change occurred in the counseling group than the control groups and was sustained throughout the 2 years of follow-up. Further analyses suggest that printed counseling materials given to all participants at the conclusion of the original study were associated with decreased exposure in the control groups.

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</table>
| Winickoff et al 2005 | To review impact of parental smoking on child health and pediatrician-initiated interventions aimed at parents | NA | No inclusion criteria stated | 71 | 20% | ● 3 clinic-based studies showed improved quit rates  
● 3 showed no improvement  
● Pediatrician offices are promising place for parent smoking interventions, but more research is needed |
| Winickoff et al 2003 | To evaluate feasibility and impact of parental smoking cessation intervention at child’s hospitalization | Design:  
- Prospective cohort  
- 20-minute counseling session  
- 1 week of free nicotine replacement therapy  
- 2 follow-up phone calls  
- Referral to MA smoker’s hotline  
- Follow up with primary care provider  
- Participants followed up at 2 months  
Setting:  
- Children’s Hospital in Boston, MA  
Inclusion:  
- All parents of children admitted with respiratory illness  
- Parents must smoke, have phone, speak English | 71 | | ● 5 parents (7%) called free quit line  
● 35 parents (49%) made quit attempt within last 24 hours  
● 15 parents (21%) reported 7-day abstinence at 2 months  
● No control group, so difficult to interpret results  
● Demonstrates feasibility of implementing intervention at hospitalization |
| Zhang and Qiu 1993 | To increase knowledge of the health consequences of cigarette smoking, promote healthier attitudes among elementary school students, and motivate fathers who smoke to quit | In treatment schools:  
- a tobacco-use prevention curriculum, encouragement to implement smoking-control policies to severely limit or restrict smoking, and encouragement of teachers to be nonsmoking role models. Students whose fathers smoked monitored, recorded, and reported their fathers’ smoking status | 10 395 students in grades 1–7 from 23 primary schools and their fathers. The reference group comprised 9987 students in grades 1–7 from 21 primary schools and their fathers | Not provided | Scores of students in the intervention group were significantly higher than both the reference group follow-up scores and the intervention group baseline scores. On the basis of the daily recordings maintained by students in the intervention group, 1037 fathers (15.2%) had not smoked cigarettes for 180 or more days. In comparison, on the basis of the interviews of health educators, 800 fathers (11.7%) reported that they maintained cessation. For a later period, the reported smoking rate for fathers in the intervention group decreased from 68.8% to 60.7% (P < .05), while the reported rate remained approximately the same among fathers in the reference group. Approximately 90% of the fathers in the intervention group who were smokers in May 1989 were reported to have quit smoking for at least 10 days. The 6-month cessation rate for fathers in the intervention group was 11.7% compared with 0.2% in the reference group |
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<tr>
<td>Colby et al 2005</td>
<td>To evaluate the efficacy of motivational interviewing (MI) encouraging teens to quit smoking</td>
<td>Design: RCT&lt;br&gt;Intervention: Standard care of brief advice (BA)&lt;br&gt;Follow-up appointments at 1, 3, and 6 months</td>
<td>Setting: Emergency department and adolescent health clinic in the northeast USA&lt;br&gt;Intervention: MI with 1 week booster contact&lt;br&gt;Follow-up appointments at 1, 3, and 6 months</td>
<td>I: 43</td>
<td>I: 20%</td>
<td>Results:&lt;br&gt;3 month quit rates: no different between groups&lt;br&gt;6 month quit rates: MI = 23%, n = 8; BA = 3%, n = 1&lt;br&gt;Results support that MI may be effective in a medical setting&lt;br&gt;High attrition rates made results difficult to interpret</td>
</tr>
<tr>
<td>Dalton et al 2003</td>
<td>To ascertain whether exposure to smoking in movies predicts smoking initiation</td>
<td>Design: Prospective&lt;br&gt;Intervention: Exposure to smoking in movies was estimated for individual respondents on the basis of the number of smoking occurrences viewed in unique samples of 50 movies, which were randomly selected from a larger sample pool of popular contemporary movies. Students were re-contacted 13–26 months later to determine whether they had initiated smoking</td>
<td>Setting: 14 schools in VT and NH&lt;br&gt;Inclusion: Adolescents (aged 10–14 years) who reported in a baseline survey that they had never tried smoking</td>
<td>3547</td>
<td>2603 (73% of original sample)</td>
<td>Overall, 10% (n = 259) of students initiated smoking during the follow-up period. In the highest quartile of exposure to movie smoking, 17% students (n = 107) had initiated smoking, compared with only 3% (n = 22) in the lowest quartile. After controlling for baseline characteristics, adolescents in the highest quartile of exposure to movie smoking were 2.71 (95% CI 1.73–4.25) times more likely to initiate smoking compared with those in the lowest quartile. The effect of exposure to movie smoking was stronger in adolescents with nonsmoking parents than in those whose parent smoked. In this cohort, 52.2% (95% CI 30.0–67.3) of smoking initiation can be attributed to exposure to smoking in movies</td>
</tr>
<tr>
<td>Grimshaw and Stanton 2006</td>
<td>To evaluate the effectiveness of strategies that help young people stop smoking</td>
<td>Searched CENTRAL, Cochrane Tobacco Addiction Group, Medline, EMBASE, PsychINFO, ERIC, CINAHL, and bibliographies</td>
<td>Setting: All levels including individual, organizational, or community&lt;br&gt;Intervention: Randomized controlled trials, cluster-randomized trials, and controlled trials&lt;br&gt;Primary outcome measure was smoking status at 6 months</td>
<td>15 studies</td>
<td>NA</td>
<td>Pooled results of trials based on TTM achieved moderate long-term success&lt;br&gt;TTM pooled OR at 1 year: 1.7, 95% CI 1.25–2.33&lt;br&gt;TTM pooled OR at 2 years: 1.38, 95% CI 0.99–1.92&lt;br&gt;Pharmacological interventions did not result in statistically significant results&lt;br&gt;Cognitive behavior interventions did not achieve statistical success&lt;br&gt;Motivational interviewing achieved statistical success (OR 2.05, 95% CI 1.10–3.80), but it is difficult to isolate effects of interview from other study elements</td>
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<th>Study</th>
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<th>Comments</th>
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</table>
| Hersey et al 2005     | To evaluate the impact of state anti-smoking ads on youth smoking                     | **Design:**  
  - Cross-sectional observational  
  **Intervention:**  
  - Compared rates of smoking between 1999 and 2002 in states with smoking prevention campaigns  
  - 3 separate surveys fielded: 1 before and 2 after implementation of campaign  
  **Setting:**  
  - USA  
  - States broken down into 3 categories of campaigns: established, new, no campaign  
  - States with established campaigns: CA, FL, MA  
  - States with new campaigns: IN, MS, MN, NJ  
  **Inclusion:**  
  - Youth aged 12–17  
  - Data collected using national sample, oversampling African Americans, Hispanics, and Asians  | Wave 1:  
  - 3424  
  Wave 2:  
  - 12 967  
  Wave 3:  
  - 10 855  | NA   | Greater declines seen in states with established and new anti-smoking campaigns vs other states ($P < .05$)  
  Decline in smoking 1999–2002 based on program: established: 55% (12.3%–5.5%), new: 47% (15.0%–7.9%), no campaign: 25% (12.5%–9.4%)  
  Exposure to campaign only assessed by residency in state, not individual level exposure  
  Campaigns usually included school-based programming, factors in addition to media most likely responsible for decline |
| Hyland et al 2005     | To assess the relationship between exposure to state-sponsored antismoking ads and smoking cessation | **Design:**  
  - Cross-sectional/observational  
  **Intervention:**  
  - Compared smoking behavior among those living in states with state sponsored media campaigns and those without  
  **Setting:**  
  - CA, IA, MA, NM, NJ NY, NC, OR, WA, Ontario  
  **Inclusion:**  
  - Lived in same community in 1998 and 2001  
  - Resided in one of top 75 media markets  
  - Smokers in 1999  | 2061  | NA   | Those reporting that antitobacco information had increased “a lot” showed significant increase in quit rate (RR 1.19, 95% CI 1.03–1.38)  
  States above median exposure to ads had significantly higher quit rates (12.9% vs 11.0%; $P = .047$)  
  Higher exposure leads to increases in quit rates  
  Not able to assess individual exposure  
  Controlled for other antitobacco policies (tax increases) but not able to control for other potential confounders |
### Lantz et al 2000

To provide a comprehensive review of interventions and policies aimed at reducing youth cigarette smoking in the USA, including strategies that have undergone evaluation and emerging innovations that have not yet been assessed for efficacy.

- Medline literature searches, books, reports, electronic list servers, and interviews with tobacco control advocates
- Various
- Not specified
- NA

Interventions and policy approaches were categorized using a typology with 7 categories (school based, community interventions, mass media/public education, advertising restrictions, youth access restrictions, tobacco excise taxes, and direct restrictions on smoking). Novel and largely untested interventions were described using 9 categories. Youth smoking prevention and control efforts have had mixed results. However, this review suggests a number of prevention strategies that are promising, especially if conducted in a coordinated way to take advantage of potential synergies across interventions. Several types of strategies warrant additional attention and evaluation, including aggressive media campaigns, teen smoking cessation programs, social environment changes, community interventions, and increasing cigarette prices. A significant proportion of the resources obtained from the recent settlement between 46 US states and the tobacco industry should be devoted to expanding, improving and evaluating “youth-centered” tobacco prevention and control activities.

### Levy et al 2004

Review of tobacco control policies’ contribution to smoking cessation and initiation.

- Examined studies evaluating (1) taxes, (2) clean air laws, (3) restrictions on advertising, (4) antismoking media campaigns, (5) health warning labels, (6) enforcement of youth access laws, (7) school education programs, and (8) policies to increase utilization of cessation treatments
- Inclusion criteria not stated
- NA
- NA

**Taxes:**
- A 10% increase in cigarette price would result in a 3%–5% decrease in demand for cigarettes per adult
- Youth are more susceptible to the price of cigarettes; higher prices influence progression to established smoker
- Among adolescents, a 10% increase in cigarette price would reduce the number of young smokers by 7%

**Clean Indoor Air Laws:**
- States with clean air laws have 10% lower smoker prevalence vs other states
- Work sites with smoking bans can see significant increases in quit rates, ranging 0%–20%
- Comprehensive bans on smoking could result in an 11% quit rate

**Advertising Restrictions:**
- Results are mixed—for bans to be effective, they must be comprehensive
- A comprehensive ban could result in a decrease in smoke prevalence by 4%; a partial ban would result in a 2% decrease

**Media Campaigns:**
- Results are mixed, but when combined with other programs, media campaigns can potentially reduce smoking prevalence by 7%

**School Education Programs:**
- Evidence from school programs is mixed; many result positively affect attitudes and lead to only short-term change in use

**Access to Treatment:**
- Broad coverage and requirements for physician involvement could lead to a 3.5% reduction in prevalence over 10 years

**Telephone Quit Lines:**
- Absolute difference in quit rates between quit line users and nonusers ranges 3.4%–23%

(Continued)
### Tobacco Interventions—Smoking Among Youth

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<th>Study</th>
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| McDonald et al 2003 | To offer program managers, policy makers, and researchers a scientific basis for developing and selecting smoking cessation treatments for adolescents | An evidence review panel systematically rated published and unpublished reports of cessation treatments for youth to make recommendations on theoretical foundations, delivery settings, types of intervention, and provider type | Various | 20 studies | NA | • The 9 studies that reported treatments that increased cessation were based on social cognitive theory  
• Cognitive-behavioral interventions are a promising approach for helping young smokers quit smoking. Evidence is insufficient to draw other conclusions at this time |
| Muñoz et al 2006 | To evaluate Internet-based smoking cessation programs in both English- and Spanish-speaking populations | **Design:**  
- RCT  
**Intervention:**  
- (1) Guía smoking cessation guide + individually timed educational messages (ITEMs)  
- (2) Guía + ITEMs + mood management  
- Participants followed up at 1, 3, 6, and 12 months | 7 databases were searched for relevant articles published in English between 1980 and 2005, and reference lists were examined for additional published studies. The studies were categorized as (1) individual approaches, such as on-campus cessation programs, and (2) institutional approaches, such as smoke-free policies. The studies were categorized by type of institution and geographic location, study design, sample demographics, and outcomes | English intervention, 280 Spanish intervention, 288 | NA | • Among English speakers, Guía + ITEM alone had higher quit rates at 12 months (17.0 vs 8.6%, \( P = .036 \))  
• There was no significant difference in quit rates among Spanish-speaking participants  
• Study provides evidence that Internet interventions are possible  
• Limited support for efficacy of studied intervention  
• No baseline measurements reported  
• Very high attrition rates |
| Murphy-Hoefer et al 2005 | To review interventions designed to reduce the prevalence of smoking among college/university students | Various | 14 studies | NA | • Only 5 of the 14 studies identified received a “satisfactory” rating based on evaluation criteria. Most studies were based on convenience samples and were conducted in 4-year institutions. Seven studies used comparison groups, and 3 were multi-institutional. Individual approaches included educational group sessions and/or individual counseling that were conducted on campus mostly by health care personnel. None used nicotine replacement or other medications for cessation. The quit rates for both smokeless tobacco and cigarette users varied, depending on definitions and duration of follow-up contact. Institutional interventions focused mainly on campus smoking restrictions, smoke-free policies, antitobacco messages, and cigarette pricing. Results indicated that interventions can have a positive influence on student behavior, specifically by reducing tobacco use (ie, prevalence of cigarette smoking and use of smokeless products, amount smoked) among college students, and increasing acceptability of smoking policies and campus restrictions among both tobacco users and nonusers  
• Although some promising results have been noted, rigorous evaluations of a wider range of programs are needed, along with studies that address cultural and ethnic diversity on campuses |
Ranney et al 2006
To examine effective interventions at the community and population level to prevent tobacco use and increase demand for effective cessation interventions

**Design:**
- Searched Medline, CINAHL, Cochrane Libraries and Clinical Trial Register, Psychological Abstracts, and Social Abstracts

**Setting:**
- None stated

**Inclusion:**
- Randomized trials, observational studies, and systematic reviews all included

**Results:**
- Strong evidence exists for increasing price of tobacco products and mass media campaigns concurrent with other interventions
- Sufficient evidence exists for short-term effects of school based programs
- Insufficient evidence for long-term effects of school-based programs
- Strong evidence supporting telephone support increases cessation in adults; insufficient evidence in adolescents
- Community-based pharmacist interventions successful in reducing adult quit rates

Roddy et al 2006
To evaluate the impact of nicotine replacement therapy on quit rates of low income youth smokers

**Design:**
- RCT

**Intervention:**
- All participants offered counseling
- Randomized to placebo or active nicotine replacement therapy patches

**Setting:**
- Youth community center in inner city Nottingham, UK

**Inclusion:**
- Aged 12–20
- Current smoker, nonpregnant

**Results:**
- 70% of total remained at end of study
- Median length of patch therapy was 1 week
- High attrition rates make study result difficult to interpret
- On the basis of poor compliance, authors suggest nicotine replacement therapy is not effective in this population

Rodgers et al 2005
To determine the effectiveness of a mobile phone text-messaging smoking cessation program

**Design:**
- RCT

**Intervention:**
- Received text messages with smoking cessation advice and 1 month free text messaging after quit day—encouraged to contact family
- Matched with quit buddy to provide support
- Followed up at 6, 12, and 26 weeks

**Setting:**
- New Zealand

**Inclusion:**
- Aged ≥6 years (one-third of sample 16–19 years)
- Currently smoking but interested in quitting
- Able to send and receive text messages

**Results:**
- OR 0.49 for tobacco use in the media þ curriculum communities vs control (P = 0.039)
- OR 0.72 for tobacco use in curriculum communities (P < .005)
- School assignment not completely random—based on staffing capabilities
- Results may also be biased by active consent procedures

Slater et al 2006
To test the impact of an in-school mediated communication campaign, in combination with a participatory, community-based media effort, on marijuana, alcohol, and tobacco uptake among middle-school students

**Design:**
- RCT

**Intervention:**
- Schools in media communities randomized to media plus curriculum or media alone
- Schools in nonmedia communities randomized to curriculum or no intervention

**Setting:**
- Middle and junior high schools

**Inclusion:**
- Communities recruited using National Center for Educational Statistics

**Results:**
- Of 4216 students recruited, 66% consented
- 68.6% provided data at all 4 collection points
- OR 0.49 for tobacco use in the media + curriculum communities vs control (P = 0.039)
- OR 0.72 for tobacco use in curriculum communities (P < .005)
- School assignment not completely random—based on staffing capabilities
- Results may also be biased by active consent procedures
### Tobacco Interventions—Smoking Among Youth

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| Sowden and Arblaster 2000 | To review effectiveness of mass media campaigns in preventing uptake of smoking by youth | Searched Medline, 28 other electronic databases, plus hand-searched key journals and contacted experts | Setting:  
• Not specified  
Inclusion:  
• Randomized trials, controlled trials, and time series studies  
• Assessed smoking behavior of people aged <25 | 6 | NA | Some evidence exists that mass media campaigns can be effective, but evidence is not strong  
2 studies concluded that mass media were effective in influencing smoking behavior of young people  
One successful study found students in communities where TV and radio messages were combined with a school based program had a lower risk of weekly smoking than those in communities receiving only the schools-based component (OR 0.62, 95% CI 0.49–0.78)  
A Norwegian campaign found the OR for being a smoker in the intervention county compared with being a smoker in the control county was 0.74 (95% CI 0.64–0.86) after adjustment for smoking at baseline and sex  
Effective campaigns had solid theoretical bases, and used formative research |
| Sussman 2002 | To review research in adolescent and young-adult tobacco use cessation | Literature review | Studies focusing on adolescents and youth | 66 tobacco-cessation intervention studies, 17 prospective studies of adolescent self-initiated tobacco use cessation | Average reach and retention across the intervention studies was 61% and 78%, respectively |
| Swartz et al 2006 | To test the short-term efficacy of an Internet smoking cessation program | Design:  
• RCT  
Intervention:  
• Randomized to program or wait list  
• Intervention consisted of personalized computer-based modules mimicking smoking cessation counselor  
• Participants followed up at 90 days  
• After 90-day wait period, controls also had access to program | Setting:  
• Subjects recruited from Internet and work-site promotions  
Inclusion:  
• At least 18 years old  
• Currently smoking, considering quitting, willing to make quit attempt | I: 171  
C: 180 | I: 49%  
C: 39% | Treatment cessation rate: 24.1% (n = 21).  
Control cessation rate: 8.2% (n = 9), P = .002  
Intention-to-Treat Analysis:  
• Treatment cessation rate: 12.3% (n = 21)  
• Control cessation rate: 5.0% (n = 9) P = 0.015  
Notes:  
• Study had high attrition rate  
• Tobacco use self-reported, no biochemical validation |
Task Force on Community Preventive Services 2000

To conduct systematic reviews on 14 selected interventions and make subsequent recommendations

