Review

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

Academic Pediatrics 2009;9:142–9

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 Barker[2] 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-gene 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

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Received for publication April 18, 2008; accepted December 26, 2008.

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: SYNOPSES 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.[3] Prenatal exposure to cigarette smoking is associated with many risks, including preterm delivery, low birth weight,[4] sudden infant death syndrome,[5] and attention-deficit/hyperactivity disorder.[6] ETS exposure among young children can lead to respiratory symptoms and infections, more frequent and severe asthma attacks, allergies, and ear infections.[7]

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.[8] In addition, the cost to treat childhood illnesses caused by parental smoking has been estimated at $7.9 billion per year.[9] 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

Table Examples of Reviewed Interventions*

Health Problem	Intervention Level			
	Individual	Family	Community/Neighborhood School	Society/Policy
Tobacco exposure	• Smoking cessation intervention for pregnant women	• Smoking cessation for pregnant women with partner support • Smoking cessation for adults living with children	• Bans/restrictions in workplaces and public	• Increasing the price of tobacco products and enforcing age bans
Obesity	• Exercise program • Dietary and physical activity • Reducing TV watching	• Obesity prevention education home visits	• Healthier food served in preschools	
Unintentional injury		• Prenatal home visitation • Home visits that assess risks and provide education	• Community education combined with giving incentives for road safety • Primary care–based education • Smoke detector distribution	• Changes in baby walker safety standards • Child passenger safety laws
Mental health	• Child-focused skills training • Parenting skills training programs	• Parent- and child-interaction training programs • Collaborative parent problem solving • Supportive consultation programs	• Preschool-based programs including academic tutoring, teacher training	• Employer-based work support through extensive child care assistance and health care subsidies

*Refer to text and the Evidence Table for each program's references.

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 study[15] 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%.[32,33] Children and youth from certain ethnic minority groups have an even higher obesity rate. Both prepregnancy maternal weight[34] and gestational weight gain[35] 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 uninformed 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.[36]

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.[37] Furthermore, an estimated 50% to 80% of obese children and adolescents stay overweight in adulthood.[38]

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.[39] The psychosocial consequences include low self-esteem, social alienation, discrimination, lower self-reported quality of life, and depression.[40] It is projected that pediatric obesity might shorten life expectancy by 2 to 5 years by midcentury in the United States.[41]

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.[42]

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).[43] 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.[44] 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.[45]

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."[46] A recent systematic review[47] of interventions for preschooler obesity identified only 5 interventions that target preschool children; two[48,49] 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.[50]

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.[51,52] The annual cost of treating children ages 1 to 5 nationwide was estimated at $864 million in 2006 dollars.[53] 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.[54]

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.[55] As such, mental health problems are found to have a large negative effect on other outcomes, such as educational attainment,[56] unemployment,[57] and violent crimes committed.[58]

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.[59] In short-term studies, effect sizes vary from small to

moderate; but very few studies document the long-term effects of these approaches.[60]

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 Hammond[65]—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 limited to small-scale clinical interventions in the case of mental health and 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 socioeconomic, 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.[71]

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.[72] 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.

ACKNOWLEDGMENTS

This study was funded by both the Partnership for America's Economic Success and the Zanvyl and Isabelle Krieger Fund. We appreciate reviews from Susan Bales and Beth Hare, and support from Sara Watson, Elaine Weiss, and Lauren Zerbe. No potential conflicts of interest and corporate sponsors are reported.

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Electronic Table 1. Studies on Tobacco Use

Tobacco Use Prevention and Cessation—Economic Studies					
Study	Study Question	Perspective	Study Type and Design	Population and Setting	Results/ Comments
Adams et al 1997 Cost: 1987 and 1995	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	Societal	• Cost estimate • Analysis of 1987 National Medical Expenditures Survey data • Cost estimates based on amounts paid by all insurers and by persons paying out-of-pocket for health care • The probability of pregnancy complications and expected expenditures were estimated based on sociodemographic factors, receipt and timing of prenatal care, and smoking status	Civilian, noninstitutionalized US population	• 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) • 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%
Aligne and Stoddard 1997 Cost: 1993	To determine the economic influence of pediatric disease attributable to parental smoking	Payer	Cost estimate	*Setting:* • US population *Inclusion:* • Neonate to 18 years old	*Total Costs:* • Direct medical: $4.6 billion; loss of life: $8 billion *Cost Attributable to Low Birth Weight:* • Direct medical: $1.2 billion; loss of life: $3.7 billion *Cost Attributable to Sudden Infant Death Syndrome:* • Loss of life: $2.7 billion *Cost Attributable to Respiratory Syncytial Virus:* • Direct medical: $130 million; loss of life: $1.5 billion *Cost Attributable to Otitis Media:* • Direct medical: $150 million *Cost Attributable to Otitis Media With Effusion:* • Direct medical: $290 million *Cost Attributable to Asthma:* • Direct medical: $180 million; loss of life: $19 million *Cost Attributable to Burns:* • Direct medical: $24 billion; loss of life: $330 million

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Electronic Table 1. (*Continued*)

Tobacco Use Prevention and Cessation—Economic Studies

Study	Study Question	Perspective	Study Type and Design	Population and Setting	Results/ Comments
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

DiFranza et al 2001	To estimate the cost-effectiveness of active enforcement of tobacco sales to minors on a national level	Societal	The intervention included employing minors to attempt tobacco purchases, licensing tobacco vendors, and civil penalties for vendors who illegally sold tobacco products to minors; analyses were based on enforcement costs of $50, $150, $250, and $350, where marginal expense is lowest at the community level and highest at the federal level	USA	• 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 • 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
Fiore et al 2000 Cost: various	To identify effective, experimentally validated tobacco dependence treatments and practices	Societal	Review of evidence on cost-effectiveness of smoking cessation interventions	Various	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 "gold standard" 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
Lightwood et al 1999 Cost: 1995	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	Societal	Simulations using data on neonatal costs per live birth; outcome measures were mean US excess direct medical cost per live birth, total excess direct medical cost, reductions in low birth weight, and savings in medical costs from an annual 1 percentage point drop in smoking prevalence among pregnant women	USA	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

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Tobacco Use Prevention and Cessation—Economic Studies

Study	Study Question	Perspective	Study Type and Design	Population and Setting	Results/ Comments
Windsor 2003 Cost: 2002	To estimate the projected cost benefit of maternal smoking cessation	Societal	• Meta-analysis • Cost-benefit analysis	USA, Norway, Canada, Sweden	• 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

Tobacco Interventions—Preconception and Prenatal Periods

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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 Fresh-Start 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% Partners quitting at 30 weeks' gestation: (a) 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

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Tobacco Interventions—Preconception and Prenatal Periods