Multidisciplinary teams developed an approach to organizing, grouping, and selecting the interventions for review, assessed the quality of the body of evidence of effectiveness for interventions and summarizing the strength of this body of evidence, summarized information regarding other evidence, and identified and summarized research gaps

Interventions were either single component or multicomponent. To be included in the reviews of effectiveness, studies had to meet these criteria: (1) they were limited to primary investigations of interventions selected for evaluation; (2) they were published in English from January 1980 through May 2000; (3) they were conducted in industrialized countries; and (4) they compared outcomes in groups of persons exposed to the intervention with outcomes in groups of persons not exposed or less exposed to the intervention (whether the comparison was concurrent or before–after)

166 studies NA

On the basis of the evidence of effectiveness, the task force either strongly recommended or recommended 9 of the 14 strategies evaluated, including 1 intervention to reduce exposure to ETS (smoking bans and restrictions), 2 interventions to reduce tobacco-use initiation (increasing the unit price for tobacco products and multicomponent mass media campaigns), and 6 interventions to increase cessation (increasing the unit price for tobacco products; multicomponent mass media campaigns; provider reminder systems; a combined provider reminder plus provider education with or without patient education program; multicomponent interventions including telephone support for persons who want to stop using tobacco; and reducing patient out-of-pocket costs for effective cessation therapies)

Thomas and Perera 2006

To review behavioral interventions in school to prevent smoking initiation

Searched Cochrane Central Register of Controlled Trials, Cochrane Tobacco Register, Medline, EMBASE, PsychINFO, ERIC, CINAHL, Health Star, individual authors, and dissertation abstracts

Setting:
- Schools

Inclusion:
- Students, classes, schools, or school districts randomized
- Children aged 5–12 or 13–18
- Measured nonsmoking, no biochemical validation required

94, with 23 identified as high quality NA

- Some evidence supporting social influence models, although the largest, most rigorous study The Hutchinson Smoking Prevention Project (HSPP) showed no effect
- Many researchers question methods and generalizability of HSPP results
- Pooled results from social influence studies also showed no effect
- Pooled results from “life skills” interventions were positive but nonsignificant
- 3 of 4 programs that used multimodal approach had positive results, but evaluation less rigorous
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<td>Colditz 1999</td>
<td>To assess the economic cost of inactivity and obesity</td>
<td>Societal</td>
<td>Review of Medline for studies reporting cost of obesity, inactivity, or cost of illness&lt;br&gt;Calculated population-attributable risk for diseases related to obesity</td>
<td>USA</td>
<td>* Sedentary behavior and lack of physical exercise costs the US $24.3 billion/year in direct health care costs (2.4% of US health care expenditures)&lt;br&gt;* Direct medical costs related to obesity total $70 billion (7% of US health care costs)&lt;br&gt;* Indirect costs associated with obesity total $48 billion&lt;br&gt;* Of 8404 patients, 17.8% were overweight and 21.9% were obese. Of the obese children, 42.9% had a diagnosis of obesity&lt;br&gt;* Increased laboratory use was found in both children with diagnosed obesity (odds ratio [OR], 5.49; 95% confidence interval [95% CI], 4.65–6.48) and children with undiagnosed obesity (OR, 2.32; 95% CI, 1.97–2.74), relative to the healthy-weight group&lt;br&gt;* Health care expenditures were significantly higher for children with diagnosed obesity (adjusted mean difference, $172; 95% CI, $138–$206) vs the healthy-weight group&lt;br&gt;* Factors associated with the diagnosis of obesity were age 10 years and older (OR, 2.7; 95% CI, 2.0–3.4), female sex (OR, 1.5; 95% CI, 1.2–1.8), and having Medicaid (OR, 1.6; 95% CI, 1.1–2.3)&lt;br&gt;* Obesity accounts for 5% of health expenditures among business- and employer-sponsored health plans&lt;br&gt;* Medicare pays for ~50% of all obesity-attributable costs&lt;br&gt;* Obese individuals are more likely to experience absenteeism, costing employers $2.4 billion&lt;br&gt;* Total (direct and indirect) costs of obesity are as high as $139 billion per year</td>
</tr>
<tr>
<td>Hampl et al 2007</td>
<td>To compare health care utilization and expenditures for healthy-weight patients, overweight patients, and patients with diagnosed and undiagnosed obesity and to examine factors associated with a diagnosis of obesity</td>
<td>Primary care clinic within an urban hospital setting</td>
<td>Retrospective study using claims data from a large pediatric integrated delivery system in an urban academic children’s hospital</td>
<td>US children aged 5–18 years</td>
<td></td>
</tr>
<tr>
<td>Finkelstein et al 2005</td>
<td>To review causes and consequences of obesity</td>
<td>NA</td>
<td>Review of published literature (search terms include BMI [body-mass index], obesity, and other economic indicators)</td>
<td>USA</td>
<td></td>
</tr>
</tbody>
</table>

**Electronic Table 2. Studies on Obesity**
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Objective</th>
<th>Payer</th>
<th>Methods</th>
<th>Population</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Thompson et al 1998 | Cost: 1994 | To estimate the cost of obesity to US employers | Payer | Standard methods for risk attribution and for ascertaining cost of illness were used to estimate obesity-attributable expenditures on selected employee benefits | Total US population aged 25–65 years | US businesses spent $12.7 billion on obesity in 1994, $7.7 billion spent on health insurance, $1.8 billion on life insurance, $0.8 billion on disability insurance, and $2.4 billion on paid sick leave. Obesity data are from 1993, most likely underestimating the current costs. Many obesity expenditures occur after age 65. Does not account for expenditures of uninsured.
| Wang et al 2003 | Cost: 1996 | To assess the cost effectiveness and cost-benefit of a school-based obesity prevention program | Societal | • Initial study, randomized, controlled trial (RCT) • Cost-effectiveness analysis/cost-benefit (CEA/CB) • Examined cases of adult overweight prevented (medical and lost productivity), quality adjusted life year (QALY’s), and cost of program | 10 middle schools in the Boston, MA, area over 2 years (310 girls, 331 boys) | For girls, OR of obesity in intervention schools vs control = 0.47 (P = .03) No differences found among boys. Medical costs averted: $15,887 Cost of lost productivity averted: $25,104. Cost effectiveness ratio (CER) $4305/QALY Results sensitive to discount rate, robust to other parameters.
| Wang and Dietz 2002 | Cost: 2001 | To examine the trend of obesity-associated diseases in youths and related economic costs | Hospitals | Used the National Hospital Discharge Survey (1979–1999) to analyze changes in costs among youths (based on discharges with obesity listed as a principal or secondary diagnosis) | US youth ages 6–17 years | The percentage of all discharges that were obesity-associated diseases increased dramatically over a 20-year time period: discharges of diabetes nearly doubled (from 1.43% to 2.36%), obesity and gallbladder diseases tripled (0.36% to 1.07% and 0.18% to 0.59%, respectively), and sleep apnea increased fivefold (0.14% to 0.75%). 96% of discharges with a diagnosis of obesity listed obesity as a secondary diagnosis. Obesity-associated annual hospital costs increased more than threefold, from $35 million to $127 million. (Continued)
### Electronic Table 2. (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Setting:</th>
<th>Population and Setting</th>
<th>Results/ Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budd and Volpe 2006</td>
<td>To provide an overview of school-based RCTs intended to prevent increases in BMI</td>
<td>Setting:</td>
<td>12 studies</td>
<td>• Successful interventions more likely to target older children</td>
</tr>
<tr>
<td></td>
<td>Searched Medline, CINAHL, PsychINFO, and Cochrane using obesity, prevention,</td>
<td>Inclusion:</td>
<td></td>
<td>• Use of a multicomponent, comprehensive, and detailed nutrition and physical</td>
</tr>
<tr>
<td></td>
<td>child, weight management</td>
<td></td>
<td></td>
<td>activity curricula for students in higher grades can contribute to program</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>success</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td>• The positive effects of small and brief RCTs might change if longer follow-up</td>
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<td></td>
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<td></td>
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<td>periods occurred</td>
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<td></td>
<td>• 4 successful RCTs used behavior change curriculum (including self-monitoring,</td>
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<td></td>
<td>goal setting, and cognitive restructuring)</td>
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<td></td>
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<td>• 2 programs had significant effects only on girls</td>
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<td></td>
<td></td>
<td>• For older students, classroom instruction and physical education (PE) can</td>
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<td>promote moderate to vigorous physical activity both in and out of school,</td>
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<td>especially for girls</td>
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<td></td>
<td></td>
<td>• Younger students can benefit from behavior change programs that reduce</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>sedentary behavior</td>
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<td></td>
<td>17 of the 25 studies were “effective” on the basis of a statistically significant</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>reduction in BMI or skin-fold measures for the intervention group. Four</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>interventions were effective by BMI as well as skin-fold measures. Of these, 2</td>
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<tr>
<td></td>
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<td>targeted reductions in television viewing. The remaining 2 studies targeted</td>
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<td></td>
<td>direct physical activity intervention through the PE program combined with</td>
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<tr>
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<td></td>
<td>nutrition education. Of all the interventions reported, one was effective in</td>
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<td></td>
<td>reducing childhood overweight but was also associated with an increase in</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>underweight prevalence</td>
</tr>
<tr>
<td>Doak et al 2006</td>
<td>To identify aspects of successful childhood overweight prevention programs</td>
<td>Setting:</td>
<td>25 studies</td>
<td>Fifteen studies reported that prevention had a statistically significant positive</td>
</tr>
<tr>
<td></td>
<td>Medline, personal contacts with researchers, Internet Web searches, references</td>
<td>Inclusion:</td>
<td></td>
<td>effect on obesity, 24 reported neutral results, and none reported a negative</td>
</tr>
<tr>
<td></td>
<td>from published reviews, and additional Medline searches of authors with ongoing</td>
<td>Up to August 2005</td>
<td></td>
<td>result (sign test; P = .0078). Adding the studies included in 5 other</td>
</tr>
<tr>
<td></td>
<td>intervention studies</td>
<td>Children ages 6–19 years</td>
<td></td>
<td>systematic reviews yielded in total 15 studies with positive, 24 with neutral,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anthropometric measurements at baseline and follow-up</td>
<td></td>
<td>and 0 with negative results. Thus, 41% of the studies, including 40% of the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention for diet, physical activity, or both</td>
<td></td>
<td>children studied, showed a positive effect from prevention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Documentation of monitoring and evaluation</td>
<td></td>
<td>39 studies</td>
</tr>
</tbody>
</table>
Flynn et al 2006  To develop best-practice recommendations based on finding, selecting and critically appraising programs addressing prevention and treatment of childhood obesity and related risk of chronic diseases

Comprehensive search of 18 library databases (covering medical/academic and gray literature) and the Internet

Setting:
- Various

Inclusion:
- 1982–October 2003
- Indexes of overweight as outcomes
- Risk factors for obesity
- Chronic disease risk factors/markers associated with obesity
- Description of attrition
- Description of participants
- Process evaluation information

158 articles (representing 147 programs)

- Current programs lead to short-term improvements in outcomes relating to obesity and chronic disease prevention with no adverse effects noted
- Schools are a critical setting for programming where body composition, chronic disease risk factors, and fitness can all be positively affected
- Efforts could be directed toward better integration of chronic disease prevention programs to minimize duplication and optimize resources
- Programs require comprehensive evaluation that will ascertain whether long-term impact such as sustained normal weight is maintained
- Lack of evidence on programs for immigrants, children ages 0–6 years, and boys, and programs implemented in community and home settings
- Overall studies were small and of questionable quality
- Further research is needed to determine optimal management of obesity
- 2 reminder systems reported changes in provider behavior, but only 1 recorded patient outcomes
- Reminder system reporting patient outcomes resulted in an additional 4.3 and 12.9 pounds lost among women and men in intervention group at 22–24 months
- Other promising interventions include brief training interventions, shared care, in-patient care, and dietitian-led training
- No significant changes in BMI or waist circumference seen with any program
- No significant changes seen in physical activity
- Girls in Memphis had a significant decrease in consumption of sweetened beverages, but other dietary outcomes were not significant

Harvey et al 2006  To review studies of provider management of overweight and obese people

Searched Cochrane Medline, EMBASE, Sigle, Sociofile, dissertation abstracts, Conference Papers Index, Resource Database in Continuing Medical Education, plus hand searching

Setting:
- Health care settings

Inclusion:
- RCTs, controlled clinical trials, controlled before and after studies and interrupted time series designs
- Interventions targeting providers or organization of care

6 studies

- Overall studies were small and of questionable quality
- Further research is needed to determine optimal management of obesity
- 2 reminder systems reported changes in provider behavior, but only 1 recorded patient outcomes
- Reminder system reporting patient outcomes resulted in an additional 4.3 and 12.9 pounds lost among women and men in intervention group at 22–24 months
- Other promising interventions include brief training interventions, shared care, in-patient care, and dietitian-led training
- No significant changes in BMI or waist circumference seen with any program
- No significant changes seen in physical activity
- Girls in Memphis had a significant decrease in consumption of sweetened beverages, but other dietary outcomes were not significant

Kumanyika et al 2003  To summarize Girls Health Enrichment Multi-site Studies (GEMS)

Review of pilot studies aimed at preventing obesity in African American girls

Setting:
- After-school programs, summer camps in Memphis, Houston, Palo Alto/Oakland, Minneapolis

Inclusion:
- Adolescent African American girls

4 pilot studies

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Perspective</th>
<th>Study Type and Design</th>
<th>Population and Setting</th>
<th>Results/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Katz et al 2005</td>
<td>To review school- or work-based programs to control overweight and obesity</td>
<td>• Searched electronic databases</td>
<td>School- or work-based programs</td>
<td>10 school-based programs, 20 work-based programs, 7 used for comparison</td>
<td>School Based: Evidence was insufficient to determine whether school based programs are successful</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hand search of reference lists, Cochrane reviews, and reports</td>
<td>Inclusion: Interventions related to diet, physical activity, or both</td>
<td></td>
<td>Interventions that produced modest but positive changes include: (1) including nutrition and physical activity components in combination; (2) allotting additional time to physical activity during the school day; (3) including noncompetitive sports (eg, dance); (4) reducing sedentary activities, especially television viewing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1966–2001</td>
<td></td>
<td></td>
<td>Work Based: Programs that use both diet and exercise were effective in the workplace—each component alone was not effective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Common weight measure used</td>
<td></td>
<td></td>
<td>Cost to engage 1% of at-risk population is &lt;$1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Followed for at least 6 months</td>
<td></td>
<td></td>
<td>Most interventions focused on short-term changes right after the intervention</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>Interventions resulted in modest changes in behaviors and mixed results with indicators of obesity</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>TV watching seems to be the most modifiable behavior, followed by physical activity and nutrition behaviors</td>
</tr>
<tr>
<td>Sharma 2006</td>
<td>To review population-based interventions for preventing childhood obesity carried out in school settings</td>
<td>Searched CINAHL, ERIC, Medline</td>
<td>School-based</td>
<td>11 programs</td>
<td>Most programs had multiple components, so it was not possible to say which components worked and to what extent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>US and UK</td>
<td></td>
<td>Outcome measures such as BMI, triceps skinfold thickness, and waist circumference not measured by all studies included in this review</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1999–2004</td>
<td></td>
<td>Results (reported by outcomes):</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kindergarten through high school</td>
<td></td>
<td>4 outcomes had small effect sizes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Focus on general (not just overweight) children and adolescents</td>
<td></td>
<td>4 outcomes were medium</td>
</tr>
<tr>
<td>Snethen 2006</td>
<td>To conduct a meta-analysis of intervention studies designed to reduce overweight/obesity, and improve activity and nutrition</td>
<td>Searched multiple databases</td>
<td>Various</td>
<td>7 studies</td>
<td>7 outcomes from 4 studies had large effect sizes ($P = .00$)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Studies between 1980 and 2002 focusing specifically on overweight children (not general population)</td>
<td></td>
<td>Longer interventions tended to have better results</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N &gt; 7</td>
<td></td>
<td>Effective programs exist, but it’s not clear which programs are the most effective</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean age no older than 12</td>
<td></td>
<td>No maintenance studies were found</td>
</tr>
<tr>
<td>Study</td>
<td>Overview</td>
<td>Methods</td>
<td>Results/Findings</td>
<td></td>
<td></td>
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<tr>
<td>-------------------------------</td>
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</tr>
</tbody>
</table>
| Stice et al 2006              | (1) To provide a summary of prevention programs for children and adolescents and their effects; (2) to examine participant, intervention, delivery, and design features associated with larger intervention effects | - PsychINFO, Medline, Dissertation Abstracts International, CINAHL, tables of contents of various journals, reference sections of identified articles  
- Established obesity prevention researchers were contacted and asked for copies of unpublished articles (under review or in press) | - 64 programs  
- Most interventions do not produce the hypothesized weight gain prevention effects, and the overall average intervention effect was small  
- For most programs that produced significant weight gain prevention effects, the effect sizes are clinically meaningful but are usually confined to pre–post effects  
- Several prevention programs targeting a variety of health behaviors, such as eating pathology and smoking, produced weight gain prevention effects  
- Larger weight gain prevention effects were observed for programs targeting children and adolescents (vs preadolescents), girls, and self-presenting samples; programs that were relatively brief; programs solely targeting weight control versus other health behaviors (eg, hypertension); and programs evaluated in pilot trials |
| Summerbell et al 2005         | Cochrane review to assess effectiveness of programs to prevent obesity in children | - Medline, PsychINFO, EMBASE, CINAHL, and Central databases  
- Non-English-language papers were included and experts were contacted | - 22 studies  
- Nearly all studies resulted in positive changes in diet and physical activity, although results regarding BMI were mixed  
- 5 of 6 studies combining dietary education and physical activity showed no effect, and 1 had an effect on girls but not boys  
- Nutrition education alone was not effective  
- A multimedia approach to increasing physical activity is effective  
- The studies were heterogeneous in terms of study design, quality, target population, theoretical underpinning, and outcome measures, making it impossible to combine study findings using statistical methods. There was an absence of cost-effectiveness data |
| Summerbell 2003               | Cochrane review to assess effects of lifestyle interventions to treat childhood obesity | - CCTR, Medline, EMBASE, CINAHL, PsychLIT, Science Citation Index, and Social Science Citation Index  
- Contacted experts in child obesity | - 18 studies  
- There may be some support for programs involving parents, but overall, there is not enough evidence to make generalized recommendations  
- Many studies reviewed were small and had high dropout rates  
- Future research should focus on the role of families and culturally specific messages |
<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Study Type and Design</th>
<th>Population and Setting</th>
<th>Results/Comments</th>
</tr>
</thead>
</table>
| Whitlock et al 2005          | To examine the evidence for the benefits and harms of screening and early treatment of overweight among children and adolescents in clinical settings | Setting: Primary care, Inclusion: 1966–April 2004; studies demonstrating (1) direct evidence that screening for overweight leads to improvements, (2) the benefits and harms of overweight screening and interventions, (3) the validity of screening tests for predicting health outcomes in adulthood, (4) the efficacy of behavioral counseling, pharmacotherapeutic, and surgical interventions, and (5) studies showing intervention-associated harms | Based on 7 key questions: 353 articles for questions 1 and 2, 198 articles for questions 4 and 5, 36 articles for questions 3 and 6, 41 articles for question 2, 22 articles for questions 4 and 5, and 4 articles for question 6 | • Interventions to treat overweight adolescents in clinical settings have not been shown to have clinically significant benefits, and they are not widely available.  
• The overall evidence is poor for the direct effects of screening (and intervention) programs and screening harms. The overall evidence is fair/poor for behavioral counseling interventions, because of small, noncomparable, short-term studies with limited generalizability that reported health or intermediate outcomes, such as cardiovascular risk factors, rarely  
• Trials are particularly inadequate for nonwhite subjects and children 2–5 years of age. Fair/poor evidence is available for behavioral counseling intervention because of very limited reporting. Fair evidence supports childhood BMI as a risk factor for adult overweight, although data are limited for nonwhite subjects, and data addressing BMI as a risk factor for adult morbidities generally do not control for confounding by adult BMI. Good evidence is available for overweight prevalence based on BMI measures in all groups, except Native American and Asian groups. |