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Coleman et al 2007	To determine whether nicotine replacement therapy is effective, cost-effective, and safe when used for smoking cessation by pregnant women	*Design:* • RCT *Intervention:* • Women received either nicotine or placebo transdermal patches with behavioral support	*Setting:* • UK *Inclusion:* • Pregnant women attending antenatal care at 12–24 weeks pregnant	1050	NA	• 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 • Results not yet available because recruitment will begin in 2007
DiClemente et al 2000	To review the literature regarding the process of smoking cessation in the context of pregnancy and the postpartum periods	Review of epidemiological data, extant reviews of the literature, and current original research reports	Not specified	Not specified	NA	• Understanding obstacles and pathways for pregnancy and postpartum smoking cessation can guide implementation of effective existing programs and development of new ones • Recommendations include promoting cessation before and at the beginning of pregnancy, increasing delivery of treatment early in pregnancy, helping spontaneous and intervention-

						assisted quitters to remain tobacco-free after giving birth, aiding late pregnancy smokers, and involving the partner of the woman smoker
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	*Design:* • RCT *Intervention:* • A theory-based 3-pronged approach: positive incentives, "bolstered" social supports, and community participation • 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	220	*Treatment:* • 32% at 8 months' gestation and 36% at 2 months postpartum *Control:* • 51.5% at 8 months' gestation and 52% at 2 months postpartum	Significant differences existed between treatment and control groups in percentages of smokers who were biochemically confirmed as quit at 8 months' gestation $\div 2 = 18.4$ ($P < 0.0001$), and also at 2 months postpartum $\div 2 = 11.0$ ($P < .0009$)
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	*Design:* • RCT *Intervention:* • 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	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	242	6% of treatment group and 8% of control group	• 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

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Tobacco Interventions—Preconception and Prenatal Periods

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Fang 2004	To review existing research, current strategies, and directions for future research on smoking cessation relapse and relapse prevention in pregnancy and postpartum	Medline/PubMed search in 2002 and 2003 for articles containing the keywords "smoking," "pregnancy," "cessation," and "cessation relapse prevention" and references of retrieved papers yielded a review of >500 articles	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)	14 studies	NA	• 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 • 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
Fiore et al 2000	To identify effective, experimentally validated tobacco dependence treatments and practices	Review	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	7 studies	NA	• A "usual care" intervention with pregnant smokers typically consists of a recommendation to stop smoking, often supplemented by provision of

			pregnant women. Studies that had follow-up time points of <5 months were included because of the desire for preparturition data. For the meta-analysis, either minimal interventions (<3 minutes) or interventions labeled as "usual care" constituted the reference condition			self-help material or referral to a stop-smoking program. Extended or augmented psychosocial interventions typically involve these treatment components as well as more intensive counseling than minimal advice • An augmented smoking cessation intervention is 2.8 times as likely (95% CI 2.2%–3.7%) to result in a pregnant women quitting than usual care
Lawrence et al 2005	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 the 3 trial 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	918	393 lost	• Outcomes were 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 • 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

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Electronic Table 1. (*Continued*)

Tobacco Interventions—Preconception and Prenatal Periods

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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:* • No setting specified *Inclusion:* • Randomized and quasi-randomized of smoking cessation programs implemented during pregnancy	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, still-births, and perinatal or neonatal mortality
Melvin et al 2000	To review the evidence base underlying recommended cessation counseling for pregnant women who smoke	*Design:* • Review of literature reviews and meta-analyses	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	Studies were international, with diverse candidate	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	predictors, 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

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Electronic Table 1. (*Continued*)

Tobacco Interventions—Preconception and Prenatal Periods

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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

		smoking cessation options				participants, which may have biased the population • 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
Tappin et al 2005	To determine whether motivational interviewing helps pregnant smokers quit	*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 ≤24 weeks' gestation	• I: 351 • C: 411	• I: 4% • C: 3%	
US Department of Health and Human Services 2001	To review the evidence for effectiveness of smoking prevention and cessation programs among pregnant and postpartum women	Literature review	Various	Various	NA	• 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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Electronic Table 1. (*Continued*)

Tobacco Interventions—Preconception and Prenatal Periods

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Van't Hof et al 2000	To examine the effectiveness of a provider-delivered smoking-relapse prevention strategy	*Design:* • RCT *Intervention:* • Smoking history obtained at delivery, and transmission of the history to infant's care provider	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	287 (I: 141; C: 146)	• I: 133 • C: 144	• 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 • 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
Wahlgren et al 1997	To examine the long-term maintenance of a previously reported behavioral counseling intervention to reduce asthmatic children's exposure to environmental tobacco smoke (ETS)	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	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	91 families	67 families	• 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

						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

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Electronic Table 1. (*Continued*)

Tobacco Interventions—Preconception and Prenatal Periods

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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 *Intervention:* • 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 *Intervention:* • 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 tip sheet	*Population:* • Pregnant smokers who entered prenatal care before 7 months *Setting:* • 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)

Tobacco Interventions—Smoking Among Parents and Other Caregivers

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Abdullah et al 2005	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	Participants were randomly allocated into 2 groups: the interventiongroup 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	• Hong Kong Special Administrative Region, PR China • Smoking fathers and mothers of Chinese children aged 5 years	952(I: 467; C: 485)	49 lost by end of study	*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) ($P < .001$). 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
Emmons et al 2001	To determine whether a motivational intervention for smoking parents of young children will lead to reduced household passive smoke exposure	*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 CO_2 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	5291	*MI:* • 26 nonresponders at 6 months' follow-up *SH:* • 18 nonresponders at 6 months' follow-up	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

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Tobacco Interventions—Smoking Among Parents and Other Caregivers						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Hovell et al 2002	To test the efficacy of coaching to reduce ETS exposure among asthmatic Latino children	*Design:* • RCT *Intervention:* • After asthma management education, families assigned to no additional service or to coaching for ETS exposure reduction (approximately 1.5 hours of asthma management education and 7 coaching sessions (45 minutes each) to reduce ETS exposure)	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 *Intervention:* • Mothers given 7 counseling sessions over 3 months	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 all smokers (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	Searched Tobacco Addiction Group studies, Medline, EMBASE, bibliographies, plus other databases and specialists	*Setting:* • Community, school, or family setting *Inclusion:* • Studies addressing parent, family member, child care workers or teachers • All studies including smoking cessation, effect of legislation, smoke free policies, and other health promotion included	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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Electronic Table 1. (*Continued*)

Tobacco Interventions—Smoking Among Parents and Other Caregivers

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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	Not stated	NA	• 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 *Intervention:* • 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	20%	• 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	*Setting:* • Schools in the Jiangan district of Hangzhou from May 1989 through January 1990	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