### Obesity Interventions—School Based

<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Caballero et al 2003          | To evaluate the effectiveness of a school-based intervention              | Design: RCT, randomization at school level  
Intervention: Classroom curriculum, skill building for food services employees, increased PE, family support | Setting: 41 elementary schools in Native American communities of AZ, NM, and SD  
Inclusion: Schools with ≥15 children in third grade, ≥90% of third-grade students of American Indian ethnicity, ≥70% retention from third to fifth grades | I: 879;  
C: 825 | I: 17%;  
C: 17% | • No changes in BMI, calories consumed through school lunch, or self-efficacy attitudes  
• Significant decrease in energy consumption  
• Physical activity improved but motion sensor activity did not  
• Community support was strong  
• Significant differences in changing the food service environment to reduce the fat content of school lunches, improving self-reported out-of-school physical activity, and reducing self-reported dietary fat intake among intervention children  
Comment: The homogenous American Indian sample might have required a more intense or longer intervention, considering that this population has a high rate of obesity and diabetes. |
<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Design</th>
<th>Setting</th>
<th>Participants</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrel et al 2005</td>
<td>To determine whether a school-based fitness program can improve body composition, cardiovascular fitness level, and insulin sensitivity in overweight children</td>
<td>Design: RCT</td>
<td>Setting: Rural middle school and an academic children’s hospital</td>
<td>50</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention: Lifestyle-focused, fitness-oriented gym classes (treatment group) or standard gym classes (control group) for 9 months</td>
<td>Inclusion: Overweight children with a BMI above 95th percentile for age</td>
<td></td>
<td>Baseline test results for cardiovascular fitness, body composition, and fasting insulin and glucose levels</td>
</tr>
<tr>
<td>Coleman et al 2005</td>
<td>To assess the impact of Child and Adolescent Trial for Cardiovascular Health (CATCH)</td>
<td>Design: Quasi-experimental matched controlled design with pretest/post test</td>
<td>Setting: Schools located in the El Paso, TX, school district</td>
<td>I: 723, C: 473</td>
<td>Overall, by fourth grade 9%, by fifth grade 27%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention: CATCH training for PE teachers, food services staff, and home room teachers; gym equipment purchased</td>
<td>Inclusion: Third-grade children with permission from parents</td>
<td></td>
<td>Girls and boys in control schools had a significant increase in risk of overweight or overweight (both CATCH and control groups increased, but rate of increase was larger in control group)</td>
</tr>
<tr>
<td>Donnelly et al 1996</td>
<td>To attenuate obesity and improve physical and metabolic fitness in elementary school children</td>
<td>Design: 2-year cohort</td>
<td>Setting: 2 school districts in rural NE</td>
<td>108</td>
<td>Not indicated in abstract available on the Web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention: Enhanced physical activity, grade-specific nutrition education, and a lower fat and sodium school lunch program. Controls continued with a regular school lunch and team sports activity program</td>
<td>Inclusion: Cohorts from grades 3 to 5</td>
<td></td>
<td>Intervention school lunches had significantly less energy (9%), fat (25%), and sodium (21%) and had more fiber (17%). However, measures of 24-hour energy intake for intervention and control groups showed significant differences for sodium only. Physical activity in the classroom was 6% greater for intervention than control ($P &lt; .05$), but physical activity outside of school was approximately 16% less for intervention than control ($P &lt; .05$). Body weight and body fat were not different between schools for normal weight or obese children. No differences were found for cholesterol, insulin, and glucose. It appears that compensation in both energy intake and physical activity outside of school may be responsible for the lack of differences between intervention and control groups</td>
</tr>
</tbody>
</table>
### Obesity Interventions—School Based

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitzgibbon et al 2005</td>
<td>To assess the impact of dietary and physical activity on BMI</td>
<td>Design: RCT</td>
<td></td>
<td>I: 197</td>
<td>Postintervention BMI did not differ between groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td></td>
<td>C: 212</td>
<td>At 1 year, the mean increase in BMI between groups was significantly different (0.02 k/m(^2) vs 0.64 k/m(^2), (P = .002))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting:</td>
<td></td>
<td>I: 9%</td>
<td>At 2 years, the mean increase in BMI between groups was significantly different (0.48 k/m(^2) vs 1.14 k/m(^2), (P = .008))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After Intervention:</td>
<td></td>
<td>C: 14%</td>
<td>Effects were similar for boys and girls</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Year 1:</td>
<td></td>
<td>I: 27%</td>
<td>No effect was seen on intake of fat, dietary fiber, or exercise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Year 2:</td>
<td></td>
<td>C: 31%</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>I: 26%</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C: 28%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design: RCT with 5 intervention and 5 control schools. Outcomes were assessed</td>
<td>Setting:</td>
<td>401</td>
<td></td>
<td>No significant differences between intervention and control schools in either</td>
</tr>
<tr>
<td></td>
<td>using preintervention (fall 1995) and follow-up measures (spring 1997),</td>
<td>Intervention: 12</td>
<td></td>
<td>Year 1:</td>
<td>primary or secondary outcomes at post-intervention, year 1, or year 2 follow-ups</td>
</tr>
<tr>
<td>Fitzgibbon et al 2006</td>
<td>including prevalence, incidence, and remission of obesity.</td>
<td>predominantly Latino</td>
<td></td>
<td></td>
<td>When Hip-Hop to Health Jr was conducted</td>
</tr>
<tr>
<td></td>
<td>Intervention:</td>
<td>Head Start centers</td>
<td></td>
<td>Year 2:</td>
<td>in predominantly black Head Start centers, it was effective in reducing</td>
</tr>
<tr>
<td></td>
<td>Sessions within existing curricula using classroom teachers focused on</td>
<td>Inclusion:</td>
<td></td>
<td></td>
<td>subsequent increases in BMI in preschool children. In</td>
</tr>
<tr>
<td></td>
<td>decreasing television viewing, decreasing consumption of high-fat foods,</td>
<td>All children and</td>
<td></td>
<td></td>
<td>contrast, it was not effective in Latino</td>
</tr>
<tr>
<td></td>
<td>increasing fruit and vegetable intake, and increasing moderate</td>
<td>families at centers</td>
<td></td>
<td></td>
<td>centers (although it was very well received). Future interventions with this</td>
</tr>
<tr>
<td></td>
<td>and vigorous physical activity</td>
<td></td>
<td></td>
<td></td>
<td>population may require further cultural tailoring and a more robust parent</td>
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<td></td>
<td></td>
<td></td>
<td>intervention</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>• The prevalence of obesity among girls in intervention schools was reduced</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>compared with controls, controlling for baseline obesity (OR, 0.47; (P = .03)),</td>
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<td></td>
<td>with no differences found among boys. There was greater remission of obesity</td>
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<td></td>
<td></td>
<td></td>
<td>among intervention girls vs control girls (OR, 2.16; (P = .04))</td>
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<td></td>
<td></td>
<td></td>
<td>• The intervention reduced television hours among both girls and boys, and</td>
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<td></td>
<td></td>
<td></td>
<td>increased fruit and vegetable consumption and resulted in a smaller increment in</td>
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<td></td>
<td>total energy intake among girls. Reductions in television viewing predicted</td>
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<td>obesity change and mediated the intervention effect. Among girls, each hour of</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>reduction in television viewing predicted reduced obesity prevalence (OR, 0.85;</td>
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<td></td>
<td></td>
<td></td>
<td>(P = .02))</td>
</tr>
<tr>
<td>Gortmaker et al 1999</td>
<td>To evaluate the impact of a school-based health behavior intervention (Planet</td>
<td>Setting:</td>
<td>1560</td>
<td>83%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health) on obesity among boys and girls in grades 6 to 8</td>
<td>Intervention: RCT</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Setting: 10 ethnically</td>
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<tr>
<td></td>
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<td>diverse public schools</td>
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<td></td>
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<td>in 4 MA communities</td>
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<tr>
<td></td>
<td></td>
<td>Inclusion: Grade 6 and</td>
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<tr>
<td></td>
<td></td>
<td>7 students</td>
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</tbody>
</table>
Jamner et al 2004

To evaluate the effect of an intervention designed to increase physical activity among sedentary adolescent girls

**Design:**
- Specific individuals targeted before and after test

**Intervention:**
- Special PE class (5 days a week for 60 minutes each day with 40 minutes of aerobic activity), and a lecture/discussion (1 day a week) focusing on health benefits of physical activity and strategies for becoming physically active

**Setting:**
- 2 public high schools in Orange County, CA

**Inclusion:**
- Sedentary (ie, fewer than three 20-minute vigorous bouts of exercise per week or fewer than five 30-minute bouts of moderate exercise per week) girls enrolled in 10th or 11th grade
- Girls at or below the 75th percentile of predicted cardiovascular fitness (based on age and sex)
- Girls physically able to exercise without restrictions

**Results:**
- I: 36
- C: 25
- Significant effect on cardiovascular fitness ($P = .017$), lifestyle activity ($P = .005$), and light ($P = .023$), moderate ($P = .007$), and hard ($P = .006$) activity. All changes were in a direction that favored the intervention. There was no effect of the intervention on psychosocial factors related to exercise
- Lean body mass and BMI percentile did not change over time

Pangrazi et al 2003

To examine the effects of a school-based intervention called PLAY (Promoting Lifestyle Activity for Youth) on physical activity levels and BMI

**Design:**
- TX schools randomized into PLAY, PE, PLAY and PE, and no treatment
- No baseline data

**Intervention:**
- 12-week intervention promoting play behavior, teacher-directed activities, and encouraging self-directed play

**Setting:**
- 35 schools in AZ and NM

**Inclusion:**
- Fourth-grade students

**Results:**
- Not indicated in abstract available on the Web
- Intervention effective at increasing the physical activity level of children (steps per day), especially girls. No significant differences between groups were found for BMI

Robinson 1999

To assess the effects of reducing television, videotape, and videogame use on changes in adiposity, physical activity, and dietary intake

**Design:**
- RCT conducted from September 1996 to April 1997

**Intervention:**
- 18-lesson, 6-month classroom curriculum to reduce television, videotape, and video game use

**Setting:**
- 2 sociodemographically and scholastically matched public elementary schools in San Jose, CA

**Inclusion:**
- Third- and fourth-grade students

**Results:**
- Children in intervention group had statistically significant relative decreases in BMI ($P = .002$), triceps skin-fold thickness ($P = .002$), waist circumference ($P < .001$), and waist-to-hip ratio ($P < .001$)
- Relative to controls, intervention group changes were accompanied by statistically significant decreases in children’s reported television viewing and meals eaten in front of the television
- No statistically significant differences between groups for changes in high-fat food intake, moderate to vigorous physical activity, and cardiorespiratory fitness

Sallis et al 1997

To increase physical activity during PE classes and outside of school

**Design:**
- Schools randomized into treatment or control

**Intervention:**
- Health-related PE taught by PE specialists or trained classroom teachers

**Setting:**
- 7 schools outside San Diego, CA

**Inclusion:**
- Grades 4–5

**Results:**
- Number not provided; however, no differences seen in attrition between groups
- Students spent more minutes per week being physically active in specialist-led (40 minutes) and teacher-led (33 minutes) PE classes than in control classes
- After 2 years, girls in the specialist-led group were superior to girls in the control group on abdominal strength and endurance ($P < .001$) and cardiorespiratory endurance ($P < .001$)
- No effects on physical activity outside of school

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Spiegel 2006        | To evaluate the effectiveness of a multidisciplinary school based intervention | **Design:** • RCT  
**Intervention:** • Based on Theory of Reasoned Action  
• All activities incorporated into core curriculum  
• Year-long program consisting of 7 modules  
• Both regular and PE teachers involved | **Setting:** • DE, FL, KS, NC  
**Inclusion:** • Grades 4–6  
• Sampling done at district level; controls selected from same school | 69 classes in 16 schools participated  
I: 534  
C: 479 | 1.5% reduction in intervention children classified as >85% to <95% BMI ($P = .01$)  
No significant shift noticed in control group  
Both groups reported consuming more fruits/vegetables but still consumed less than recommended  
Physical activity increased from 59 minutes per week to 102.5 minutes per week in intervention group  
**Comment:**  
Method of reporting food intake not very rigorous  
Teachers applied to participate in program |
| Patrick et al 2006  | To improve adolescent physical activity, to limit their sedentary behaviors, and to improve their dietary intake of fruits and vegetables, fiber, or total dietary fat | **Design:** • RCT  
**Intervention:** • Primary care, office-based, computer-assisted diet and physical activity assessment and stage-based goal setting followed by brief provider counseling and 12 months of monthly mail and telephone counseling; a comparison group received information addressing sun exposure protection | **Setting:** • Primary care with follow-up at home  
**Inclusion:** • Adolescent girls and boys aged 11–15 years | 878 | -  | **Outcomes/Comments**  
- Intervention girls and boys significantly reduced sedentary behaviors ($P = .001$);  
- Intervention boys reported more active days per week ($P = .01$)  
- The number of servings of fruits and vegetables for intervention girls approached significance ($P = .07$)  
- No intervention effects were seen for percentage of calories from fat or minutes of physical activity per week  
- Percentage of adolescents meeting recommended health guidelines was significantly improved for girls for consumption of saturated fat (relative risk, 1.33) and for boys' participation in days per week of physical activity (relative risk, 1.47)  
- No between-group differences were seen in BMI |
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
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<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ebbeling et al 2006</td>
<td>To examine the effect of decreasing sugar-sweetened beverage (SSB) consumption on body weight</td>
<td><strong>Design:</strong> • RCT&lt;br&gt;&lt;br&gt;<strong>Intervention:</strong> • Home deliveries of noncaloric beverages to displace SSBs</td>
<td><strong>Setting:</strong> • Recruited from pediatric population at Children’s Hospital Boston (MA)</td>
<td>103</td>
<td>None</td>
<td>• Consumption of SSBs decreased by 82% in the intervention group and did not change in the control group. Change in BMI between treatment and control groups was not significant overall. However, baseline BMI was a significant effect modifier. Among the subjects in the upper baseline-BMI tertile, BMI change differed significantly between the intervention and control groups. The interaction between weight change and baseline BMI was not attributable to baseline consumption of SSBs&lt;br&gt;• This simple environmental intervention almost completely eliminated SSB consumption in a diverse group of adolescents. The beneficial effect on body weight of reducing SSB consumption increased with increasing baseline body weight</td>
</tr>
<tr>
<td>Epstein et al 2005</td>
<td>To test whether alternatives to eating can influence weight control</td>
<td><strong>Design:</strong> • RCT&lt;br&gt;&lt;br&gt;<strong>Intervention:</strong> • Families received information about Traffic Light Diet, Food Guide Pyramid, and healthy eating. Also received information about physical activity and praise/reinforcement systems; intervention group received points for engaging in non-food-related activities</td>
<td><strong>Setting:</strong> • Recruited from newspaper flyers, physicians, and other health care providers&lt;br&gt;&lt;br&gt;<strong>Inclusion:</strong> • Families with child aged 8–12 with BMI ≥85th percentile&lt;br&gt;• One parent reporting willingness to attend to treatment needs</td>
<td>I: 19</td>
<td>I: 1 (5%)</td>
<td>• No significant differences found between groups&lt;br&gt;• Both groups had significant declines maintained at 12 and 24 months ($P &lt; .001$)&lt;br&gt;• Differences consistent with both intention to treat and measured BMI&lt;br&gt;• Episodes of eating significantly decreased over time ($P &lt; .001$)&lt;br&gt;• Possible that no difference seen between groups as a result of implementation problems</td>
</tr>
<tr>
<td>Golan et al 2006</td>
<td>To compare the effects of targeting parents alone vs parents and children in obesity treatment</td>
<td><strong>Design:</strong> • RCT&lt;br&gt;&lt;br&gt;<strong>Intervention:</strong> • 1-hour support and education session weekly for 10 weeks, biweekly for 4 weeks, monthly for 2 months&lt;br&gt;• Monthly 40–50-minute interventions per family&lt;br&gt;• Emphasized healthy eating, exercise, and parenting skills</td>
<td><strong>Setting:</strong> • Israel&lt;br&gt;&lt;br&gt;<strong>Inclusion:</strong> • Children 6–11 years&lt;br&gt;• Children &gt;85th percentile BMI&lt;br&gt;• No other weight loss program participation</td>
<td>32 families</td>
<td>4 parent only, 1 parent-child</td>
<td>• Follow-up occurred 12 months after end of program (total of 18 months)&lt;br&gt;• 80% of parent only group had full attendance vs 55% in parent-child group&lt;br&gt;• Parent-only group overweight change was −9.5% vs −92.4% in parent-child group&lt;br&gt;• Difference between groups significant for change in BMI ($P = .024$) and change in percentage overweight ($P = .02$)&lt;br&gt;• Both groups reported a reduction in obesogenic habits (22% in parent-only vs 15% in parent-child), but difference between groups significant ($P &lt; .05$)&lt;br&gt;• More permissive parents found fewer changes in child’s BMI&lt;br&gt;• Large difference in attendance at sessions may signify baseline difference in groups, and may explain variation in program effectiveness</td>
</tr>
</tbody>
</table>

(Continued)
### Excluded Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datar et al 2004</td>
<td>Examine effect of PE time on BMI change</td>
<td><em>Design:</em> Observational longitudinal cohort</td>
<td>National sample of kindergarten students</td>
<td>19 028</td>
<td>5177 missing from waves 2 and 4; 10 211 had all measurements at all waves</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><em>Intervention:</em> No intervention made—observational study</td>
<td></td>
<td></td>
<td></td>
<td>• Observational study</td>
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<td></td>
<td></td>
<td><em>Inclusion:</em> Data from Early Childhood Longitudinal Study</td>
<td></td>
<td></td>
<td></td>
<td>• PE instruction had strong negative effect on BMI in girls, but no significant impact on boys</td>
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<td></td>
<td></td>
<td><em>Setting:</em></td>
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<tr>
<td>Danielzik et al 2005</td>
<td>To evaluate the effects of preventive school measures on long-term obesity</td>
<td><em>Design:</em> Cross-sectional population-based surveys</td>
<td>Kiel, Germany</td>
<td>T0, 257; T1, 257</td>
<td>NA</td>
<td>• Interim study—data not available on all schoolchildren</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Intervention:</em> 6-hour school-based intervention</td>
<td>All first-graders entering school between 1996 and 2001 (T0), and all fourth graders entering school between 2000 and 2005 (T1)</td>
<td></td>
<td></td>
<td>• 4-year incidence of overweight reduced in intervention group (36.5 vs 41.7%)</td>
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<td></td>
<td></td>
<td><em>Inclusion:</em></td>
<td></td>
<td></td>
<td></td>
<td>• Children participating in family program had slower increase in fat mass compared to both intervention and nonintervention group (10% vs 27% and 32%, respectively)</td>
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<td></td>
<td><em>Setting:</em></td>
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<tr>
<td>Edwards et al 2006</td>
<td>Assess acceptability and impact of family-based behavioral treatment (FBBT) for childhood obesity</td>
<td><em>Design:</em> Pre- and posttest evaluation of 4 consecutive groups</td>
<td>Clinic in the UK</td>
<td>33</td>
<td>12 weeks, 19%; 3 months, 40%</td>
<td>• Primary follow-up only 12 weeks</td>
</tr>
<tr>
<td></td>
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<td><em>Intervention:</em> Advice for whole family on lifestyle changes, weight control plan for child, and strategies</td>
<td>Referred from general practitioners, school nurses, or pediatricians</td>
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<td>• No control group—just pre- and posttest design</td>
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<td></td>
<td></td>
<td><em>Inclusion:</em></td>
<td>At least 1 parent willing to participate</td>
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<td></td>
<td>• Significant reduction seen for percentage BMI and total BMI (P &lt; .001)</td>
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<td></td>
<td></td>
<td><em>Setting:</em></td>
<td>Children excluded if existing organic cause of obesity</td>
<td></td>
<td></td>
<td>• Self-concept score (Piers-Harris) and depression (CDI) went up (P &lt; .001), although this was not related to change in BMI</td>
</tr>
<tr>
<td>Jurg et al 2006</td>
<td>To assess a school-based intervention that focuses on the use of theory, environmental changes, and parental influences</td>
<td><em>Design:</em> Quasi-experimental pretest/posttest</td>
<td>Grades 4, 5 and 6 of 4 intervention schools and 2 control schools in Amsterdam</td>
<td>510 children</td>
<td></td>
<td>• Children and families chose to participate—were referred by nurses and clinicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Intervention:</em> Behavioral skills development using computer assessment, physician consultation, and telephone reinforcement</td>
<td>Pediatric primary clinics in Southern California</td>
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<td></td>
<td>• Large-scale feasibility questionable as a result of cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Inclusion:</em></td>
<td>Aged 12–16, 20%–100% above median BMI for sex and age</td>
<td></td>
<td></td>
<td>• Full text not on Web</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Setting:</em></td>
<td>I: 23; C: 21</td>
<td></td>
<td></td>
<td>• Measures not appropriate</td>
</tr>
<tr>
<td>Saelens et al 2002</td>
<td>To evaluate the effect of behavioral weight control initiated in a primary care setting</td>
<td><em>Design:</em> RCT</td>
<td>Pediatric primary clinics in Southern California</td>
<td></td>
<td></td>
<td>• Treatment program only lasted 4 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Intervention:</em></td>
<td>Aged 12–16, 20%–100% above median BMI for sex and age</td>
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<td></td>
<td>• Significantly more control subjects increased their BMI z-scores compared with intervention (P &lt; .03)</td>
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<td><em>Inclusion:</em></td>
<td>I: 12%; C: 9%</td>
<td></td>
<td></td>
<td>• More intervention adolescents decreased BMI z-score after treatment (40.0% vs 10.5%, P &lt; .04)</td>
</tr>
<tr>
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<td><em>Setting:</em></td>
<td></td>
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<td></td>
<td>• Overall BMI did not produce an overall average loss of weight among participants</td>
</tr>
</tbody>
</table>

**Study**
- Datar et al 2004
- Danielzik et al 2005
- Edwards et al 2006
- Jurg et al 2006
- Saelens et al 2002
<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Design</th>
<th>Intervention</th>
<th>Setting</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Taylor 2005   | Assess education- and exercise-based in family-centered environment       | 8-week group intervention | ● Recruited from pediatricians, school nurses, newspapers  
● Age 8–15 years  
● BMI >85th percentile  
● Stable vitals, adequate coordination required | Recruited from pediatricians, school nurses, newspapers  
● Age 8–15 years  
● BMI >85th percentile  
● Stable vitals, adequate coordination required | Study not long enough in duration |
| Zahner et al 2006 | To increase overall PA and to improve fitness and health in 6- to 13-year-old children | Design: RCT  
Intervention:  
● 2 additional PE classes per week given by trained PE teachers adding up to a total of 5 physical activity classes per week  
● Short physical activity breaks (2–5 minutes each) during academic lessons  
● Physical activity homework  
● Adaptation of recreational areas around the school | Setting:  
2 provinces in Switzerland | I: 298  
C: 204 | Excluded because results are not yet available |
### Individual-Level Interventions: Gun Safety

<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Hardy 2002    | Assess effectiveness of skills-based firearm safety program             | **Design:**  
  - Randomized controlled trial (RCT)                                                                                   | **Setting:**  
  - 3 day care centers in urban southeastern USA                                                                 | I: 34 | None      | - The intervention had no effect on the likelihood that children would play with guns or alert adults when guns were found during play  
  - Among children who played with guns, there was no difference in gun-related behavior such as play shooting or displays of aggressive behavior  
  - Children reporting that their parents owned a gun were more likely to play with guns ($P = .001$) and display significantly more gun-related (shooting) behavior ($P = .017$) |
|               |                                                                          | **Intervention:**  
  - Intervention group received 4 lessons delivered by trained undergraduate students on gun safety aimed at changing behavior when guns are encountered  
  - Follow-up period not clearly stated—appears to be directly after intervention  
  - Control group received intervention 1 week after evaluation                              | **Inclusion:**  
  - Children attending day care whose parents consented                                    | C: 36 |           |                                                                                                                                              |
|               |                                                                          |                                                                                                   |                                                                                       |      |           |                                                                                                                                                    |

### Family-Level Interventions: Gun Safety

<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Carbone et al 2005 | Evaluate the effectiveness of gun safety counseling by pediatricians | **Design:**  
  - Controlled pretest, posttest                                                                                           | **Setting:**  
  - Pediatric clinic within a community Health Center in Tucson, AZ                                                                 | I: 73 families | 16%       | - The intervention had no effect on gun ownership  
  - Among families reporting no locks at baseline, no significant effect was seen on increasing lock use  
  - Overall gun safety (defined as any change in locked storage of gun, improved type of gun storage, or storing gun unloaded) practice increased among intervention group (relative risk [RR] 2.29; 95% confidence interval [95% CI] 1.52–3.44; $P < .001$)  
  - Frequency of locked storage increased in intervention group (RR 5.2; 95% CI 1.59–17.32; $P < .003$)  
  - Control group more likely to have proper gun storage at baseline                                                         | C: 78 families |           |                                                                                                                                              |
|               |                                                                          | **Intervention:**  
  - Physicians trained in Steps to Prevent Firearm Injury (STOP 2) program                                                   | **Inclusion:**  
  - All families with children aged <18 years attending clinic who reported owning guns                                     |      |           |                                                                                                                                                    |
|               |                                                                          | - Families receiving intervention counseled by physician, given brochures and gun lock                                                                 |                                                                                       |      |           |                                                                                                                                                    |
|               |                                                                          | - Families followed up 1 month after intervention                                                                                   |                                                                                       |      |           |                                                                                                                                                    |
Grossman et al 2000 To determine effectiveness of gun safety counseling in well child visits

**Design:**
- RCT; unit of randomization was provider

**Intervention:**
- Physicians trained by academic detailers, given reading materials, bibliography, and audiotape to assist in counseling
- Parents received only one counseling session
- Follow-up with parents occurred 3 months after office visit

**Setting:**
- Primary care clinics at Group Health Cooperative in WA

**Inclusion:**
- Providers seeing at least 5 patients <18 years of age per month
- Families having a scheduled well-child visit for child aged 2 months to 18 years

**Providers:**
- I: 28
- C: 28

**Families:**
- I: 618
- C: 677

No statistical difference between control and intervention groups in acquisition of firearms, removal of guns, or acquisition of safe storage boxes

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**Family-Level Interventions: Road Safety**

**Bicycle Helmet Use**

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Wu et al 2005 | To evaluate the effectiveness of 3 competing pediatric emergency department (ED) interventions aiming to increase sport helmet use in a state without helmet legislation | **Design:**
  - RCT
**Intervention:**
  - I1: received free helmet
  - I2: received a voucher for helmet
  - C: received counseling | **Setting:**
  - Pediatric ED
**Inclusion:**
  - English-speaking children aged 5–16 | **At Initiation of Study:**
  - I1: 78
  - I2: 65
  - C: 57 | **At Follow-up:**
  - I1: 77
  - I2: 62
  - C: 53 | - Directly receiving a free helmet in the ED significantly increased reported helmet use relative to the control group; the odds that a parent reported helmet use were nearly 16 times higher ($P < .01$), and the odds that a child reported helmet use were nearly 10 times higher ($P < .01$)

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**Family-Level Interventions: General Home Safety**

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Clamp 1998 | To assess effectiveness of general practitioner advice about child safety, and provision of low-cost safety equipment to low-income families on use of safety equipment and safe practices at home | **Design:**
  - Randomized, unblinded, controlled trial
**Intervention:**
  - General practitioner safety advice
  - Access to safety equipment at low cost
  - Control families received usual care | **Setting:**
  - A general practice in Nottingham, UK
**Inclusion:**
  - 169 families with children aged up to 5 registered with the practice | **At Initiation of Study:**
  - I: 83
  - C: 82 | None | - After intervention, intervention group used more safety equipment: fireguards (RR 1.89, 95% CI 1.18–2.94), smoke alarms (RR 1.14, 95% CI 1.04–1.25), socket covers (RR 1.27, 95% CI 1.10–1.48) locks on cupboards for storing cleaning materials (RR 1.38, 95% CI 1.02–1.88), and door slam devices (RR 3.60, 95% CI 2.17–5.97)
- Significantly more families in intervention group showed very safe practice in storage of sharp objects (RR 1.98, 95% CI 1.38–2.83), storage of medicines (RR 1.15, 95% CI 1.03–1.28), window safety (RR 1.30, 95% CI 1.06–1.58), fireplace safety (RR 1.84, 95% CI 1.34–2.54), socket safety (RR 1.77, 95% CI 1.37–2.28), smoke alarm safety (RR 1.11, 95% CI 1.01–1.22), and door slam safety (RR 7.00, 95% CI 3.15–15.6)

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
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<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Gielen et al 2002 | To present the results of an intervention trial to enhance parents’ home safety practices through pediatric safety counseling, home visits, and an on-site children’s safety center | Design:  
- RCT  
Intervention:  
- I1: Parents in the enhanced-intervention group received the standard services plus a home safety visit by a community health worker  
- I2: Parents in the standard-intervention group received safety counseling and referral to the children’s safety center from their pediatrician | Setting:  
- A hospital-based pediatric resident continuity clinic in an inner city  
Inclusion:  
- First- and second-year pediatric residents and their patient-parent with children no older than 6 months | I1: 94  
I2: 93 | 12-Month Follow-up:  
- I1: 62  
I2: 60 | The prevalence of safety practices ranged from 11% of parents who stored poisons safely to 82% who had a working smoke alarm  
- No significant differences in safety practices were found between study groups  
- Families who visited the children’s safety center compared with those who did not had a significantly greater number of safety practices (34% vs 17% had ≥3) |
| Johnston et al 2000 | Evaluate pilot program adding family injury prevention to low-income preschool in WA | Design:  
- Quasi-experimental  
Intervention:  
- Group 1: standard care plus written materials  
- Group 2: in addition to standard care, case workers added safety counsel, tested safety devices, and given safety supplies | Setting:  
- 2 counties in WA  
Inclusion:  
- Families of children aged 4 or 5 years enrolled in Head Start or WA preschool program | I: 258  
C: 160 | I: 18%  
C: 7% | Intervention families were more likely to have obtained first working smoke detector (RR 3.3; 95% CI 1.3–8.6) or to have added a smoke detector (RR 2.0; 95% CI 1.2–3.1)  
- Because families were given smoke detectors by case workers, this does not show evidence of change in parent behavior |
Johnston et al 2006  Evaluate Healthy Steps (HS) program on child development, parenting practices, and parental well-being

**Design:**
- Concurrent comparison at clinic level with nested randomized trial in intervention arm

**Intervention:**
- Usual care (UC)
- Standard HS (HS)
- Postnatal home counseling on child development, telephone support, and developmental assessment
- HS plus 3 prenatal visits (HSP)

**Setting:**
- Large integrated delivery system in the Pacific Northwest, USA

**Inclusion:**
- Less than 22 weeks’ gestation
- Younger than 45 years

**UC = 136**
- **HS = 152**
- **HSP + prenatal = 151**

- **UC: 23%**
- **HS: 23%**
- **HSP: 19%**

- Families followed up at 3 months
- Intervention families more likely to use stair gates (RR 1.19; 95% CI 1.15–1.23) and have access to poison control centers (RR 1.08; 95% CI 1.03–1.12) but less likely to have safety latches (RR 0.88; 95% CI 0.83–0.93)
- Other safety measures included nonhome outcomes
- Nonparticipants significantly different than participants (less maternal education, lower family income)

Kendrick et al 1999  To assess the effectiveness of safety advice, provision of low-cost safety equipment, and first aid training on frequency and severity of unintentional injuries in children at home

**Design:**
- Cluster RCT

**Intervention:**
- A package of safety advice at child health surveillance consultations at 6–9, 12–15, and 18–24 months
- Provision of low-cost safety equipment to families on means tested state benefits; home safety checks
- First aid training by health visitors

**Setting:**
- 36 general practices in Nottingham, UK

**Inclusion:**
- All children aged 3–12 months registered with participating practices

**I: 1124**
- **C: 1028**

- **I: 1020 (7%)**
- **C: 960 (6%)**

- No significant difference was found in frequency of at least one medically attended injury (odds ratio [OR] 0.97, 95% CI 0.72–1.30), at least one attendance at an accident and ED for injury (OR 1.02, 95% CI 0.76–1.37), at least one primary care attendance for injury (OR 0.75, 95% CI 0.48–1.17), or at least one hospital admission for injury (OR 0.69, 95% CI 0.42–1.12)
- No significant difference in the secondary outcome measures was found between the intervention and control groups

King et al 2001  To examine the effectiveness of home visit program to improve home safety and decrease frequency of injury to children

**Design:**
- RCT

**Intervention:**
- All groups received home inspection
- Nonintervention arm received general safety pamphlet
- Intervention arm received information package, coupons, and specific instructions
- Participants contacted by phone 4–8 months after home visit

**Setting:**
- Multicenter trial in 5 hospitals in 4 Canadian urban centers

**Eligibility:**
- 1172 children aged <8 initially enrolled onto an injury case-control study

**I: 601**
- **C: 571**

- **I: 482 (20%)**
- **C: 469 (18%)**

- Overall intervention did not significantly affect injury prevention behaviors
- Intervention group more likely to have hot water <54°C (OR 1.31, 95% CI 1.14–1.50, P < .001)
- Rate ratio of injury requiring doctor visit, 0.75; 95% CI 0.58–0.96
- All injury data self-reported

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
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</thead>
<tbody>
<tr>
<td>King et al 2005</td>
<td>To review the long-term (36-month) effects of the previous study</td>
<td></td>
<td>36 Months: I: 403</td>
<td>I: 33%</td>
<td>C: 35%</td>
<td>Participants in the intervention group (63%) reported that home visits changed their knowledge, beliefs, or practices around the prevention of home injuries compared with those in the nonintervention group (43%; P &lt; .001)</td>
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<td></td>
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<td>C: 371</td>
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<td>The rate of injury visits to the doctor was 0.74 (95% CI 0.63–0.87)</td>
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<td>The effectiveness of the intervention appears to be diminishing with time (rate ratio for the 12–36-month study interval, 0.80; 95% CI 0.64–1.00)</td>
</tr>
<tr>
<td>Kitzman et al 1997</td>
<td>To review the effectiveness of home-visitations services as a way of</td>
<td>Design: RCT</td>
<td>I: 228</td>
<td>I: 5%</td>
<td>C: 22%</td>
<td>In the first 2 years of children’s lives, intervention group encountered fewer injuries or ingestions (0.43 vs 0.55; P = .05); fewer hospitalization due to injury or ingestion (0.03 vs 0.16, P &lt; .01)</td>
</tr>
<tr>
<td></td>
<td>improving maternal and child outcomes</td>
<td>Intervention: Free transportation for scheduled prenatal care</td>
<td>C: 615</td>
<td></td>
<td></td>
<td>Differences favoring the intervention group were found for 4 of 6 behavior outcomes. For example, the proportion reporting never allowing children near operating mowers increased from half to two-thirds with no change among comparison group parents</td>
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<tr>
<td></td>
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<td>Intensive nurse home visiting (average = 7)</td>
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<td></td>
<td>Control group received free transportation and screening</td>
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<tr>
<td></td>
<td></td>
<td>Design: RCT</td>
<td>I: 216</td>
<td>I: 25%</td>
<td>C: 12.5%</td>
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<tr>
<td></td>
<td></td>
<td>Intervention: Outpatient orthopedic clinic at Cardinal Glennon Children’s</td>
<td>C: 481</td>
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<td>Hospital, St Louis, MO</td>
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<td>Inclusion: Parents who: (1) have access to a lawn mower and have operated it</td>
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<td>within the past year; (2) have preteen children living at home; (3) agree to</td>
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<td></td>
<td></td>
<td>participate</td>
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<td>Setting: Urban pediatric ED</td>
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<td></td>
<td></td>
<td>Inclusion: All caregivers of children up to 5 years of age</td>
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<tr>
<td>Mayer et al 1998</td>
<td>To evaluate a 20-minute video intervention to increase parents’ safety</td>
<td>Design: RCT</td>
<td>I: 30</td>
<td>I: 25%</td>
<td>C: 12.5%</td>
<td></td>
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<tr>
<td></td>
<td>awareness and preventive actions to avoid child injuries from lawn mower</td>
<td>Intervention: Parents in the intervention group viewed a 20-minute video</td>
<td>C: 35</td>
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<td></td>
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<td>Setting: Public system of obstetric care in Memphis, TN</td>
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<td></td>
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<td>Inclusion: Women at less than 29 weeks’ gestation</td>
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<td>No previous live births</td>
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<td>≥2 following socio-economic status risks: unmarried, &lt;12 years of education,</td>
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<td></td>
<td></td>
<td>unemployed</td>
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<tr>
<td>Posner et al 2004</td>
<td>To assess effectiveness of ED-based home safety intervention</td>
<td>Design: RCT</td>
<td>I: 49</td>
<td>I: 29%</td>
<td>C: 30%</td>
<td></td>
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<td></td>
<td></td>
<td>Intervention: All participants received verbal counseling and home safety</td>
<td>C: 47</td>
<td></td>
<td></td>
<td>Intervention group had higher overall safety score (73% vs 66.8%, P &lt; .002)</td>
</tr>
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<td></td>
<td></td>
<td>handout</td>
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<td>Intervention group had higher scores for cut/piercing safety (P &lt; .001) and burn safety (P &lt; .03), but no difference was found for falls, water safety, aspiration prevention, or fire prevention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention group received additional counseling plus home safety kit</td>
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<td>Most of the safety improvement came from kit distribution</td>
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<tr>
<td></td>
<td></td>
<td>Participants were contacted 6–8 weeks after initial ED visit</td>
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<td>All safety improvements were self-reported</td>
</tr>
</tbody>
</table>
Sznajder et al 2003 To test the effectiveness of free preventive devices and counseling for injury prevention