Tobacco Interventions—Smoking Among Youth

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Colby et al 2005	To evaluate the efficacy of motivational interviewing (MI) encouraging teens to quit smoking	*Design* • RCT *Intervention* • Control: Standard care of brief advice (BA) • Intervention: MI with 1 week booster contact • Follow-up appointments at 1, 3, and 6 months	*Setting:* • Emergency department and adolescent health clinic in the northeast USA *Inclusion:* • Aged 12–19 and reported smoking in previous 30 days	• I: 43 • C: 42	• I: 20% • C: 20%	*Results:* • 3 month quit rates: no different between groups • 6 month quit rates: MI = 23%, n = 8; BA = 3%, n = 1 • Results support that MI may be effective in a medical setting • High attrition rates made results difficult to interpret
Dalton et al 2003	To ascertain whether exposure to smoking in movies predicts smoking initiation	*Design:* • Prospective *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 recontacted 13–26 months later to determine whether they had initiated smoking	*Setting:* • 14 schools in VT and NH *Inclusion:* • Adolescents (aged 10–14 years) who reported in a baseline survey that they had never tried smoking	3547	2603 (73% of original sample)	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
Grimshaw and Stanton 2006	To evaluate the effectiveness of strategies that help young people stop smoking	Searched CENTRAL, Cochrane Tobacco Addiction Group, Medline, EMBSE, PsychINFO, ERIC, CINAHL, and bibliographies	*Setting:* • All levels including individual, organizational, or community *Inclusion:* • Randomized controlled trials, cluster-randomized trials, and controlled trials • Primary outcome measure was smoking status at 6 months	15 studies	NA	• Pooled results of trials based on TTM achieved moderate long-term success • TTM pooled OR at 1 year: 1.7, 95% CI 1.25–2.33 • TTM pooled OR at 2 years: 1.38, 95% CI 0.99–1.92 • Pharmacological interventions did not result in statistically significant results • Cognitive behavior interventions did not achieve statistical success • 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

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Electronic Table 1. (*Continued*)

Tobacco Interventions—Smoking Among Youth

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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, over sampling 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%

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Electronic Table 1. (*Continued*)

Tobacco Interventions—Smoking Among Youth						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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) Guia smoking cessation guide + individually timed educational messages (ITEMs) • (2) Guia + ITEMs + mood management • Participants followed up at 1, 3, 6, and 12 months	*Setting:* • Participants recruited via press releases, search engine links, e-mail messages, announcements on health information sites *Inclusion:* • 18 years of age • Planning to quit smoking in next 3 months • Using Internet weekly	• English intervention, 280 Spanish intervention, 288	• English 65% • Spanish 39%	• Among English speakers, Guia + 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	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	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	102	NA	• 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	• I: 49 • C: 49	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	• I: 852 • C: 853	• I: 30% • C: 21%	• 6-week risk of quitting: RR 2.2 (95% CI 1.70–2.70; $P < .001$) • 12-week risk of quitting: RR 1.3 (95% CI 1.3–1.84; $P < .001$) • 26-week risk of quitting: RR 1.07 (95% CI 0.91–1.26; $P = .04$) • At 12 and 26 weeks, percentage of quitting in control group increased (18.8% and 23.7%, respectively) • 20.8% of those reporting not smoking at 6 weeks failed oral cotinine test • Approximately one-third of each group was aged 16–19—may be an effective strategy for youth
Slater et al 2006	To test the impact of an in-schoolmediated communication campaign, in combinationwith a participatory, community-based mediaeffort, 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	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

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Electronic Table 1. (*Continued*)

Tobacco Interventions—Smoking Among Youth

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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	• A comparison of intervention theories revealed that motivation enhancement (19%) and contingency-based reinforcement (16%) programs showed higher quit rates than the overall intervention cessation mean. Classroom-based programs showed the highest quit rates (17%). Computer-based (expert system) programs also showed promise (13% quit rate), as did school-based clinics (12%) • These data suggest that use of adolescent tobacco use cessation interventions double quit rates on average. In 17 self-initiated quitting survey studies, key predictors of quitting were living in a social milieu that is composed of fewer smokers, less pharmacological or psychological dependence on smoking, anti-tobacco beliefs (eg, that society should step in to place controls on smoking), and feeling relatively hopeful about life. Key variables relevant to the quitting process may include structuring the context of programming for youth, motivating quit attempts and reducing ambivalence about quitting, and making programming as enjoyable as possible. There also is a need to help youth to sustain a quit attempt. In this regard, one could provide ongoing support during the acute withdrawal period and teach youth social/life skills
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

Electronic Table 2. Studies on Obesity

Obesity Prevention—Economic Studies					
Study	Study Question	Perspective	Study Type and Design	Population and Setting	Results/ Comments
Colditz 1999 Cost: 1995	To assess the economic cost of inactivity and obesity	Societal	• Review of Medline for studies reporting cost of obesity, inactivity, or cost of illness • Calculated population-attributable risk for diseases related to obesity	USA	• 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) • Direct medical costs related to obesity total $70 billion (7% of US health care costs) • Indirect costs associated with obesity total $48 billion
Hampl et al 2007 Cost: 2003	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	Primary care clinic within an urban hospital setting	Retrospective study using claims data from a large pediatric integrated delivery system in an urban academic children's hospital	US children aged 5–18 years	• Of 8404 patients, 17.8% were overweight and 21.9% were obese. Of the obese children, 42.9% had a diagnosis of obesity • 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 • Health care expenditures were significantly higher for children with diagnosed obesity (adjusted mean difference, $172; 95% CI, $138–$206) vs the healthy-weight group • 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)
Finkelstein et al 2005	To review causes and consequences of obesity	NA	Review of published literature (search terms include BMI [body-mass index], obesity, and other economic indicators)	USA	• Obesity accounts for 5% of health expenditures among business- and employer-sponsored health plans • Medicare pays for ∼50% of all obesity-attributable costs • Obese individuals are more likely to experience absenteeism, costing employers $2.4 billion • Total (direct and indirect) costs of obesity are as high as $139 billion per year

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 $2.4 billion on paid sick leave *Comments:* • Obesity data are from 1993, most likely underestimating the current costs • Many obesity expenditures occur after age 65 • Does not account for expenditures of uninsured
Wang et al 2003 Cost: 1996	To assess the cost effectiveness and cost-benefit of a school-based obesity prevention program	Societal	• Initial study, randomized, controlled trial (RCT) • Cost-effectiveness analysis/ cost-benefit (CEA/CB) • Examined cases of adult overweight prevented (medical and lost productivity), quality adjusted life year (QALYs), and cost of program	10 middle schools in the Boston, MA, area over 2 years (310 girls, 331 boys)	• For girls, OR of obesity in intervention schools vs control = 0.47 ($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

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Electronic Table 2. (*Continued*)

Obesity Prevention—Review Articles					
Study	Study Question	Perspective	Study Type and Design	Population and Setting	Results/ Comments
Budd and Volpe 2006	To provide an overview of school-based RCTs intended to prevent increases in BMI	Searched Medline, CINAHL, PsychINFO, and Cochrane using obesity, prevention, child, weight management	*Setting:* • School-based *Inclusion:* • RCTs with BMI for age and sex as an outcome • Published between 1985–2004 • US elementary, middle, and high schools • Published in peer-reviewed journal	12 studies	• Successful interventions more likely to target older children • Use of a multicomponent, comprehensive, and detailed nutrition and physical activity curricula for students in higher grades can contribute to program success • The positive effects of small and brief RCTs might change if longer follow-up periods occurred • 4 successful RCTs used behavior change curriculum (including self-monitoring, goal setting, and cognitive restructuring) • 2 programs had significant effects only on girls • For older students, classroom instruction and physical education (PE) can promote moderate to vigorous physical activity both in and out of school, especially for girls • Younger students can benefit from behavior change programs that reduce sedentary behavior
Doak et al 2006	To identify aspects of successful childhood overweight prevention programs	Medline, personal contacts with researchers, Internet Web searches, references from published reviews, and additional Medline searches of authors with ongoing intervention studies	*Setting:* • School-based *Inclusion:* • Up to August 2005 • Children ages 6–19 years • Anthropometric measurements at baseline and follow-up • Intervention for diet, physical activity, or both • Documentation of monitoring and evaluation	25 studies	17 of the 25 studies were "effective" on the basis of a statistically significant reduction in BMI or skin-fold measures for the intervention group. Four interventions were effective by BMI as well as skin-fold measures. Of these, 2 targeted reductions in television viewing. The remaining 2 studies targeted direct physical activity intervention through the PE program combined with nutrition education. Of all the interventions reported, one was effective in reducing childhood overweight but was also associated with an increase in underweight prevalence
Flodmark et al 2006	To review medical interventions aimed at preventing obesity during childhood and adolescence	Searched PubMed, Cochrane Library, NHSEED, PubMed databases, reference lists of relevant articles, other review articles	*Setting:* • Various *Inclusion:* • 2001 to May 2004 prevention studies with controls, follow-up at least 12 months, description of percentage of overweight subjects, BMI or skin-fold thickness as outcomes, general population	39 studies	Fifteen studies reported that prevention had a statistically significant positive effect on obesity, 24 reported neutral results, and none reported a negative result (sign test; $P = .0078$). Adding the studies included in 5 other systematic reviews yielded in total 15 studies with positive, 24 with neutral, and 0 with negative results. Thus, 41% of the studies, including 40% of the children studied, showed a positive effect from prevention

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
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
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	• 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

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Electronic Table 2. (*Continued*)

Obesity Prevention—Review Articles					
Study	Study Question	Perspective	Study Type and Design	Population and Setting	Results/ Comments
Katz et al 2005	To review school- or work-based programs to control overweight and obesity	• Searched electronic databases • Hand search of reference lists, Cochrane reviews, and reports	*Setting:* • School- or work-based programs *Inclusion:* • Interventions related to diet, physical activity, or both • 1966–2001 • Common weight measure used • Followed for at least 6 months	10 school-based programs, 20 work-based programs, 7 used for comparison	*School Based:* • Evidence was insufficient to determine whether school based programs are successful • 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 *Work Based:* • Programs that use both diet and exercise were effective in the workplace—each component alone was not effective • Cost to engage 1% of at-risk population is <$1
Sharma 2006	To review population-based interventions for preventing childhood obesity carried out in school settings	Searched CINAHL, ERIC, Medline	*Setting:* • School-based • US and UK *Inclusion:* • 1999–2004 • Kindergarten through high school • Focus on general (not just overweight) children and adolescents	11 programs	• Most interventions focused on short-term changes right after the intervention • Interventions resulted in modest changes in behaviors and mixed results with indicators of obesity • TV watching seems to be the most modifiable behavior, followed by physical activity and nutrition behaviors • Most programs had multiple components, so it was not possible to say which components worked and to what extent • Outcome measures such as BMI, triceps skinfold thickness, and waist circumference not measured by all studies included in this review
Snethen 2006	To conduct a meta-analysis of intervention studies designed to reduce overweight/obesity, and improve activity and nutrition	Searched multiple databases using obesity, children, intervention, weight loss, exercise, nutrition, and dietary	*Setting:* • Various *Inclusion:* • Studies between 1980 and 2002 focusing specifically on overweight children (not general population) • N > 7 • Mean age no older than 12 • Intervention focused on weight loss	7 studies	Results (reported by outcomes): • 4 outcomes had small effect sizes • 4 outcomes were medium • 7 outcomes from 4 studies had large effect sizes ($P = .00$) • Longer interventions tended to have better results • Effective programs exist, but it's not clear which programs are the most effective • No maintenance studies were found

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)	*Setting:* • Various *Inclusion:* • 1980–October 2005; outcome: proxy measure of body fat; RCTs; active interventions not focused on weight gain prevention; trials with relevant comparison group; trials targeting children and adolescents	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	*Setting:* • Various *Inclusion:* • 1990–2005 • RCTs with a minimum duration of 12 weeks • Outcomes included weight and height, percentage fat content, BMI, ponderal index, skin-fold thickness	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	*Setting:* • Not specified *Inclusion:* • 1985–July 2001 • Included studies with lifestyle interventions • RCTs with 6 months' observation • Age <18 years • Primary outcome height and weight or weight measurement	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

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Electronic Table 2. (*Continued*)

Obesity Prevention—Review Articles

Study	Study Question	Perspective	Study Type and Design	Population and Setting	Results/ Comments
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	Cochrane, Medline, PsychINFO, DARE, and CINAHL	*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

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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

Carrel et al 2005	To determine whether a school-based fitness program can improve body composition, cardiovascular fitness level, and insulin sensitivity in overweight children	*Design:* • RCT *Intervention:* • Lifestyle-focused, fitness-oriented gym classes (treatment group) or standard gym classes (control group) for 9 months	*Setting:* • Rural middle school and an academic children's hospital *Inclusion:* • Overweight children with a BMI above 95th percentile for age	50	None	• Baseline test results for cardiovascular fitness, body composition, and fasting insulin and glucose levels • Treatment group demonstrated a significantly greater loss of body fat, greater increase in cardiovascular fitness, and greater improvement in fasting insulin level
Coleman et al 2005	To assess the impact of Child and Adolescent Trial for Cardiovascular Health (CATCH)	*Design:* • Quasi-experimental matched controlled design with pretest/post test *Intervention:* • CATCH training for PE teachers, food services staff, and home room teachers; gym equipment purchased	*Setting:* • Schools located in the El Paso, TX, school district *Inclusion:* • Third-grade children with permission from parents	• I: 723 • C: 473	Overall, by fourth grade 9%, by fifth grade 27%	• 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) • Percentage of overweight in girls did not vary between intervention and control throughout intervention • Percentage of overweight increased among boys in both CATCH and control arms • Results of physical fitness inconclusive, and no results from cafeteria changes
Donnelly et al 1996	To attenuate obesity and improve physical and metabolic fitness in elementary school children	*Design:* • 2-year cohort *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	*Setting:* • 2 school districts in rural NE *Inclusion:* • Cohorts from grades 3 to 5	108	Not indicated in abstract available on the Web	• 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 ($P < .05$), but physical activity outside of school was approximately 16% less for intervention than control ($P < .05$). 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

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Electronic Table 2. (*Continued*)