**Design:**
- RCT

**Intervention:**
- Standard intervention of counseling, 2 pamphlets on domestic injury, emergency call numbers
- Standard intervention plus a safety kit containing home safety items
- Both groups followed up at 6–8 weeks after first visit

**Setting:**
- Hauts-de-Seine near Paris, France

**Inclusion:**
- Usual criteria for social services

**Participants:**
- I: 50
- C: 50
- I: 2%
- C: 0%

**Outcomes/Comments:**
- Participants not random—families selected by Mother and Child Protection Services
- Only assesses behavior, not injury outcome
- Groups receiving kits had significantly more safety improvements related to falls, fire, poisoning, and suffocation ($P < .02$) but specific activities not reported
- Where specific unsafe behaviors were observed, group receiving kits had overall higher increase in reduction of these behaviors (64.4% vs 41.2%, $P < .02$)
- Behaviors not related to the kits also improved

---

Kendrick et al 2005 Evaluate the effectiveness of educating pregnant women to reduce baby walker possession and use

**Design:**
- Cluster RCT

**Intervention:**
- Control group received standard advice on baby walkers
- Intervention group received advice at recruitment and home visits at 10 days and 3–4 months postpartum

**Setting:**
- Practices in Nottingham and Newark and Sherwood primary care trust, UK

**Population:**
- Pregnant women of at least 28 weeks’ gestation

**Participants:**
- I: 525
- C: 631
- I: 11%
- C: 14%

**Outcomes/Comments:**
- OR of owning baby walker, 0.63 (95% CI 0.43–0.93, $P = 0.02$)
- OR of using baby walker, 0.26 (95% CI 0.08–0.84, $P = 0.03$)
- Participants not blinded to study group
- Walker use is self-reported

---

Sidman et al 2005 Evaluation of a broad public education campaign to promote safe handgun storage

**Design:**
- Quasi-experimental

**Intervention:**
- Campaign included media campaign, fact sheets, discount coupons for lockboxes, and a hotline

**Setting:**
- King County, WA

**Population:**
- Families with at least 1 child <18 and owned a gun
- 9 control counties identified west of the Mississippi River, selected on the basis of population

**Participants:**
-Baseline: 151
- Follow-up: 217
- Control:
  -Baseline: 151
  - Follow-up: 128

**Outcomes/Comments:**
- No significant difference found between intervention and control groups
- Both control and intervention groups had increases in guns stored in lockboxes (12.5% for intervention, 11.4% for control)
### Electronic Table 3. (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
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<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| **Burke et al 1996** | To evaluate the effectiveness of a stencil in the shape of a school bus applied to the pavement at a bus stop in improving safe behaviors | **Design:**  
  - Randomly controlled trial  
  **Intervention:**  
  - Children were instructed to remain within a safe area during boarding that was demarcated by a pavement stencil | **Setting:**  
  - 9 bus stops in Farmington, CT | I: 5 stops, 145 observations  
  C: 4 stops, 174 observations | NA |  
  - Children in the control group were twice as likely to show unsafe behavior while waiting (OR 2.1) |
| **Stevenson et al 1999** | To assess the effectiveness of community/environmental interventions undertaken as part of the Child Pedestrian Injury Prevention Project (CPIPP) | **Design:**  
  - Quasi-experimental community intervention trial over 3 years  
  **Intervention:**  
  - 3 communities were assigned to one of: (1) community/environmental road-safety intervention and a school-based road/pedestrian safety education program (intervention group 1 [I1]); (2) a school-based road/pedestrian safety education program only (intervention group 2 [I2]); or no road-safety intervention (comparison group [C]) | **Setting:**  
  - 3 communities (local government areas) in the Perth metropolitan area, Western Australia | I1: 1 community  
  I2: 1 community  
  C: 1 community | NA |  
  - Greater road-safety activity was observed in intervention group 1 compared with the other groups  
  - A significant reduction in the volume of traffic on local access roads was also observed over the period of the trial in I1, but not in the remaining groups |
<table>
<thead>
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<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Britt et al 1998</td>
<td>To evaluate the effectiveness of a multifaceted bicycle helmet promotion program for low-income children</td>
<td>Design:</td>
<td></td>
<td></td>
<td></td>
<td>• Treatment and control sites are not randomly selected</td>
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<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td></td>
<td></td>
<td></td>
<td>• Provide classroom instruction to children</td>
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<td></td>
<td>• Educate parents</td>
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<td></td>
<td>• Obtain and fit helmets for each child</td>
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<td>• Conduct bicycle rodeos that allowed the children to practice safe riding skills and to see other children wearing helmets</td>
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<td></td>
<td>• Require children wear helmets while riding on school grounds</td>
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<td></td>
<td>Setting:</td>
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<td></td>
<td>• Preschool Head Start programs in WA</td>
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<td>• Eligible families in either program must have incomes at or below the federal poverty level</td>
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<td>• Children must be 3 or 4 years old and their siblings up to 14</td>
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<td>I: 14 sites, 543 children</td>
<td></td>
<td>I: 30%</td>
<td>• Helmet use in the intervention group more than doubled, from 43% to 89%, while use in the control group increased from 42% to 60% (P &lt; .05 for intervention group changes vs control group changes)</td>
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<tr>
<td></td>
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<td>C: 4 sites, 200 children</td>
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<td>C: 10%</td>
<td>• Intervention own helmet: RR 1.53 (1.34–1.79)</td>
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<td>• Intervention always wear helmet: RR 1.58 (1.25–1.99)</td>
</tr>
<tr>
<td>Farley et al 1996</td>
<td>To assess the effectiveness of a 4-year program of bicycle helmet promotion that targeted elementary school children in one region of Quebec, Canada</td>
<td>Design:</td>
<td></td>
<td></td>
<td></td>
<td>• Quasi-experimental</td>
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<td></td>
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<td>Intervention:</td>
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<td></td>
<td>• Persuasive communication and community organization</td>
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<td></td>
<td>• Combining standard educational activities and activities to facilitate helmet acquisition and use (eg, offering coupons)</td>
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<td></td>
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<td>Setting:</td>
<td></td>
<td></td>
<td></td>
<td>• 25 municipalities in Monteregie region, Quebec, Canada</td>
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<td></td>
<td>• Children 5–12 residing in those municipalities</td>
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<td></td>
<td>I: 6087</td>
<td></td>
<td>NA</td>
<td>• Helmet use increased from 1.3% to 33% in 1993 in the intervention communities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C: 2025</td>
<td></td>
<td></td>
<td>• OR of use of helmet for group exposure to program vs not was 1.78 (99% CI 1.10–2.89)</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ebel et al 2003</td>
<td>To evaluate the effectiveness of a multifaceted community booster seat campaign in increasing observed booster seat use among child</td>
<td>Design:</td>
<td>• Prospective, non-randomized, controlled community intervention trial</td>
<td></td>
<td></td>
<td>• Before the campaign began, 13.3% of eligible children in the intervention communities and 17.3% in the control communities were using booster seats, adjusting for child age, driver seat belt use, and sex of driver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td>• The campaign targeted both parents and children</td>
<td></td>
<td></td>
<td>• 15 months after the start of the campaign, adjusted booster seat use had increased to 26.1% in the intervention communities and 20.2% in the control communities ($P = .008$ for the difference in time trends between intervention and control communities)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting:</td>
<td>• Broad-based community education program</td>
<td></td>
<td></td>
<td>• I: 4 communities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Discount booster seat coupons</td>
<td></td>
<td></td>
<td>• C: 8 communities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Car seat training programs</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Inclusion:</td>
<td>• Children aged 4–8 years and weighing 18–36 kg (40–80 pounds)</td>
<td></td>
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</tr>
<tr>
<td>Greenberg-Seth et al 2004</td>
<td>To evaluate short-term effect of a community-based effort to promote child rear seating in a low-income Hispanic community</td>
<td>Design:</td>
<td>• Quasi-experiment</td>
<td></td>
<td></td>
<td>• After Intervention, the percentage of motor vehicles with all children placed in rear seats significantly increased from 33% to 49% ($P &lt; .0001$), which was significantly different from the increase in the control cities ($P &lt; .0001$)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td>• “Kids in the Back”</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Setting:</td>
<td>• Holyoke, MA, a low-income community with a substantial proportion of Hispanics</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Incentive programs over 6 months: gave gifts to reward those who put kids in the back; gave information on risks to those who didn’t</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Inclusion:</td>
<td>• Child passengers younger than 12 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Istre et al 2002</td>
<td>To evaluate a program to increase child restraint use among Hispanics</td>
<td>Design:</td>
<td>• Nonrandomized, controlled trial</td>
<td></td>
<td></td>
<td>• Child restraint use among preschool-aged Hispanic children increased significantly in all 3 settings between 1997 and 2000 ($P &lt; .0001$)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td>• Establishing a child safety seat loaner program</td>
<td></td>
<td></td>
<td>• Observed driver seat belt use also increased significantly in each of the 3 settings ($P &lt; .001$), whereas little change in driver seat belt use for other parts of Dallas (not significant)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting:</td>
<td>• 3 adjacent zip codes (75208, 75211, and 75212) in the west sector of Dallas, TX; other parts of Dallas served as comparison</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Educating parents in small classes</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Identifying mothers as authority figures to help communicate the message</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Addressing the issue of fatalism or destiny</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Using videos that graphically showed what happens to a child held on an adult’s lap in a car crash</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Inclusion:</td>
<td>• Children &lt;5 years old</td>
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<tr>
<td>Study</td>
<td>Study Question</td>
<td>Intervention</td>
<td>Population and Setting</td>
<td>N</td>
<td>Attrition</td>
<td>Outcomes/Comments</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Petridou et al 1997</td>
<td>To assess effectiveness (follow-up 255 days) of a health education injury-prevention program focusing on home injuries among the young (≤18 years old) and elderly (≥65 years old)</td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>• Naxos (intervention) had statistically significant improvements with respect to 11 of the 28 examined variables, whereas on the island of Spetses (control), such improvement was only noted for one variable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community</td>
<td>Greek islands of Naxos</td>
<td>I: 172 households</td>
<td></td>
<td>• Home accident incident rate per 105 person-days among 0–18 was 87 in the intervention and 110 in the comparison group, which was not significantly different (1-sided ( P = .09 ))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>controlled</td>
<td>(intervention) and</td>
<td>C: 177 households</td>
<td></td>
<td>• For total home accidents that happened to targeted 0–18-year-olds in the intervention group, RR 0.79, 90% CI 0.60–1.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>trial</td>
<td>Spetses (control)</td>
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<td></td>
<td></td>
<td>NA</td>
<td>• The mean burn injury rate decreased by 51.5% after the implementation of the intervention in Harstad ( (P &lt; .05) ) and by 40.1% in the 6 municipalities (not significant)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>• Rates in the reference city, Trondheim, increased 18.1% (not significant)</td>
</tr>
<tr>
<td>Ytterstad et al 1998</td>
<td>To describe the long-term effectiveness of a community-based program targeting prevention of burns in young children</td>
<td>Quasi-experimental</td>
<td>Norwegian city of</td>
<td>11: population 23 000</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td>Harstad (main intervention), 6 surrounding municipalities (intervention diffusion), and Trondheim (reference)</td>
<td>I2: population 14 000</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>C: population 134 000</td>
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</table>
### Electronic Table 3. (Continued)

#### Community-Based Interventions: General Home Safety

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Mallonee 2000                  | Assess impact of smoke detector distribution program                           | Design:  
- Quasi-experimental  
- Distribution of smoke detectors to targeted neighborhoods  
- Distribution of written materials to selected populations  
|                               | Setting:  
- Oklahoma City, OK  
- Residents of targeted neighborhood  
- Neighborhood chosen on the basis of a high rate of residential fires  
|                               | N: NA  
|                               | Attrition: NA  
|                               | • 10 100 smoke alarms distributed  
|                               | • 80% of houses in need of and 25% of total homes received alarm  
|                               | • At 48 months, 46% of alarms were installed and functioning  
|                               | • Injury rate associated with residential fires decreased by 81% in targeted area and 7% in nontargeted area  
|                               | • Injury rate per 100 fires decreased 76% in targeted group and 12% in nontargeted areas  
|                               | • Estimated that 60 injuries and deaths prevented during 6-year follow-up  

#### Community-Based Interventions: General Community Safety

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Ginnelly et al 2005           | To determine whether a smoke alarm give-away program is effective and cost-effective in reducing the risk of fire-related deaths and injuries | Design:  
- Cluster RCT  
- “Let’s Get Alarmed”: smoke alarms, batteries and fire safety brochures were distributed to intervention groups  
|                               | Setting:  
- 40 wards in inner London boroughs of Camden and Islington, UK  
- Households above average material deprivation  
|                               | I: 73 399 households  
|                               | C: comparable size  
|                               | N: NA  
|                               | • The mean cost for a household in a give-away ward, including the cost of the program, was £12.76, compared to £10.74 for the control ward  
|                               | • The total mean number of deaths and injuries was greater in the intervention wards than the control wards, 6.45 and 5.17.  
|                               | • When an injury/death avoided is valued at £1000, a smoke alarm give-away has a probability of being cost-effective of 0.15.  
|                               | • From 1998 to 2000, a 25% reduction in the burn-related hospitalization rate of children aged 0–4, from 1.39/1000 to 1.05/1000 infants and toddlers ($P = .03$) was realized in intervention communities  
|                               | • No change was observed in the nonintervention group, where the rate at the 2 measurements remained stable at 1.26/1000 infants and toddlers  

#### School Safety

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Roseveare et al 1999          | To evaluate the relative effectiveness of 2 methods of reducing playground hazards in schools | Design:  
- Randomly controlled trial  
- The intervention group received a health promotion program consisting of information about hazards, an engineer’s report, regular contact and encouragement to act on the report, and assistance in obtaining funding  
- The control group only received information about hazards in their playground  
|                               | Setting:  
- 24 schools in Wellington, New Zealand  
- The 12 schools that made up the intervention group were randomly sampled from the 60 primary schools in Wellington City  
|                               | I: 12 schools  
|                               | C: 12 schools  
|                               | N: None  
|                               | • A key result was the 52% reduction in height/surface hazards achieved in the intervention schools, compared with an 8% reduction in the controls  
|                               | • By the second follow-up, 9 of the 12 intervention schools had eliminated at least one height/surface hazard compared with only 3 control schools  

### Community-Based Interventions: General Community Safety

#### Community Injuries

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Attrition</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>model with respect to child injuries</td>
<td>Implementation of WHO safe community model</td>
<td>- Implementation of WHO safe community model</td>
<td>community</td>
<td></td>
<td>in the intervention/postintervention period</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting:</td>
<td>- Setting:</td>
<td>I: 1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Waitakere, New Zealand, population 155 000; control community 147 000</td>
<td>• Setting:</td>
<td>C: 1</td>
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<tr>
<td></td>
<td></td>
<td>NA</td>
<td>• Setting:</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I: 1 community</td>
<td>• Setting:</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harrell 2003</td>
<td>To evaluate the effectiveness of 2 warning signs on adult supervision and child</td>
<td>Quasi-experimental interventions</td>
<td>2 supermarkets in similar size in Canada</td>
<td>I1: 100</td>
<td>NA</td>
<td>• No effect was found</td>
</tr>
<tr>
<td></td>
<td>risky activities in grocery carts</td>
<td>- One supermarket had signs to prompt adults not to allow children to stand in</td>
<td>- Inclusion:</td>
<td>I2: 100</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>the cart seat or basket (I1)</td>
<td>• Children aged 1–6</td>
<td>NA</td>
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<tr>
<td></td>
<td></td>
<td>- The other supermarket had signs to inform parents of the risk of injury to a</td>
<td></td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>child in carts (I2)</td>
<td></td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>injuries</td>
<td>1985–89):</td>
<td>- Local mass media provide regular information about injury prevention</td>
<td>community</td>
<td></td>
<td>0.74, 95% CI 0.68–0.81) than in a control community exposed only to national level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Trained nurses provide information to parents</td>
<td>- Trained nurses provide information to parents</td>
<td>C: 1</td>
<td></td>
<td>injury-prevention programs (OR 0.93, 95% CI 0.82–1.05)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Indoor environments at schools and sports facilities were evaluated</td>
<td>- Intervention (Motala municipality) and control (Mjolby municipality) areas, both in</td>
<td>NA</td>
<td></td>
<td>- The risk of severe or fatal (AIS 3–6) injuries remained constant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ostergotland County, Sweden</td>
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</tbody>
</table>

#### Injury Economic Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Perspective</th>
<th>Study type and design</th>
<th>Population and Setting</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook et al 1999</td>
<td>To develop reliable US estimates of the medical costs of treating gunshot injuries</td>
<td>Medical cost</td>
<td>Cost burden</td>
<td>National acute-care and follow-up treatment costs and payment sources for gunshot injuries</td>
<td>Mean medical cost per injury was about $17 000</td>
</tr>
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<td></td>
<td>The 134 445 gunshot injuries in 1994 produced $2.3 billion (95% CI, $2.1–2.5 billion) in lifetime medical costs (1994 dollars)</td>
</tr>
</tbody>
</table>
### Electronic Table 3. (Continued)