Obesity Interventions—School Based						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Fitzgibbon et al 2005	To assess the impact of dietary and physical activity on BMI	*Design:* • RCT *Intervention:* • 20 minutes' instruction on healthy eating and 20 minutes of exercise 3 times a week, parents received weekly newsletters and homework, controls received general health information	*Setting:* • Head Start programs in the Archdiocese of Chicago, IL *Inclusion:* • All children and families eligible to participate—program did not target overweight youth	• I: 197 • C: 212	*After Intervention:* • I: 9% • C: 14% *Year 1:* • I: 27% • C: 31% *Year 2:* • I: 26% • C: 28%	• Postintervention BMI did not differ between groups • At 1 year, the mean increase in BMI between groups was significantly different (0.02 k/m^2 vs 0.64 k/m^2, $P = .002$) • At 2 years, the mean increase in BMI between groups was significantly different (0.48 k/m^2 vs 1.14 k/m^2, $P = .008$) • Effects were similar for boys and girls • No effect was seen on intake of fat, dietary fiber, or exercise • Culturally specific program using specially trained early childhood educators, so generalizability questionable
Fitzgibbon et al 2006	To assess the impact of dietary and physical activity on BMI among Latino preschoolers	*Design:* • RCT *Intervention:* • Culturally proficient 14-week (3 times weekly) diet/physical activity intervention. Parents completing weekly homework assignments. Controls received general health information	*Setting:* • 12 predominantly Latino Head Start centers *Inclusion:* • All children and families at centers	401	*Year 1:* • 16% *Year 2:* • 17%	• No significant differences between intervention and control schools in either primary or secondary outcomes at postintervention, year 1, or year 2 follow-ups • When Hip-Hop to Health Jr was conducted in predominantly black Head Start centers, it was effective in reducing subsequent increases in BMI in preschool children. In contrast, it was not effective in Latino centers (although it was very well received). Future interventions with this population may require further cultural tailoring and a more robust parent intervention
Gortmaker et al 1999	To evaluate the impact of a school-based health behavior intervention (Planet Health) on obesity among boys and girls in grades 6 to 8	*Design:* • RCT with 5 intervention and 5 control schools. Outcomes were assessed using preintervention (fall 1995) and follow-up measures (spring 1997), including prevalence, incidence, and remission of obesity. *Intervention:* • Sessions within existing curricula using classroom teachers focused on decreasing television viewing, decreasing consumption of high-fat foods, increasing fruit and vegetable intake, and increasing moderate and vigorous physical activity	*Setting:* • 10 ethnically diverse public schools in 4 MA communities *Inclusion:* • Grade 6 and 7 students	1560	83%	• The prevalence of obesity among girls in intervention schools was reduced compared with controls, controlling for baseline obesity (OR, 0.47; $P = .03$), with no differences found among boys. There was greater remission of obesity among intervention girls vs control girls (OR, 2.16; $P = .04$) • The intervention reduced television hours among both girls and boys, and increased fruit and vegetable consumption and resulted in a smaller increment in total energy intake among girls. Reductions in television viewing predicted obesity change and mediated the intervention effect. Among girls, each hour of reduction in television viewing predicted reduced obesity prevalence (OR, 0.85; $P = .02$)

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	• I: 36 • C: 25	• I: 25 • C: 22	• 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	606	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 video game 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	198	192	• 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	955	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*)

Electronic Table 2. (*Continued*)

Obesity Interventions—School Based

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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	• I: 13.7% • C: 16.2%	• 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

Obesity Interventions—Clinic Based

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
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		• 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

Obesity Interventions—Family-Based Interventions

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/ Comments
Ebbeling et al 2006	To examine the effect of decreasing sugar-sweetened beverage (SSB) consumption on body weight	*Design:* • RCT *Intervention:* • Home deliveries of noncaloric beverages to displace SSBs	*Setting:* • Recruited from pediatric population at Children's Hospital Boston (MA) *Inclusion:* • Adolescents 13–18 years who regularly consumed SSBs	103	None	• 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 • 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
Epstein et al 2005	To test whether alternatives to eating can influence weight control	*Design:* • RCT *Intervention:* • 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	*Setting:* • Recruited from newspaper flyers, physicians, and other health care providers *Inclusion:* • Families with child aged 8–12 with BMI ≥85th percentile • One parent reporting willingness to attend to treatment needs	• I: 19 • C: 22	• I: 1 (5%) • C: 5 (22%)	• No significant differences found between groups • Both groups had significant declines maintained at 12 and 24 months ($P < .001$) • Differences consistent with both intention to treat and measured BMI • Episodes of eating significantly decreased over time ($P < .001$) • Possible that no difference seen between groups as a result of implementation problems
Golan et al 2006	To compare the effects of targeting parents alone vs parents and children in obesity treatment	*Design:* • RCT *Intervention:* • 1-hour support and education session weekly for 10 weeks, biweekly for 4 weeks, monthly for 2 months • Monthly 40–50-minute interventions per family • Emphasized healthy eating, exercise, and parenting skills	*Setting:* • Israel Inclusion: • Children 6–11 years • Children >85th percentile BMI • No other weight loss program participation	32 families	4 parent only, 1 parent-child	• Follow-up occurred 12 months after end of program (total of 18 months) • 80% of parent only group had full attendance vs 55% in parent-child group • Parent-only group overweight change was −9.5% vs −92.4% in parent-child group • Difference between groups significant for change in BMI ($P = .024$) and change in percentage overweight ($P = .02$) • Both groups reported a reduction in obesogenic habits (22% in parent-only vs 15% in parent-child), but difference between groups significant ($P < .05$) • More permissive parents found fewer changes in child's BMI • Large difference in attendance at sessions may signify baseline difference in groups, and may explain variation in program effectiveness

(*Continued*)

Electronic Table 2. (*Continued*)

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

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		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

Electronic Table 3. Studies on Injury Prevention

Individual-Level Interventions: Gun Safety						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Hardy 2002	Assess effectiveness of skills-based firearm safety program	*Design:* • Randomized controlled trial (RCT) *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	*Setting:* • 3 day care centers in urban southeastern USA *Inclusion:* • Children attending day care whose parents consented	• I: 34 • C: 36	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 ($P = .017$)

Family-Level Interventions: Gun Safety						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Carbone et al 2005	Evaluate the effectiveness of gun safety counseling by pediatricians	*Design:* • Controlled pretest, posttest *Intervention:* • Physicians trained in Steps to Prevent Firearm Injury (STOP 2) program • Families receiving intervention counseled by physician, given brochures and gun lock • Families followed up 1 month after intervention	*Setting:* • Pediatric clinic within a community Health Center in Tucson, AZ *Inclusion* • All families with children aged <18 years attending clinic who reported owning guns	• I: 73 families • C: 78 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

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	*Providers:* • None *Families:* • 23%	No statistical difference between control and intervention groups in acquisition of firearms, removal of guns, or acquisition of safe storage boxes

Family-Level Interventions: Road Safety

Bicycle Helmet Use

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
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 ($P < .01$)

Family-Level Interventions: General Home Safety

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
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	• 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*)

Electronic Table 3. (*Continued*)

Family-Level Interventions: General Home Safety						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
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 • Programs partitioned into 2 groups on the basis of size, geographic location, and staff *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	*25 Months:* • 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	*1 Year:* • 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*)

Electronic Table 3. (*Continued*)

Family-Level Interventions: General Home Safety

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
King et al 2005	To review the long-term (36-month) effects of the previous study			*36 Months:* • I: 403 • C: 371	• I: 33% • C: 35%	• 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%; $P < .001$) • The rate of injury visits to the doctor was 0.74 (95% CI 0.63–0.87) • 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)
Kitzman et al 1997	To review the effectiveness of home-visitation services as a way of improving maternal and child outcomes	*Design:* • RCT *Intervention:* • Free transportation for scheduled prenatal care • Free screening • Intensive nurse home visiting (average = 7) • Control group received free transportation and screening	*Setting:* • Public system of obstetric care in Memphis, TN *Inclusion:* • Women at less than 29 weeks' gestation • No previous live births • ≥2 following socioeconomic status risks: unmarried, <12 years of education, unemployed	• I: 228 • C: 615 *24-Month Intervention:* • I: 216 • C: 481	• I: 5% • C: 22%	• 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, $P < .01$)
Mayer et al 1998	To evaluate a 20-minute video intervention to increase parents' safety awareness and preventive actions to avoid child injuries from lawn mower	*Design:* • RCT *Intervention:* • Parents in the intervention group viewed a 20-minute video	*Setting:* • Outpatient orthopedic clinic at Cardinal Glennon Children's Hospital, St Louis, MO *Inclusion:* • Parents who: (1) have access to a lawn mower and have operated it within the past year; (2) have preteen children living at home; (3) agree to participate	• I: 30 • C: 35	• I: 25% • C: 12.5%	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
Posner et al 2004	To assess effectiveness of ED-based home safety intervention	*Design:* • RCT *Intervention:* • All participants received verbal counseling and home safety handout • Intervention group received additional counseling plus home safety kit • Participants were contacted 6–8 weeks after initial ED visit	*Setting:* • Urban pediatric ED *Inclusion:* • All caregivers of children up to 5 years of age	• I: 49 • C: 47	• I: 29% • C: 30%	• Intervention group had higher overall safety score (73% vs 66.8%, $P < .002$) • Intervention group had higher scores for cut/piercing safety ($P < .001$) and burn safety ($P < .03$), but no difference was found for falls, water safety, aspiration prevention, or fire prevention • Most of the safety improvement came from kit distribution • All safety improvements were self-reported

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	• I: 50 • C: 50	• I: 2% • C: 0%	• 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

Family-Level Interventions: Baby Walkers

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
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	• I: 525 • C: 631	• I: 11% • C: 14%	• Participants followed up when infant aged 3–4 months • 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

Community-Based Interventions: Gun Safety

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
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 • Baseline data collected in 1996, program implemented in 1997–2001, follow-up data collected in 2001	*Setting:* • King County, WA *Inclusion:* • 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	*Intervention:* • Baseline: 151 • Follow-up: 217 *Control:* • Baseline: 151 • Follow-up: 128	NA	• 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)

(*Continued*)

Electronic Table 3. (*Continued*)

Community-Based Interventions: Road Safety						
Pedestrian/Road Safety						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
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

Community-Based Interventions: Road Safety						
Bicycle Helmet						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Britt et al 1998	To evaluate the effectiveness of a multifaceted bicycle helmet promotion program for low-income children	*Design:* • Treatment and control sites are *not* randomly selected *Intervention:* • Provide classroom instruction to children • Educate parents • Obtain and fit helmets for each child • Conduct bicycle rodeos that allowed the children to practice safe riding skills and to see other children wearing helmets • Require children wear helmets while riding on school grounds	*Setting:* • Preschool Head Start programs in WA *Inclusion:* • Eligible families in either program must have incomes at or below the federal poverty level • Children must be 3 or 4 years old and their siblings up to 14	• I: 14 sites, 543 children • C: 4 sites, 200 children	• I: 30% • C: 10%	• Helmet use in the intervention group more than doubled, from 43% to 89%, while use in the control group increased from 42% to 60% ($P < .05$ for intervention group changes vs control group changes) • Intervention own helmet: RR 1.53 (1.34–1.79) • Intervention always wear helmet: RR 1.58 (1.25–1.99)
Farley et al 1996	To assess the effectiveness of a 4-year program of bicycle helmet promotion that targeted elementary school children in one region of Quebec, Canada	*Design:* • Quasi-experimental *Intervention:* • Persuasive communication and community organization • Combining standard educational activities and activities to facilitate helmet acquisition and use (eg, offering coupons)	*Setting:* • 25 municipalities in Monteregie region, Quebec, Canada *Inclusion:* • Children 5–12 residing in those municipalities	• I: 6087 • C: 2025	NA	• Helmet use increased from 1.3% to 33% in 1993 in the intervention communities • OR of use of helmet for group exposure to program vs not was 1.78 (99% CI 1.10–2.89)

(*Continued*)

Electronic Table 3. (*Continued*)

Community-Based Interventions: Road Safety						
Car Seat						
Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Ebel et al 2003	To evaluate the effectiveness of a multifaceted community booster seat campaign in increasing observed booster seat use among child	*Design:* • Prospective, nonrandomized, controlled community intervention trial *Intervention:* • The campaign targeted both parents and children • Broad-based community education program • Discount booster seat coupons • Car seat training programs	*Setting:* • The campaign was initiated in 4 communities (250 000) in the greater Seattle, WA, area between January 2000 and March 2001. Eight communities in Portland, OR, and Spokane, WA, served as control sites *Inclusion:* • Children aged 4–8 years and weighing 18–36 kg (40–80 pounds)	• I: 4 communities • C: 8 communities	NA	• 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 • 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)
Greenberg-Seth et al 2004	To evaluate short-term effect of a community-based effort to promote child rear seating in a low-income Hispanic community	*Design:* • Quasi-experiment *Intervention:* • "Kids in the Back" • Community education • Incentive programs over 6 months: gave gifts to reward those who put kids in the back; and gave information on risks to those who didn't	*Setting:* • Holyoke, MA, a low-income community with a substantial proportion of Hispanics *Inclusion:* • Child passengers younger than 12 years	• I: 1 community • C: 2 cities	NA	• After Intervention, the percentage of motor vehicles with all children placed in rear seats significantly increased from 33% to 49% ($P < .0001$), which was significantly different from the increase in the control cities ($P < .0001$)
Istre et al 2002	To evaluate a program to increase child restraint use among Hispanics	*Design:* • Nonrandomized, controlled trial *Intervention:* • Establishing a child safety seat loaner program • Educating parents in small classes • Identifying mothers as authority figures to help communicate the message • Addressing the issue of fatalism or destiny • Using videos that graphically showed what happens to a child held on an adult's lap in a car crash	*Setting:* • 3 adjacent zip codes (75208, 75211, and 75212) in the west sector of Dallas, TX; other parts of Dallas served as comparison *Inclusion:* • Children <5 years old	• I: 3 zip code areas (7413 observations) • C: The rest of Dallas (4137 observations)	NA	• Child restraint use among preschool-aged Hispanic children increased significantly in all 3 settings between 1997 and 2000 ($P < .0001$) • Observed driver seat belt use also increased significantly in each of the 3 settings ($P < .001$), whereas little change in driver seat belt use for other parts of Dallas (not significant)