**Injury Economic Studies**

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Question</th>
<th>Perspective</th>
<th>Study type and design</th>
<th>Population and Setting</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Corso et al 2006 | To measure national incidence, medical costs, and productivity losses of medically treated injuries | Societal | Cost burden of all injuries | All injuries in 2000 | • Injury in 2000 resulted in lifetime costs of $406 billion, $80 billion for medical treatment and $326 billion for lost productivity  
• Male subjects had a 20% higher rate of injury than female subjects  
• Injuries resulting from falls or being struck by/against an object accounted for >44% of injuries  
• In total, 20,050 free smoke alarms were distributed  
• The giveaway program cost £145,087, of which >60% was for personnel costs. The 1-year reminder postcards cost £12,736, most of which paid for data entry  
• Actual installation remains unknown: “Given our target population, we speculate that a substantial proportion of the alarms may not have been installed…” |
| DiGuiseppi et al 1999 | To reduce fires and fire-related injuries by increasing the prevalence of functioning smoke alarms in high-risk households | Study: Cluster RCT  
Intervention: “Let’s Get Alarmed”: Smoke alarms, batteries and fire safety brochures were distributed to intervention groups  
Inclusion: Households above average material deprivation | Cost of the program | Setting: 40 wards in inner London boroughs of Camden and Islington, UK | • 20,050 alarms distributed among 73,399 intervention households  
• Injuries and deaths more common from fires in intervention households (6.45 vs 5.17 over 24 months)  
• Costs for the giveaway program were also higher than control wards  
• No lost productivity costs were accounted for  
• Program was cost saving from both societal and health care system perspective  
• Total discounted cost of intervention was $531,000 over 5 years  
• Estimated medical costs prevented over 5 years: $1.5 million  
• Estimated productivity costs averted: $14 million  
• Medical costs do not include emergency room, rehabilitation, or out-of-pocket expenses  
• 92% of the participants reported proper use of the device, and 82% had already purchased the second-stage car restraint  
• The cost-effectiveness ratio varies between €418 and €3225 per life-year saved, depending on whether the modest administrative fee is considered |
| Ginnelly et al 2005 | Evaluate cost effectiveness of mass smoke alarm distribution | Societal | Cost-effectiveness | Residents of underprivileged wards of inner London boroughs, UK | • 20,050 alarms distributed among 73,399 intervention households  
• Injuries and deaths more common from fires in intervention households (6.45 vs 5.17 over 24 months)  
• Costs for the giveaway program were also higher than control wards  
• No lost productivity costs were accounted for  
• Program was cost saving from both societal and health care system perspective  
• Total discounted cost of intervention was $531,000 over 5 years  
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• Medical costs do not include emergency room, rehabilitation, or out-of-pocket expenses  
• 92% of the participants reported proper use of the device, and 82% had already purchased the second-stage car restraint  
• The cost-effectiveness ratio varies between €418 and €3225 per life-year saved, depending on whether the modest administrative fee is considered |
| Haddix et al 2001 | Evaluate cost-effectiveness of target smoke alarm distribution | Societal | Cost-effectiveness | Oklahoma City, OK, residents living in targeted high-risk neighborhood | • 20,050 alarms distributed among 73,399 intervention households  
• Injuries and deaths more common from fires in intervention households (6.45 vs 5.17 over 24 months)  
• Costs for the giveaway program were also higher than control wards  
• No lost productivity costs were accounted for  
• Program was cost saving from both societal and health care system perspective  
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• 92% of the participants reported proper use of the device, and 82% had already purchased the second-stage car restraint  
• The cost-effectiveness ratio varies between €418 and €3225 per life-year saved, depending on whether the modest administrative fee is considered |
| Kedikoglou et al 2005 | To present an infant car-restraint loan scheme and evaluate its cost-effectiveness | Car restraints were lent for a 6-month period to eligible prospective parents for a modest fee | Cost-effectiveness | 188 families who attended the psycho-prophylactic delivery classes at the University Maternity Hospital “Alexandra” in Athens | • The risk of head injury was highest among children aged 5–16  
• The greatest reduction in absolute risk of head injury, 1.0%–1.4% over 5 years estimated helmet lifetime, occurred among children who started using a helmet between ages 3 and 13  
• Estimates indicate it would cost $2200 in bicycle helmet expenses to prevent any one upper head injury for children aged 3–13  
• In contrast, it would cost $10,000–25,000 to avoid an adult injury |
| Kopjar et al 2000 | Estimate cost-effectiveness of helmet use based on an estimated risk reduction | Societal | Cost-effectiveness | Included all cases of head injuries reported through the registration system from 1990 through 1996 in USA | • The risk of head injury was highest among children aged 5–16  
• The greatest reduction in absolute risk of head injury, 1.0%–1.4% over 5 years estimated helmet lifetime, occurred among children who started using a helmet between ages 3 and 13  
• Estimates indicate it would cost $2200 in bicycle helmet expenses to prevent any one upper head injury for children aged 3–13  
• In contrast, it would cost $10,000–25,000 to avoid an adult injury |
<table>
<thead>
<tr>
<th>Reference</th>
<th>Objective</th>
<th>Participants</th>
<th>Design</th>
<th>Setting</th>
<th>Eligibility</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kim et al 1997</td>
<td>To determine whether asking for a $5 donation for bicycle helmets, compared</td>
<td>6 clinic sites were randomly assigned to either free helmet distribution or to</td>
<td>Willingness to pay</td>
<td>6 public health clinic sites (506 eligible children) in King County, WA</td>
<td>82% of children whose parents were asked for a copayment and 77% of children who received free helmets were reported to wear their helmets every time they rode their bicycles ($P = .20$)</td>
<td>The adjusted OR for the association between copayment compared with free helmets and helmet use was 1.66 (95% CI 0.94–2.92)</td>
</tr>
<tr>
<td></td>
<td>with distribution free of charge, would affect helmet use among children</td>
<td>$5 suggested donation for the helmets</td>
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<td></td>
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<td>6 clinic sites were randomly assigned to either free helmet distribution or to a</td>
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<tr>
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<td></td>
<td>$5 suggested donation for the helmets</td>
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<tr>
<td>King et al 2001,</td>
<td>Examine effectiveness of home visit program to improve home safety and</td>
<td>89% of children whose parents were asked for a copayment and 77% of children</td>
<td>Setting:</td>
<td>I: 601</td>
<td>Significant safety modifications occurred in homes having hot water not exceeding 54°C (OR 1.31, 95% CI 1.14–1.50), the presence of a smoke detector (OR 1.45, 95% CI 0.94–2.22).</td>
<td>The intervention group reported significantly less injury visits to the doctor compared with the nonintervention group (rate ratio 0.75, 95% CI 0.58–0.96).</td>
</tr>
<tr>
<td>Canadian 1999</td>
<td>decrease frequency of injury to children</td>
<td>who received free helmets were reported to wear their helmets every time they</td>
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<td>rode their bicycles ($P = .20$)</td>
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<td>Levitt and Doyle</td>
<td>To test the relative effectiveness of child safety seats, lap-and-shoulder</td>
<td>US children aged 2–6</td>
<td>Societal</td>
<td>Cost-effectiveness</td>
<td>US children aged 2–6</td>
<td>No apparent difference in the 2 most serious injury categories for children in child safety seats vs lap-and-shoulder belts</td>
</tr>
<tr>
<td>2006</td>
<td>seat belts, and lap belts in preventing injuries among motor vehicle</td>
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<td>3 Data Sets:</td>
<td></td>
<td>Child safety seats provide a statistically significant 25% reduction in the least serious injury category</td>
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<td>passengers aged 2–6</td>
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<td>General Estimates Survey, a nationally representative sample of</td>
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<td>Lap belts are somewhat less effective than the 2 other types of restraints, but far superior to riding unrestrained</td>
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<td>approximately 50,000 crashes each year for 16 years</td>
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<td>New Jersey Department of Transportation data covering all crashes</td>
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<td>in NJ between 2001 and 2004</td>
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<td>A WI data set that includes the universe of crashes with police</td>
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<td>reports in the state from 1994 to 2002, and links these crashes to</td>
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<td>hospital discharge records</td>
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<td>Miller et al</td>
<td>To analyze the societal return on investment in booster seats and in laws</td>
<td>Cost-outcome analysis</td>
<td>Booster seats for auto occupants aged 4–7 years</td>
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<td>A booster seat costs $30 plus $167 for maintenance and time spent on</td>
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<td>2006</td>
<td>requiring their use in the USA</td>
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<td>installation and use</td>
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<td>Miller et al</td>
<td>To estimate the societal costs of pedestrian and bicycle crash injuries in</td>
<td>Cost-outcome analysis</td>
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<td></td>
<td>This investment saves $1854 per seat, a return on investment of 9.4 to 1</td>
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<td>2003</td>
<td>the USA</td>
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<td>Even lower bound estimates in sensitivity analysis indicated that</td>
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<td>society would benefit from the use of booster seats. Seat laws offer</td>
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<td>a return of 8.6 to 1</td>
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<td>Costs of pedestrian and bicyclists injuries in 2000 total $40</td>
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<td>billion over their lifetimes</td>
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<td>Youth aged 5–14 face greater annual risks</td>
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<thead>
<tr>
<th>Study</th>
<th>Question</th>
<th>Perspective</th>
<th>Study type and design</th>
<th>Population and Setting</th>
<th>Outcomes/Comments</th>
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<tbody>
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<td>• Total: $81 400</td>
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<td>• Productivity: $66 500</td>
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<td>• Medical costs: $13 800</td>
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<td>• Other resources: $1 100</td>
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<td><em>Per-Victim Costs by Injury:</em></td>
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<td>• Burn/anoxia: $4500</td>
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<td>• Caught between objects: $1900</td>
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<td>• Drowning/submersion: $21 000</td>
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<td>• Fall: $4200</td>
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<td>• Firearm: $17 000</td>
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<td>• Suffocating/choking: $11 000</td>
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<td>Notes:</td>
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<td>• Cost estimates are incidence based and are based on multiple national data sources</td>
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<td>• Productivity costs undervalue lives of women and minorities because they are paid less than white men</td>
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<td>• Some data (cost of coroners) date back 10–20 years</td>
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<tr>
<td>Miller and Levy 2000</td>
<td>To review cost-outcome analyses in injury prevention and control and estimate associated benefit-cost ratios and cost per quality-adjusted life-year</td>
<td>Societal</td>
<td>Cost-outcome analysis</td>
<td>Medline and Internet search, bibliographic review, and federal agency contacts identified published and unpublished studies from 1987 to 1998 for the USA</td>
<td>More than half of the 84 injury-prevention measures reviewed yielded net societal cost savings</td>
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<td>• 12 measures had costs that exceeded benefits</td>
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<td>• Of 33 road-safety measures analyzed, 19 yielded net cost savings</td>
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<td>• Of 34 violence prevention approaches studied, 19 yielded net cost savings, whereas 8 had costs that exceeded benefits</td>
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</tbody>
</table>
| Miller et al 1997                        | Discuss methodology of cost outcomes related to injury, cost effective analysis of smoke detectors | Societal    | Benefit cost analysis | All US homes | Estimated cost savings for each detector are $210–$636  
|                                           |                                                                          |             |                       |                         | • Benefit/cost ratio: 5.5–15.5 per detector                                           |
|                                           |                                                                          |             |                       |                         | • Costs include medical, other tangible costs, quality-of-life gains, but not property damage savings |
|                                           |                                                                          |             |                       |                         | • Parental time caring for children not included                                        |
| Miller and Cohen 1997                    | To estimate the costs of US gunshot and cut/stab wounds by intent       | Societal    | Cost estimation       | Gunshot and cut/stab wounds | In 1992, gunshot wounds cost an estimated US $126 billion; cut/stab wounds cost another $51 billion |
| Roberts et al 1998                       | Estimate costs of injuries on the basis of prevalence of incidence      | Societal    | Cost estimation       | USA, children 0–15 years old | Road accident cost  
|                                           |                                                                          |             |                       |                         | • Home accident cost                                                                 |
|                                           |                                                                          |             |                       |                         | • Hidden cost of injury                                                               |
| Winston et al 2001                       | Provide national estimates of incidence and costs of handlebar-related child injuries | Societal    | Cost estimation       | USA, people <20 years old | An estimated 1147 subjects in the USA had serous nonmotor-involved bicycle-related abdominal or pelvic organ injury leading to hospitalization in 1997 |
|                                           |                                                                          |             |                       |                         | • An estimated $9.6 million in total hospital charges                                  |
|                                           |                                                                          |             |                       |                         | • $10 million in lifetime medical costs                                              |
|                                           |                                                                          |             |                       |                         | • $11.5 million in life productivity losses                                            |
|                                           |                                                                          |             |                       |                         | • $503.9 million in lifetime monetized quality-adjusted life-years                   |
After intervention, both behavioral family intervention (BFI) programs were associated with significantly lower levels of parent-reported child behavior problems (<P .05), lower levels of dysfunctional parenting, and greater parental competence than the WL condition. At 3 months, the parents who received the intervention reported significantly greater improvement in parenting practices and a significantly greater reduction in child problem behavior than the control group. The gains achieved at postintervention were maintained at 1-year follow-up. The enhanced program was not shown to be superior to the standard program using any of the outcome measures at either postintervention or follow-up.

### Electronic Table 4. Studies on Prevention and Intervention for Mental Health Disorders

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N/Attrition</th>
<th>Measures</th>
<th>Outcomes/Comments</th>
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</thead>
<tbody>
<tr>
<td>Bor et al 2002</td>
<td>To review the effects of the Triple P-Positive Parenting Program on preschool children with co-occurring disruptive behavior or attention-deficit/hyperactivity disorder (ADHD)</td>
<td><strong>Design:</strong> Randomized, controlled trial (RCT)</td>
<td><strong>Intervention:</strong> Triple P, Enhanced behavioral family intervention (EBFI; I1), Standard behavioral family intervention (SBFI; I2), Waiting list (WL)</td>
<td><strong>Inclusion:</strong> 87 preschoolers with co-occurring disruptive behavior and attentional/hyperactive difficulties</td>
<td><strong>Attrition:</strong> 28%</td>
<td>After intervention, both behavioral family intervention (BFI) programs were associated with significantly lower levels of parent-reported child behavior problems (&lt;P .05), lower levels of dysfunctional parenting, and greater parental competence than the WL condition. The gains achieved at postintervention were maintained at 1-year follow-up. The enhanced program was not shown to be superior to the standard program using any of the outcome measures at either postintervention or follow-up.</td>
</tr>
<tr>
<td>Bradley et al 2003</td>
<td>To review a 4-session psychoeducational group for parents of preschoolers with behavior problems, delivered in community agencies</td>
<td><strong>Design:</strong> RCT</td>
<td><strong>Intervention:</strong> Brief Psychoeducational Parenting Program, 3 weekly group sessions and a 1-month booster, focusing on being to support effective discipline</td>
<td><strong>Inclusion:</strong> Parents of 3–4 children</td>
<td><strong>Attrition:</strong> 25%</td>
<td>At 3 months, the parents who received the intervention reported significantly greater improvement in parenting practices and a significantly greater reduction in child problem behavior than the control group. At 1-year follow-up, changes in parenting behavior appeared to be sustained over a 1-year follow-up, although these follow-up results may not be representative of the sample as a whole.</td>
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<tr>
<td>Cicchetti et al</td>
<td>To review a program promoting secure attachment in the offspring of depressed moms</td>
<td><strong>Design:</strong> RCT</td>
<td><strong>Intervention:</strong> Mothers and toddlers participated joint therapy sessions</td>
<td><strong>Inclusion:</strong> Toddlers with mothers with or without depression history</td>
<td><strong>Attrition:</strong> 1-year follow-up, 25%</td>
<td>To promote secure attachment.</td>
</tr>
<tr>
<td>Cohen et al 1999</td>
<td>To contrast the effectiveness of an infant-led with an alternate form of parent-infant psychotherapy</td>
<td><strong>Design:</strong> RCT</td>
<td><strong>Intervention:</strong> Watch, Wait, and Wonder (WWW), Mother-infant psychotherapy (PPT)</td>
<td><strong>Inclusion:</strong> 10–30-month-old infants and their mothers who were referred to the center</td>
<td><strong>Attrition:</strong> 25%</td>
<td>Infants in the WWW group were significantly more likely than infants in the PPT group to move toward either a secure or organized attachment relationship (&lt;P &lt;.03). Before treatment, mothers and infants in both groups exhibited greater reciprocity in play and less conflict.</td>
</tr>
<tr>
<td>Connell et al 1997</td>
<td>To evaluate the effectiveness of a self-directed family program on oppositional behaviors in rural and remote areas</td>
<td><strong>Design:</strong> RCT</td>
<td><strong>Intervention:</strong> Parents were required to read a workbook each week for 10 weeks, Weekly telephone contact</td>
<td><strong>Inclusion:</strong> Families reside in rural area in Australia, children aged 2–6 without development delays</td>
<td><strong>Attrition:</strong> 25%</td>
<td>There was a significantly lower level of disruptive child behavior in the treatment group than the control group after treatment (&lt;P =.0005). A significant reduction in ECBI intensity scores for the treatment, but not significant for control (&lt;P =.0005).</td>
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<tr>
<th>Authors</th>
<th>Study Question</th>
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<th>Measures</th>
<th>Outcomes/Comments</th>
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</table>
| Dozier et al 2006 | To present preliminary data testing the effectiveness of an intervention delivered to foster children | Design: *RCT*  
Intervention:  
- Attachment and Biobehavioral Catch-up  
- Foster parents received in-home training for 10 weekly sessions  
- Control intervention group received an educational program: Developmental Education for Families  
- Comparison group: nonfoster children  | Setting:  
- Foster care  
Inclusion:  
- Infants and toddlers in foster care  | 11: 30  
12: 30  
C: 104  
Attrition: NA  | PDR  | A main effect for the intervention group emerged ($P < .002$)  
Post hoc analyses revealed differences between the control intervention group and the other 2 groups ($P < .001$), but not between the experimental intervention group and the typically developing group ($P > .20$)  
The intervention group main effect on behavior was not significant, nor were differences significant when considering only the toddler group ($P > .10$)  |
| Funderburk et al 1998 | To review the maintenance of treatment effects of parent-child interaction therapy | Design: *Controlled trial*  
Intervention:  
- 14-session parent-child interaction programs  | Setting:  
- School  
Inclusion:  
- Children 2–7 with had behavior problems  | I: 12  
C: 72  | SESBI  
Walker-McConnell Scale of Social Competence and school adjustment  | At 12-month follow-up, treatment children maintained posttreatment improvements in conduct problems  
At 18-month follow-up, results declined on most measures into the range of pretreatment levels  |
| Gardner et al 2006 | To test effectiveness of a parenting intervention for reducing conduct problems in clinically referred children | Design: *RCT*  
Intervention:  
- Webster-Stratton Incredible Years video-based 14-week group program  | Setting:  
- 9 sites across one county in the UK  
Inclusion:  
- Children referred for conduct problems, aged 2–9, primarily low-income families  | I: 44  
C: 32  
Attrition: 7% at month 6; 10% at month 12  | ECBI  
Parenting Scale  
BDI (parents)  | Posttreatment improvements were found in child problem behavior, by parent report (effect size [ES] .48, $P = .05$) and direct observation (ES .78, $P = .02$)  
Child independent play (ES .77, $P = .003$)  
Observed negative (ES .74, $P = .003$) and positive (ES .38, $P = .04$)  
Parenting; parent-reported confidence (ES .40, $P = .03$) and skill (ES .65, $P = .01$), LBW-T intervened infants had higher scores than LBW-T control infants on the cover test ($P < .05$) and were more cooperative ($P < .01$) and happy ($P < .05$)  |
| Gardner et al 2003 | To determine whether early psychosocial intervention with low-birth-weight–term (LBW-T) infants improved cognition and behavior | Design: *RCT*  
Intervention:  
- Weekly home visits by paraprofessionals for the first 8 weeks of life  | Setting:  
- Kingston, Jamaica  
Inclusion:  
- LBW-T infants (weight <2500 g)  | I: 66  
C: 69  | Four 9-point rating scales (developed in Brazil)  |  |
| Gianni et al 2006 | To evaluate the effects of an early postdischarge developmental mother-child intervention program on neurodevelopment outcome at 36 months in very low birth weight infants | Design: *RCT*  
Intervention:  
- Mother-child pairs attend group meetings with psychologist and a psychometrician  | Setting:  
- Outpatient department  
Inclusion:  
- Infants with birthweight $<1250$ g, singleton, infant fed preterm formula, without abnormal magnetic resonance imaging scan  | I: 18  
C: 18  | Griffiths Mental Development Scale  | Compared with controls, children in intervention group exhibited higher scores in personal-social subscales (mean [SD] = 101.4 [9.3] vs 92.9 [12.1], $P = .02$)  |
At 1 month, infants in the experimental group were performing more optimally than infants in the control group on Social Interaction (MABI) independently and periodically at home.