Community-Based Interventions: General Home Safety

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Petridou et al 1997	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)	*Design:* • Community controlled trial *Intervention:* • There was an injury-prevention campaign at Naxos involving virtually all opinion leaders and implemented through lectures, workshops and publicity in the local media • The main intervention focused on 172 households on the island of Naxos and was done by trained local collaborators who visited each household weekly	*Setting:* • Greek islands of Naxos (intervention) and Spetses (control) *Inclusion:* • Residents on both islands	• I: 172 households • C: 177 households	NA	• 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 • 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 $P = .09$) • 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
Ytterstad et al 1998	To describe the long-term effectiveness of a community-based program targeting prevention of burns in young children	*Design:* • Quasi-experimental *Intervention:* • Purchase and installation of stove safeguards (guard rail around the edge of the stove) • Lowering tap water thermostat settings to 55°C in homes, kindergartens, and public buildings	*Setting:* • Norwegian city of Harstad (main intervention), 6 surrounding municipalities (intervention diffusion), and Trondheim (reference) *Inclusion:* • Children 0–5 years old	• I1: population 23 000 • I2: population 14 000 • C: population 134 000	NA	• The mean burn injury rate decreased by 51.5% after the implementation of the intervention in Harstad ($P < .05$) and by 40.1% in the 6 municipalities (not significant) • Rates in the reference city, Trondheim, increased 18.1% (not significant)

(*Continued*)

Electronic Table 3. (*Continued*)

Community-Based Interventions: General Home Safety

Smoke Alarm/Detector

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Mallonee 2000	Assess impact of smoke detector distribution program	*Design:* • Quasi-experimental *Intervention:* • Distribution of smoke detectors to targeted neighborhoods • Distribution of written materials to selected populations	*Setting:* • Oklahoma City, OK *Eligibility:* • Residents of targeted neighborhood • Neighborhood chosen on the basis of a high rate of residential fires	NA	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
Ginnelly et al 2005	To determine whether a smoke alarm give-away program iseffective and cost-effective in reducing the risk of fire-related deaths and injuries	*Design:* • Cluster RCT *Intervention:* • "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 *Inclusion:* • Households above average material deprivation	• I: 73 399 households • C: comparable size	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.
Peleg et al 2005	To map Israeli child burn prevention programs and to measure their success from the rate of burn-related hospitalizations	*Design:* • Community comparison; historical comparison *Intervention:* • 13 interventions were identified in the intervention communities	*Setting:* • Israeli communities *Inclusion:* • Only Jewish communities were compared in the evaluation	• I: 13 communities • C: 35 communities	NA	• 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

Community-Based Interventions: General Community Safety

School Safety

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Roseveare et al 1999	To evaluate the relative effectiveness of 2 methods of reducing playground hazards in schools	*Design:* • Randomly controlled trial *Intervention:* • 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 *Inclusion:* • The 12 schools that made up the intervention goup were randomly sampled from the 60 primary schools in Wellington City	• I: 12 schools • C: 12 schools	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

Study	Study Question	Intervention	Population and Setting	N	Attrition	Outcomes/Comments
Coggan et al 2000	To evaluate the outcome of the World Health Organization (WHO) Safe Community model with respect to child injuries	*Design:* • Population-based quasi-experimental *Interventions (WHO Safe Community Model 1995–97):* • Implementation of WHO safe community model	*Setting:* • Waitakere, New Zealand, population 155 000; control community 147 000	• I: 1 community • C: 1 community	NA	• For children 0–14, community showed a decrease in injury hospitalization rates in the intervention/postintervention period
Harrell 2003	To evaluate the effectiveness of 2 warning signs on adult supervision and child risky activities in grocery carts	*Design:* • Quasi-experimental *Interventions:* • One supermarket had signs to prompt adults not to allow children to stand in the cart seat or basket (I1) • The other supermarket had signs to inform parents of the risk of injury to a child in carts (I2)	*Setting:* • 2 supermarkets in similar size in Canada *Inclusion:* • Children aged 1–6	• I1: 100 • I2: 100	NA	• No effect was found
Lindqvist et al 2002	To evaluate the outcome of the WHO Safe Community model with respect to child injuries	*Design:* • Population-based quasi-experimental *Interventions (WHO Safe Community Model, 1985–89):* • Local mass media provide regular information about injury prevention • Trained nurses provide information to parents • Indoor environments at schools and sports facilities were evaluated	*Setting:* • Intervention (Motala municipality) and control (Mjolby municipality) areas, both in Ostergotland County, Sweden	• I: 1 community • C: 1 community	NA	• The total RR of child injury in the intervention community decreased more (OR 0.74, 95% CI 0.68–0.81) than in a control community exposed only to national level injury-prevention programs (OR 0.93, 95% CI 0.82–1.05) • The risk of severe or fatal (AIS 3–6) injuries remained constant

Injury Economic Studies

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

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Electronic Table 3. (*Continued*)

Injury Economic Studies					
Study	Study Question	Perspective	Study type and design	Population and Setting	Outcomes/Comments
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
DiGuiseppi et al 1999	To reduce fires and fire-related injuries by increasing the prevalence of functioning smoke alarms in high-risk households	*Design:* • Cluster RCT *Intervention:* • "Let's Get Alarmed": Smoke alarms, batteries and fire safety brochures were distributed to intervention groups	Cost of the program	*Setting:* • 40 wards in inner London boroughs of Camden and Islington, UK *Inclusion:* • Households above average material deprivation	• 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…"
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
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	• 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
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	• 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 J 418 and J 3225 per life-year saved, depending on whether the modest administrative fee is considered
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

Kim et al 1997	To determine whether asking for a $5 donation for bicycle helmets, compared with distribution free of charge, would affect helmet use among children	6 clinic sites were randomly assigned to either free helmet distribution or to a $5 suggested donation for the helmets	Willingness to pay	6 public health clinic sites (506 eligible children) in King County, WA	• 82% of children whose parents were asked for a copayment and 77% of children who received free helmets were reported to wear their helmets every time they rode their bicycles ($P = .20$) • The adjusted OR for the association between copayment compared with free helmets and helmet use was 1.66 (95% CI 0.94–2.92)
King et al 2001, Canadian 1999	Examine 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	*Setting:* • Multicenter trial in 5 hospitals in 4 Canadian urban centers *Eligibility:* • Children aged <8 initially enrolled onto an injury case-control study	• I: 601 • C: 571	• Significant safety modifications occured 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). • 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). • Incremental cost per participant, $48.11 • Cost per injury prevented, $372
Levitt and Doyle 2006	To test the relative effectiveness of child safety seats, lap-and-shoulder seat belts, and lap belts in preventing injuries among motor vehicle passengers aged 2–6	Societal	• Cost-effectiveness *3 Data Sets:* • General Estimates Survey, a nationally representative sample of approximately 50 000 crashes each year for 16 years • New Jersey Department of Transportation data covering all crashes in NJ between 2001 and 2004 • A WI data set that includes the universe of crashes with police reports in that state from 1994 to 2002, and links these crashes to hospital discharge records	US children aged 2–6	• No apparent difference in the 2 most serious injury categories for children in child safety seats vs lap-and-shoulder belts • Child safety seats provide a statistically significant 25% reduction in the least serious injury category • Lap belts are somewhat less effective than the 2 other types of restraints, but far superior to riding unrestrained
Miller et al 2006	To analyze the societal return on investment in booster seats and in laws requiring their use in the USA	Societal	Cost-outcome analysis	Booster seats for auto occupants aged 4–7 years	• A booster seat costs $30 plus $167 for maintenance and time spent on installation and use • This investment saves $1854 per seat, a return on investment of 9.4 to 1 • Even lower bound estimates in sensitivity analysis indicated that society would benefit from the use of booster seats. Seat laws offer a return of 8.6 to 1
Miller et al 2003	To estimate the costs of pedestrian and bicycle crash injuries in the USA	Societal	Cost-outcome analysis		• Costs of pedestrian and bicyclists injuries in 2000 total $40 billion over their lifetimes • Youth aged 5–14 face greater annual risks