Child behavior improved significantly in both groups.

A significant difference in responsiveness was found between depressed mothers and their depressed infants.

The small advantage shown at 2 years of age is no longer detectable at 5 years.

There were no differences between the 3 preterm groups at 5 Years.
### Individual-Level Interventions: Parent-Focused

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<tr>
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<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Lieberman et al 2005     | To compare the efficacy of child-parent psychotherapy (CPP) and case management plus treatment | Design:  
- RCT  
- Intervention:  
  - Child-parent psychotherapy (CPP): weekly parent-child sessions for 1 year  
  - Community referral for individual treatment | Setting:  
- Community  
- Inclusion:  
  - Children aged 3–5 of divorced mothers | I1: 36  
I2: 29  
Attrition I1: 14%  
Attrition I2: 12% | CBCL | The CPP group had a significant intake posttest reduction in the number of traumatic stress disorder symptoms ($t(32) = 5.46, P < .001$), whereas the comparison group did not. Only the CPP group showed significant reductions in behavior problems (CPP: intake mean = 60.32, SD = 9.00; posttest mean = 54.16, SD = 8.71, $t(18) = 3.10$, $P < .01$; comparison: intake mean = 58.86, SD = 8.82; posttest mean = 59.64, SD = 13.11).
Follow-up analyses revealed that only the CPP group evidenced significant reductions (TC: $t26 = 3.92, P G .001$ and ITT: $t41 = 4.07, P G .001$)
Intervention families reported children as having lower CBCL externalizing $T$ score, $F_{1,97} = 2.71$, $P < .13$, at follow-up, although the differences were not significant.
| Lieberman et al 2006     | To assess the effect of CPP 6 months after termination of the program          | Design:  
- RCT  
- Intervention:  
  - Pairs intervention: 12-week parenting course (Incredible Years); coparenting component  
  - Usual care | Setting:  
- At agency  
- Inclusion:  
  - Foster children aged 3–10 without disabilities from New York City | I1: 6% (n = 27)  
I2: 14% (n = 23) | CBCL, SCL-90 Symptoms Checklist, Revised | Levels of behavioral problems for the Healthy Steps children were similar to those generally healthy children.
Mothers in the intervention group had increased reporting of aggressive behaviors compared with control group. |
| Linares et al 2006       | To compare the effectiveness of a pairs intervention with usual care on foster child’s externalizing behavior problems | Design:  
- RCT  
- Intervention:  
  - Pairs intervention: 12-week parenting course (Incredible Years); coparenting component  
  - Usual care | Setting:  
- At agency  
- Inclusion:  
  - Foster children aged 3–10 without disabilities from New York City | I1: 80  
I2: 48 | PPI, ECBI, CBCL | | |
| Minkovitz et al 2003     | To evaluate effects of a classroom-based social skills program for prekindergarten children | Design:  
- RCT  
- Intervention:  
  - Healthy Steps: incorporating developmental specialists and enhanced developmental services into pediatric care | Setting:  
- Pediatric care  
- Inclusion:  
  - Newborns up to 3 months were enrolled at birth or first office visit, who were not adopted or in foster care, or who were too ill to visit a doctor’s office | I: 832  
C: 761 | CBCL | | |
| Morawska and Sanders 2006| To examine the efficacy of a self-administered behavioral family intervention | Design:  
- RCT  
- Intervention:  
  - Triple P  
  - I1: Self-administered BFI alone, 10 weeks  
  - I2: Self-administered BFI plus brief therapist telephone assistance | Setting:  
- Home  
- Inclusion:  
  - Toddler aged 18–36 months; family living within the Brisbane metropolitan area, Australia | I1: 42  
I2: 43  
C: 41  
C: 37 | ECBI, PS | Short Term:  
- A significant intervention effect was found for child behavior problems for mothers’ report, $F_{4,312} = 5.46$, $P < .001$.
- The TASD-BFI group improved more compared with the WLC group on both the ECBI Intensity and Problem scales, $P < .01$, $P < .05$, respectively, whereas the SD-BFI group did not differ from the WLC group on either scale.
Long Term (6 months):  
- Effect maintained |
Muntz et al 2004  To estimate the longer term cost-effectiveness of an intensive practice

**Design:**
- RCT

**Intervention:**
- I1: Intensive parent behavioral training
- I2: Standard parent behavioral training

**Setting:**
- Home

**Inclusion:**
- Children aged 2–10, who were referred to mental health service because of severe behavior problems

**Analysis:**
- 6-month follow-up: the mean score for the intensive group decreased significantly to below the clinical cutoff score
- 4-year follow-up: the intensive group’s mean further decreased, but the standard group’s mean increased, so the improvement since baseline score was no longer significant in the standard group
- Significant difference between the group mean at 4 year follow-up ($t = 2.54, P = .027$)
- Switching to the intensive treatment will not only provide greater clinical effect but is £224 less costly per unit of decrease on the CBCL scale than the standard treatment

Nixon et al 2003  To compare standard and abbreviated treatments for oppositional defiant preschoolers

**Design:**
- RCT

**Intervention:**
- I1: Standard parent-child interaction therapy (PCIT; STD)
- I2: Modified PCIT that used didactic videotapes, telephone consultations, and face-to-face sessions to abbreviate treatment

**Inclusion:**
- Children aged 3–5 exhibiting behavioral difficulties

**Analysis:**
- Immediate effect:
  - Mothers in both the STD and ABB conditions reported less oppositional and conduct problem behavior (ECBI, oppositional defiant disorder [ODD] symptoms) than mothers in the WL condition. Mothers in the STD condition also reported less severe behavior problems around the home (HSQ-M) compared with WL mothers, but ABB mothers did not
  - At 6-month follow-up, all pre- and posttreatment improvements were maintained

Patterson et al 2002  To assess the effectiveness of a parenting program, delivered by health visitors in primarycare, in improving the mental health of children and their parents

**Design:**
- RCT

**Intervention:**
- Webster-Stratton 10-week parenting program

**Setting:**
- Health centers and community center

**Inclusion:**
- Parents of children aged 2–8 years who scored in the upper 50% on a behavior inventory

**Analysis:**
- The 21 children in the intervention group whose initial scores fell in the clinical range decreased by 26.1 points from preintervention to 6-month follow-up ($P < .001$); those of the 39 children initially scoring in the normal range decreased by 9.2 points ($P = .002$) over this period
- The 25 children in the control group with initial scores in the clinical range decreased by only 9.3 points ($P = .001$); those in the normal range (n = 31) decreased by 5.9 points (not significant)
- Overall, children in EBFI showed greater reliable improvement than children in other groups
- By 1-year follow-up, children in all 3 treatment groups achieved clinically reliable change in observed disruptive behavior

Sanders et al 2000  To compare 3 variants of Triple P with comparison group

**Design:**
- RCT

**Intervention:**
- BFI: Triple P
  - I1: Enhanced BFI: 60–90-minute weekly sessions (14 hours in total) with a practitioner on individual basis in local community center
  - I2: Standard BFI: parents received 10 hours of intervention on average
  - I3: Self-directed BFI: parents received a 10-session self-directed program
- C: Waiting list

**Analysis:**
- 6-month follow-up: the mean score for the intensive group decreased significantly to below the clinical cutoff score
- 4-year follow-up: the intensive group’s mean further decreased, but the standard group’s mean increased, so the improvement since baseline score was no longer significant in the standard group
- Significant difference between the group mean at 4 year follow-up ($t = 2.54, P = .027$)
- Switching to the intensive treatment will not only provide greater clinical effect but is £224 less costly per unit of decrease on the CBCL scale than the standard treatment

(Continued)
<table>
<thead>
<tr>
<th>Authors</th>
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<th>Population and Setting</th>
<th>N/Attrition</th>
<th>Measures</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Scott et al 2001   | To evaluate a behaviorally based group parenting program for antisocial behaviors in children | Design: • Controlled trial  
Intervention: • Webster Stratton basic videotape program administered to parents of 6–8 children over 13–16 weeks | Setting: • 4 local child and adolescent mental health services  
Inclusion: • 141 children aged 3–8 years referred with antisocial behavior | I: 90  
C: 51  
Follow-up: I: 73  
C: 37 | SDQ  
CBCL | Children in the intervention group showed a large reduction in antisocial behavior; those in the waiting list group did not change (effect size between groups 1.06 SD (95% CI 0.71–1.41), \( P < .001 \)) |
| Shaw et al 2006    | To test the effectiveness of the Family Check-up (FCU) in sustaining maternal involvement and preventing the exacerbation of child conduct problems | Design: • RCT  
Intervention: • Family-based interventions • FCU is a brief 3-session intervention  
“Get-to-know-you” feedback sessions; average n = 3.26  
Inclusion: • Mothers with at-risk toddler-age boys were recruited from the Special Supplemental Nutrition Program for Women, Infants and Children program | Setting:     | I: 60  
C: 60  
Follow-up: I: 46  
C: 46 | BDI  
CBCL  
HOME | At the 2-year follow-up, intervention group (change in mean = 2.44, SD = 3.11) showed a significant decrease in CBCL Destructive scores, compared with those in the control group (change in mean 0.75, SD 3.20, \( F_{1,08} = 7.81, P < .01 \)). |
| Sonuga-Barke et al 2001 | To evaluate 2 different parent-based therapies for preschool attention-deficit/hyperactivity disorder (ADHD) | Design: • RCT  
Intervention: • Structured 8-week program involving eight 1-hour weekly visits by 1 of 2 specially trained health visitor therapists  
• I1: Parent training: received coaching in child management techniques  
• I2: Parent counseling and support group: received nondirective support and counseling  
• Waiting-list control group  
Inclusion: • 3-year-old children displaying a preschool equivalent of ADHD | Setting:     | I1: 30  
I2: 28  
C: 20 | PACS  
GHQ  
PSOC | ADHD symptoms were reduced (\( F_{2,74} = 11.64; P < .0001 \)) and mothers’ sense of well-being was increased by PT relative to both other groups (\( F_{2,74} = 10.32; P < .005 \)).  
53% of children in the PT group displayed clinically significant improvement (\( \chi^2 = 4.08; P = .048 \)) |
| Sonuga-Barke et al 2004 | To assess the effectiveness of the same PT program when delivered as part of routine primary care by nonspecialist nurses | Design: • RCT  
Intervention: • PT consisted of a structured 8-week program involving eight 1-hour weekly visits. All sessions were carried out on a one-on-one basis with mothers and their ADHD children in their homes  
Inclusion: • 3-year-old children with ADHD | Setting:     | I: 59  
C: 30 | PACS  
WWP  
CBCL  
GHQ  
PSOC | There was no significant improvement in ADHD symptoms in both groups  
Although PT is an effective intervention for preschool ADHD when delivered in specialized settings, these benefits do not appear to generalize when program are delivered as part of routine primary care by nonspecialist nurses |
Stewart-Brown et al 2004 To test the effectiveness at 1 year of the Webster-Stratton Parents and Children Series group parenting program in a population sample of parents

**Design:**
- RCT

**Intervention:**
- The Incredible Years
- Webster-Stratton’s 10 week parenting program led by trained and supervised health visitors
- Parent groups

**Setting:**
- Local center

**Inclusion:**
- Parents of children aged 2–8 years who scored in the upper 50% on a validated behavior inventory

**Home Setting:**
- I: 60
- C: 56

At 12 months, significant change (P < .05) in a positive direction was observed for intervention group children on the intensity scale of the ECBI, and the total, conduct, and hyperactivity scales of the SDQ. Significant change in a positive direction was also observed for intervention group parents on all scales of the GHQ, with the exception of the anxiety subscale; on all scales of the PSI, with the exception of parent-child interaction subscale; and on the RSE scale.

At 12 months, there were no significant differences between the control and intervention group for any of the scales measuring children’s emotional and behavioral adjustment.

After receiving the intervention, mothers in the intervention group had more favorable attitudes toward sensitive discipline, \( t(235) = 4.49, P < .05 \), than control group mothers at the posttest.

Van Zeijl et al 2006 To evaluate a home-based video-feedback intervention to promote positive parenting and sensitive discipline (VIPP-SD)

**Design:**
- RCT

**Intervention:**
- Discussing actual parent-child interactions in six 1.5-hour sessions with individual families at home

**Setting:**
- Home

**Inclusion:**
- 1–3-year-old children with relatively high scores on externalizing behavior

**Home Setting:**
- I: 120
- C: 117

In families with more marital discord and in families with more daily hassles, the intervention resulted in a decrease of overactive behavior.

Immediate effect: parent-reported child behavior pretest to posttest \( (P < .001) \), pretest to 6-month follow-up \( (P = .006) \) and to 12-month follow-up \( (P = .006) \) on CBCL total scores for the CBT group but not for the 2 control groups.

Verduyn et al 2003 To evaluate the effect of group cognitive behavioral therapy (CBT) on child behavior problems and maternal depression in a group of women with young children

**Design:**
- RCT

**Intervention:**
- 4 home visits when infants were 7–10 months old
- I1: VIPP video feedback and brochures
- I2: VIPP-R additional discussions of mothers’ childhood attachment experience

**Inclusion:**
- Mothers with children aged between 2 years 6 months and 4 years, and both mothers showed depression and children showed problems

**Home Setting:**
- I: 47
- I2: 44
- C: 28

Attrition: 70%

Immediate effect: parent-reported child behavior decreased in adjusted mean ECBI by an estimated 22.4 points (95% CI 20.38–24.48). This improvement was 0.83 of a standard deviation, which corresponds to a large effect size.

Zubrick et al 2005 To evaluate the effectiveness of a universally delivered group BFI in preventing behavior problems in children

**Design:**
- Quasi-experimental longitudinal

**Intervention:**
- Triple P
- Parenting groups: 2 hours per week for 4 weeks
- Telephone support sessions
- Reading materials and video

**Inclusion:**
- Preschool-age children and their parents recruited from the Eastern Metropolitan Health Region of Western Australia

**Setting:**
- I: 804
- C: 806

• Significant change in a positive direction was observed for intervention group parents on all scales of the GHQ, with the exception of the anxiety subscale; on all scales of the PSI, with the exception of parent-child interaction subscale; and on the RSE scale.

• In families with more marital discord and in families with more daily hassles, the intervention resulted in a decrease of overactive problem behaviors in the children.

Outcome is mother-infant interaction

There were significant differences in the primary outcome of child behavior pretest to posttest \( (P < .001) \), pretest to 6-month follow-up \( (P = .006) \) and to 12-month follow-up \( (P = .007) \), whereas the 2 control groups did not.
### Individual-Level Interventions: Child-Focused

<table>
<thead>
<tr>
<th>Authors</th>
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<th>Outcomes/Comments</th>
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</thead>
</table>
| McLaughlin et al 2007 | To evaluate effects of early childhood interventions on young adult depressive symptoms | **Design:**  
- RCT  
- Abecedarian study  
- Full-day, year-round, center-based, free, educational child care from infancy through age 5  

**Inclusion:**  
- Infants at high risk for poor cognitive/academic outcomes due to environmental factors such as poverty  
- Age-21 follow-up: 104 of 111 participated  

**Setting:**  
- Center based  
- **Intervention:**  
- BSI  
- HOME  
37% of the individuals in the control group rated themselves as having depressive symptoms, in contrast to 26% of those who were in the treatment group |

### Family-Level Interventions

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<tr>
<th>Authors</th>
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<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Barkley et al 2000 | To examine the effectiveness of a multimethod psychoeducational intervention for preschool children with disruptive behavior | **Design:**  
- RCT  
- 4 groups:  
  1. No treatment (n = 42)  
  2. Parent training only (n = 39)  
  3. Full-day treatment, classroom only (n = 37)  
  4. Combination of parent training with classroom treatment (n = 40)  

**Inclusion:**  
- 158 children at kindergarten having high levels of aggressive, hyperactive, impulsive, and inattentive behavior  

**Setting:**  
- Worcester Public Schools  
- **Intervention:**  
- CBCL  
- HSQ  
- Normative Adaptive Behavior Checklist  
- PSI  
- SSQ  
- SSRS  
- Woodcock Johnson Psychoeducational Test Battery  
- CPT  
- No significant effects were found on any of the clinic laboratory tests  
- 2 subscales focusing on attention problems and aggression were statistically significant  
- Children receiving special classroom intervention had significantly higher levels of social skills and significantly fewer behavioral problems than children not receiving this intervention  
- Parent training produced no significant treatment effects, probably largely as a result of poor attendance |

| Berlin et al 1998 | To examine the effectiveness of early intervention               | **Design:**  
- Longitudinal randomized trial  
- Infant Health and Development Program  
- Home visiting  
- Extrafamilial education from 12 months for 20 hours per week  
- Parent groups  

**Inclusion:**  
- Low-birth-weight premature infants  

**Setting:**  
- 8 medical institutions between January 7, 1985, and October 9, 1985  

**Intervention:**  
- BCL  
- CBCL  
- HOME  
- ICQ  
At 24 and 36 months, intervention children’s mothers reported fewer behavior problems than mothers of follow-up children, measured by BCL and CBCL |
<table>
<thead>
<tr>
<th>Study</th>
<th>Objectives</th>
<th>Design</th>
<th>Intervention</th>
<th>Setting</th>
<th>Inclusion</th>
<th>Attrition</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Blair et al 2003</td>
<td>To examine maternal control strategy and child compliance as a function of early intervention</td>
<td>Longitudinal randomized trial</td>
<td>Infant Health and Development Program</td>
<td>8 medical institutions between January 7, 1985, and October 9, 1985</td>
<td>I: 377</td>
<td>BCL</td>
<td>Among children in the intervention group, consistent maternal guidance was related to lower externalizing and to lower internalizing.</td>
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<tr>
<td></td>
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<td></td>
<td>Low-birth-weight premature infants</td>
<td>C: 608</td>
<td>CBCL</td>
<td>HOME</td>
<td>ICQ</td>
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<tr>
<td>Brotman et al 2003</td>
<td>To review a pilot study testing a prevention program promoting families at risk</td>
<td>RCT</td>
<td>Combined Incredible Years with additional components, including: Home visit, Parenting groups, Child groups, Parent and child group activities</td>
<td>Home and clinic</td>
<td>I: 16</td>
<td>DSM-III-R</td>
<td>Children in intervention group showed decreases in externalizing behaviors over time, whereas control group showed increases; the effect ($\eta^2 = 1.41$) is considered large.</td>
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<td></td>
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<td>Children age 2.5-5 with older relatives with criminal record or with conduct disorder or ODD</td>
<td>C: 14</td>
<td>DPICS</td>
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<td>Attirition: 0%</td>
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<tr>
<td>Brotman et al 2005</td>
<td>To examine the potential beneficial effects of a family-based preventive intervention on the older siblings of targeted preschoolers at risk for conduct problems</td>
<td>RCT</td>
<td>22 weekly 90-minute concurrent groups for parents and preschoolers</td>
<td>Center- and home-based</td>
<td>I: 26</td>
<td>NYPRS</td>
<td>In all domains with significant interactions, there were intervention effects for adolescent siblings but not for school-age siblings.</td>
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<td>An additional 30 minutes of guided parent-preschooler interactions at the end of each group</td>
<td>C: 21</td>
<td>NYTRS</td>
<td>CPRS-R</td>
<td>CTRS-R</td>
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<td>10 biweekly home visits, and 5 booster sessions</td>
<td>Program elements for siblings</td>
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<td>Inclusion: All families in the trial with at least one older sibling (5-17 years old) living in the family</td>
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<td>Intervention: Incredible Years Series</td>
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<td>I: 50</td>
<td>PPI</td>
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<td>C: 49</td>
<td>Observation (OPPUS)</td>
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<td>Attraction: 25%</td>
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<td>The intervention yielded significant effects on negative parenting, parental stimulation for learning, and child social competence with peers.</td>
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<tr>
<td>Brotman et al 2005</td>
<td>To investigate the immediate impact of an 8-month center- and home-based prevention program for preschoolers at high risk for conduct problems</td>
<td>RCT</td>
<td>Incredible Years Series</td>
<td>Families were identified over a 5-year period from family court records of youths in Manhattan and the Bronx, NY, who had siblings under 5</td>
<td>I: 50</td>
<td>CBCL</td>
<td>Treatment parents reported significant reductions in child behavior problems, improved parenting practice</td>
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<td>I: 24</td>
<td>ECBI</td>
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<td>C: 23</td>
<td>HSQ</td>
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<td>5 months after treatment, teachers reported significant improvements in child behaviors</td>
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<td>Feinfield and Baker 2004</td>
<td>To evaluate the efficacy of a manualized multimodal treatment program for young externalizing children</td>
<td>RCT</td>
<td>Families of children with externalizing behavior problems, aged 4-8, not developmentally delayed</td>
<td>Families of children with externalizing behavior problems, aged 4-8, not developmentally delayed</td>
<td>I: 24</td>
<td>CBCL</td>
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(Continued)
### Electronic Table 4. (Continued)

**Family-Level Interventions**

<table>
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<tr>
<th>Authors</th>
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<th>Measures</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Greene et al 2004 | To examine the effectiveness of a cognitive-behavioral model of intervention of collaborative problem solving (CPS) | Design:  
- RCT  
- Intervention:  
  - I1: CPS: 7–16 sessions where therapists identified cognitive-behavioral therapy as their primary therapeutic orientation  
  - I2: Parent training (PT): 10-week behavior management program | Inclusion:  
- Affectively dysregulated children with ODD between 4 and 12, IQ > 80 | N1: 28  
N2: 19 | GAF score  
PCRI  
PSI  
ODD Rating Scale  
Clinical Global Impression | On the PCRI, the CPS condition produced significant improvement on both the Limit Setting subscale ($Z = 3.52, P < .01$) and the Communication subscale ($Z = 2.27, P < .05$)  
At 4-month follow-up, 80% of children in the CPS condition evidenced an excellent response to treatment, vs 44% of those in the PT condition |

| Webster-Stratton and Hammond 1997 | To examine different strategies | Design:  
- RCT  
- Intervention:  
  - Parent training (PT)  
  - Child training (CT)  
  - Parent and child training (PT + CT)  
  - Waiting list control group | Inclusion:  
- Children aged 4–8 with early-onset conduct problem | CT: 27  
PT: 26  
PT + CT: 22  
Comp: 22 | ECBI  
DSM-III | All treatment children showed significant improvements in problem solving and conflict management skills  
Favored the CT condition over the PT condition  
At home, PT and PT + CT parents and children had significantly more positive interactions, compared with CT parents and children  
At 1-year follow-up, all the significant changes noted immediately after treatment had been maintained over time  
PT + CT condition produced the most significant improvements in child behavior at 1-year follow-up |

### Community-Based Interventions

<table>
<thead>
<tr>
<th>Authors</th>
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<th>Population and Setting</th>
<th>N</th>
<th>Measures</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Conduct Problems Prevention Research Group 2004 | To examine the effects of the Fast Track program on children with early-onset conduct problems from first grade through high school | Design  
- RCT  
- Intervention:  
  - Fast Track (1 grade):  
  - Parent groups with home visiting  
  - Academic tutoring  
  - Social-skill training  
  - A universal intervention was delivered to everyone in the school | Setting:  
- Classrooms in primary schools  
- High-risk children screened from kindergarten | I: 445  
C: 446  
E: 10%  
C: NA | CPPRG  
PDR | Interventions have significant effects: odds ratio 0.66, 95% CI 0.61–0.70, for 3 outcomes respectively (social cognition and social competence problems, peer deviance, and home and community problems)  
Probability of having problems in the intervention group are 6 to 7 percentage points less than the control group for the 3 domains with significant effects (0.16 vs 0.23; 0.12 vs 0.18; 0.22 vs 0.29) |
Han et al 2005 To evaluate effects of a classroom-based social skills program for prekindergarten children

Design: RCT
Intervention:
- RECAP (Reaching Educators, Children, and Parents program:
  - Class program
  - Site-based teacher training
  - Group parent training

Setting: School
Inclusion:
- Children aged 4–5 years in 12 participating prekindergarten classrooms
Attrition: 10%

I: 83
C: 66

Significant treatment effects were found for teacher but not parent reports
Treatment group children improved significantly more than comparison group children in their teacher-rated social skills and internalizing and externalizing problems

Harrington et al 2007 To test the hypothesis that a community-based intervention by secondary child and adolescent mental health services would be significantly more effective and less costly than a hospital-based intervention

Design: RCT
Intervention:
- Parental education groups
  - Each service used its routine interventions for behavioral disorder for the age group being studied

Setting: Community vs hospital
Inclusion:
- Parents of 3–10-year-old children with behavioral disorders who had been referred to mental health services
Attrition: 18%

I1: 72
I2: 69

No significant differences between the community- and hospital-based groups on any of the outcome measures or on costs

Hutchings et al 2002 To compare a standard program to an intensive program

Design: Controlled trial
Intervention:
- Intensive program had home visit of average 25 hours
- Standard program had home visit of average 7 hours

Setting: Home
Inclusion:
- New referrals to mental health service, children aged 2–10, with ECBI in the top half of the clinical range

I: 22
C: 19

Child behavior improved significantly in both groups

King et al 1998 To evaluate the efficacy of a 4-week cognitive behavior treatment program for children who refuse to go to school

Design: RCT
Intervention:
- A 4-week program including:
  - (1) Individual child cognitive-behavior therapy
  - (2) Parent/teacher training

Setting: Home
Inclusion:
- Children aged 5–15 who met criteria for school refusal

I: 17
C: 17

Significant differences in self-reported were found after treatment between the 2 groups:
- Fear thermometer: P < .01
- Fear survey schedule for children II: P < .05
- R-CMAS: P < .01
- CDI: P < .05
- SEQSS: P < .01

No significant between-group differences in externalizing problems reported by parents
Teacher reports on the PKBS showed great improvements in both groups
Both parent and teachers’ reports found greater improvement in community treatment control group

McGoey et al 2005 To investigate a comprehensive multicomponent intervention on children at risk for ADHD

Design: RCT
Intervention:
- Early intervention:
  - School-based consultation
  - Parent training (12 weeks); 9 monthly booster sessions
  - If necessary, pharmacological treatment
  - Community treatment control

Setting: Home and school
Inclusion:
- Children aged 3–5 at risk for ADHD

I1: 30
I2: 27

Significant differences in self-reported were found after treatment between the 2 groups:
- Fear thermometer: P < .01
- Fear survey schedule for children II: P < .05
- R-CMAS: P < .01
- CDI: P < .05
- SEQSS: P < .01

No significant between-group differences in externalizing problems reported by parents
Teacher reports on the PKBS showed great improvements in both groups
Both parent and teachers’ reports found greater improvement in community treatment control group

(Continued)
<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N</th>
<th>Measures</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
</table>
| Nafpaktitis and Perlmutter 1998 | To investigate school-based early mental health intervention on at-risk children | **Design:** RCT  
**Intervention:** Four to twelve 30-minute individual play sessions | **Setting:** School  
**Inclusion:** At-risk children aged 5–10, enrolled in 2 rural elementary schools in central CA | I: 20  
C: 20 | T-CRS | The group difference was significant $F_{7,28} = 2.95$, $P < .05$ |
| Owens et al 2005        | To assess the effectiveness of Youth Experiencing Success in School (YESS) program on children with ADHD | **Design:** RCT  
**Intervention:** YESS  
Behavioral parent sessions  
Teacher consultation  
Coordination of care  
Individual child sessions with clinicians | **Setting:** Elementary schools in rural OH  
**Inclusion:** Children (1–6 grade) showing ADHD symptoms | I: 30  
C: 12 | DBD  
IRS  
CBCL | Based on parent-rated symptoms, treatment group, compared with the those on waiting list, had significant improvement in oppositional and defiant behaviors, peer relations, and aggression  
Based on teacher-rated symptoms, treatment group had significant improvement in inattention, teacher relations, academics, self-esteem, overall IRS score, attention, and DSM ADD |
| Waschbusch et al 2005   | To evaluate 3 distinct but overlapping approaches to delivering a behavioral school-based intervention on children disruptive behaviors | **Design:** RCT  
**Intervention:** SW: Focused on factors in the child’s school, consisting of both universal and targeted service  
TS: Used a targeted service focused on factors in school  
TH: Used a targeted service focused on both school and home factors | **Setting:** School and home  
**Inclusion:** Students from elementary schools aged 5–12 | SW: 26  
TS: 27  
TH: 24  
C: 29 | DSM-IV  
CIRS  
STR | Results showed that the behavior of disruptive children in all schools improved during the course of the year, with some evidence that interventions provided complementary effects |
| Webster-Stratton 1998   | 2 types of parenting programs with Head Start mothers were compared | **Design:** RCT  
**Intervention:** I: Experiment group (Incredible Years)  
Weekly parent group meetings (8–16 parents for 2 hours once a week)  
Groups viewed videotapes of modeled parenting skills  
Group leaders led a focused group discussion of the parent-child interactions  
Teacher training workshops  
I2: regular Head Start curriculum  
**Inclusion:** Children in Head Start program who are at risk for developing problems | **Setting:** Head Start centers  
**Intervention:** Children in Head Start program who are at risk for developing problems | I1: 296  
I2: 130 | CES-D  
CBCL  
ECBI  
DPICS-R  
CII | Short term: The intervention children significantly ($P < .01$) increased in positive behaviors at both home and schools from pre- to post-assessment, whereas the control children remained unchanged  
Long term (12–18 months): Pattern of change across the 3 time points in the mothers’ perceptions of child adjustment was not significantly different for the intervention and control groups |
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Intervention</th>
<th>Setting</th>
<th>Inclusion</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Webster-Stratton et al 2001</td>
<td><em>Design:</em> RCT</td>
<td><em>Intervention:</em> 12-week parent group meetings, viewed videotapes, discussion</td>
<td><em>Setting:</em> Head Start centers</td>
<td><em>Inclusion:</em> Children in the Head Start program at risk for developing problems</td>
<td>Short term: Analyses of the children of intervention attenders compared with the control children revealed significant intervention effects at home, $F_{1,171} = 4.47, P &lt; .05$, and at school $F_{1,32} = 4.63, P &lt; .04$</td>
</tr>
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<td><em>Intervention:</em> Incredible Years</td>
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<td>Long term (1 year): 80% of the experimental children were below at-risk cutoff (&lt;9 problems per 30 minutes) for conduct problems at home</td>
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<td><em>Inclusion:</em> Family-based</td>
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<td><em>Setting:</em> Community-based</td>
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<td></td>
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<td></td>
<td><em>Intervention:</em> Medication, Behavioral treatment (B), Combined medication and behavioral treatment (CT)</td>
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<td></td>
<td><em>Inclusion:</em> Children aged 7–9.9 years with ADHD combined type</td>
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<td>After the 6-month intervention, all treatments resulted in significantly fewer conduct problems with mothers, teachers, and peers compared with controls</td>
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<td>Children in the CT and M groups showed significantly greater improvement than those in the intensive B and CC groups</td>
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<td>Medical management treatment, although not as effective as combined medical management and behavioral treatment, is likely to be more cost-effective in routine treatment for children with ADHD, particularly those without comorbid disorders</td>
</tr>
</tbody>
</table>

*Continued*
### Electronic Table 4. (Continued)

#### System-Level

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Question</th>
<th>Intervention</th>
<th>Population and Setting</th>
<th>N/Attrition</th>
<th>Measures</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huston et al 2005</td>
<td>To review the long-term impacts of New Hope on children’s outcomes</td>
<td>Design: RCT</td>
<td>Community</td>
<td>840</td>
<td>Positive Behavior Scale</td>
<td>Parents of children in New Hope families rated them higher on positive social behavior than did parents of control children, but there were no program effects on parent ratings of problem behaviors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intervention:</td>
<td>Inclusion: New Hope: provided 3 financial benefits</td>
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<td>Problem Behavior Scale from the SSRS</td>
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<td>Families had 1 or more children between the ages of 13 months and 10 years 11 months</td>
<td>5-Year Attrition:</td>
<td>Loneliness and Social Dissatisfaction Questionnaire</td>
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<tr>
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<td>I: 23%</td>
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<td>C: 27%</td>
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<td></td>
<td>Positive Behavior Scale</td>
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<td>Problem Behavior Scale from the SSRS</td>
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<td></td>
<td>Loneliness and Social Dissatisfaction Questionnaire</td>
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<td></td>
<td>Parents of children in New Hope families rated them higher on positive social behavior than did parents of control children, but there were no program effects on parent ratings of problem behaviors.</td>
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<td></td>
<td>Teachers rated New Hope boys significantly higher on positive social behavior than they did control boys. They rated New Hope girls significantly higher than controls on internalizing problems.</td>
<td></td>
</tr>
</tbody>
</table>

#### Economic Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Question</th>
<th>Perspective</th>
<th>Study Type and Design</th>
<th>Population and Setting</th>
<th>Outcomes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currie and Stabile 2004</td>
<td>To estimate effects of ADHD</td>
<td>Societal</td>
<td>Using data from Canadian National Longitudinal Survey of Children and Youth and American National Longitudinal Survey of Youth</td>
<td>Children with ADHD in USA and Canada</td>
<td>ADHD symptoms increase the probability of future grade repetition and special education and reduce future reading and mathematics test scores.</td>
</tr>
<tr>
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<td>A score at the 90th percentile of the distribution of a hyperactivity score based on symptoms increases the probability of grade repetition by 6% in Canada and by 7% in the USA.</td>
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<td>Income has little effect on the probability of treatment.</td>
</tr>
<tr>
<td>Dretzke et al 2005</td>
<td>Effectiveness and cost-effectiveness of parent training/ education program for the treatment of child conduct disorder</td>
<td>Cost-effectiveness</td>
<td>Child with conduct disorder</td>
<td></td>
<td>No significant difference in either effectiveness or costs between the community- and hospital-based group parental education programs.</td>
</tr>
<tr>
<td>Study</td>
<td>Objective</td>
<td>Type</td>
<td>Control</td>
<td>Target Population</td>
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<tr>
<td>Jensen et al 2005</td>
<td>The only study on cost-effectiveness of major ADHD treatments</td>
<td>Cost-effectiveness</td>
<td>National Institute of Mental Health’s (NIMH) Multimodal Treatment Study of Children with ADHD (MTA study)</td>
<td>Children with ADHD</td>
<td></td>
</tr>
<tr>
<td>McAuley et al 2004</td>
<td>To evaluate the effectiveness of Home-Start support</td>
<td>Cost-effectiveness</td>
<td>UK Home-Start program</td>
<td>Children from disadvantaged backgrounds</td>
<td></td>
</tr>
<tr>
<td>Muntz et al 2001</td>
<td>To compare a standard and an intensive parent-child interaction training program</td>
<td>Cost-effectiveness</td>
<td>6-month RCT</td>
<td>Child with severe behavior problems</td>
<td></td>
</tr>
<tr>
<td>Romeo et al 2006</td>
<td>To identify the costs incurred by children with antisocial behaviors in UK</td>
<td>Cost of care</td>
<td>Using the Client Service Receipt Inventory for Childhood</td>
<td>Child (3–8 years old) referred to mental health services</td>
<td></td>
</tr>
<tr>
<td>Scott et al 2001</td>
<td>Estimate effects of treating antisocial behaviors</td>
<td>Societal</td>
<td>Costs applied to data of 10-year-old children from the inner London longitudinal study selectively followed to adulthood</td>
<td>Child with conduct disorders</td>
<td></td>
</tr>
<tr>
<td>Thompson et al 1996</td>
<td>Investigated the costs and outcomes of a reduced version of the Common Sense Parenting program, with approximately 30 hours of staff time to serve 10 families</td>
<td>Cost-effectiveness</td>
<td>3-month follow-up control-trial comparison</td>
<td>90 families referred to Common Sense Parenting</td>
<td></td>
</tr>
</tbody>
</table>

- They reported during 14 months of treatment, medical management cost $1180 (in 2000 dollars) per group, intensive behavior treatment cost $6988, combined medical management and behavior treatment cost $7827, and routine community care cost $1071.
- Combining with effectiveness of each treatment, they concluded management treatment, although not as effective as combined medical management and behavior treatment, was likely to be more cost effective in routine treatment for children with ADHD, especially those without comorbid disorders.
- On average, families supported by Home-Start cost £3058 more than comparison group families.
- When considering volunteer time, the average cost of intervention was £8831 higher than comparison group.
- After considering the effectiveness, they concluded Home-Start did not appear to be a cost-effective alternative to standard health visitor-based services.
- The study suggested that treatment using videotaped recordings of parent-child interactions may be more cost-effective than the standard parent-training programs.
- Mean annual total cost was £5960, ranging £48–£19 940.
- The greatest cost burden of £4637 was borne by the family.
- Cost was £571 per child.
- Cost-effectiveness: £540 per standard deviation improvement in antisocial behaviors.
- Cost-benefit: children with conduct disorder would cost public services approximately £75 000.
- Cost about $70 (in 1996 prices) per family.
- They found parents who completed this program reported more improvement in externalizing, but not in internalizing, child problems than untreated controls, and the treatment effects were maintained at 3-month follow-up.