(*Continued*)

Electronic Table 3. (*Continued*)

Injury Economic Studies					
Study	Study Question	Perspective	Study type and design	Population and Setting	Outcomes/Comments
Miller et al 2000(Future of Children)	Quantify cost of unintentional injuries to children in the USA	Societal	Cost burdens	Unintentional injuries of US children aged 0–19	*Cost of Unintentional Injury (millions of 1996 US dollars):* • Total: $81 400 • Productivity: $66 500 • Medical costs: $13 800 • Other resources: $1 100 *Per-Victim Costs by Injury:* • Burn/anoxia: $4500 • Caught between objects: $1900 • Drowning/submersion: $21 000 • Fall: $4200 • Firearm: $17 000 • Suffocating/choking: $11 000 *Notes:* • Cost estimates are incidence based and are based on multiple national data sources • Productivity costs undervalue lives of women and minorities because they are paid less than white men • Some data (cost of coroners) date back 10–20 years
Miller and Levy 2000	To review cost-outcome analyses in injury prevention and control and estimate associated benefit-cost ratios and cost per quality-adjusted life-year	Societal	Cost-outcome analysis	Medline and Internet search, bibliographic review, and federal agency contacts identified published and unpublished studies from 1987 to 1998 for the USA	• More than half of the 84 injury-prevention measures reviewed yielded net societal cost savings • 12 measures had costs that exceeded benefits • Of 33 road-safety measures analyzed, 19 yielded net cost savings • Of 34 violence prevention approaches studied, 19 yielded net cost savings, whereas 8 had costs that exceeded benefits
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

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

Individual-Level Interventions: Parent-Focused						
Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/ Comments
Bor et al 2002	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)	*Design:* • Randomized, controlled trial (RCT) *Intervention:* • Triple P • Enhanced behavioral family intervention (EBFI; I1) • Standard behavioral family intervention (SBFI; I2) • Waiting list (WL)	*Inclusion:* • 87 preschoolers with co-occurring disruptive behavior and attentional/hyperactive difficulties	• I1: 26 • I2: 29 • C: 32 • Attrition: 28%	• ECBI • PDR	• 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 • 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
Bradley et al 2003	To review a 4-session psychoeducational group for parents of preschoolers with behavior problems, delivered in community agencies	*Design:* • RCT *Intervention:* • Brief Psychoeducational Parenting Program • 3 weekly group sessions and a 1-month booster, focusing on being to support effective discipline	*Setting:* • Community agencies in metropolitan Toronto, Canada *Inclusion:* • Parents of 3–4 children	• I: 89 • C: 109 • Attrition: 1 year follow-up, 25%	• PS • PBQ • PCQ • BSI	• 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
Cicchettie et al	To review a program promoting secure attachment in the offspring of depressed moms	*Design:* • RCT *Intervention:* • Mothers and toddlers participated joint therapy sessions	*Inclusion:* • Toddlers with mothers with or without depression history	• I: 27 • C1: 36 • C: 45	• BDI • DIS-III-R • AQS	To promote secure attachment
Cohen et al 1999	To contrast the effectiveness of an infant-led with an alternate form of parent-infant psychotherapy	*Design:* • RCT *Intervention:* • Watch, Wait, and Wonder (WWW) • Mother-infant psychotherapy (PPT)	*Setting:* • Hincks-Dellcrest Centre for Children's Mental Health *Inclusion:* • 10–30-month-old infants and their mothers who were referred to the center	• I1: 34 • I2: 33	• Child Behavioral Checklist (CBCL) • YSR	• 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 ($P < .03$) • Before treatment, mothers and infants in both groups exhibited greater reciprocity in play and less conflict
Connell et al 1997	To evaluate the effectiveness of a self-directed family program on oppositional behaviors in rural and remote areas	*Design:* • RCT *Intervention:* • Parents were required to read a workbook each week for 10 weeks • Weekly telephone contact	*Setting:* • Home *Inclusion:* • Families reside in rural area in Australia, children aged 2–6 without development delays	• I: 12 • C: 11	• ECBI • PSOC • PS • DASS • PDRC	• There was a significantly lower level of disruptive child behavior in the treatment group than the control group after treatment ($P = .0005$) • A significant reduction in ECBI intensity scores for the treatment, but not significant for control ($P = .0005$)

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Electronic Table 4. (*Continued*)

Individual-Level Interventions: Parent-Focused

Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/ Comments
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	• I1: 30 • I2: 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 • Conners index • 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, $P = .01$),
Gardner et al 2003	To determine whether early psychosocial intervention with low-birth-weight–term (LBW-T) infants improvedcognition and behavior	*Design:* • RCT *Intervention:* • Weekly home visits by parapro-fessionals 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)	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 ($P < .05$)
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], $P = .02$)

Hart et al 1998	To assess the effectiveness of a short-term intervention for improving interaction behaviors of newborns with their depressed mothers	*Design:* • RCT *Intervention:* • Mothers were trained to use Assessment of the Behavior of her Infant (MABI) independently and periodically at home	*Setting:* • Home *Inclusion:* • Depressed mothers	• I: 14 • C: 13	• CES-D (mothers)	At 1 month, infants in the experimental group were performing more optimally than infants in the control group on Social Interaction, $F_{1,25} = 5.76$, $P < .05$
Horowitz et al 2001	To test the efficacy of an interactive coaching intervention to promote responsiveness between depressed mothers and their infants	*Design:* • RCT *Intervention:* • Interaction coaching for at-risk parents and their infants (ICAP)	*Setting:* • Hospital in Boston, MA *Inclusion:* • Postpartum women	• I: 60 • C: 57	*Mother:* • EPDS • BDI *Interaction:* • DMC	• A significant difference in responsiveness was found between the treatment and control groups ($P = .006$) • The treatment group had a significantly higher DMC mean score than did the control group at time 2 ($t = -3.15$, $df = 116$, $P = .002$) and at time 3 ($t = -2.22$, $df = 115$, $P = .029$)
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	• I1: 22 • I2: 19	• CBCL • BDI • Parenting scale	Child behavior improved significantly in both groups
Johnson et al 2005	To test the effectiveness of a home-based developmental education intervention in improving outcome at 5 years for very preterm infants	*Design:* • RCT *Intervention:* • Developmental education program (Portage) • Social support intervention • Standard care	*Setting:* • Home *Inclusion:* • Babies born at <33 weeks' gestation	• I1: 97 • I2: 90 • C: 97 *At 5 Years:* • I1: 63 • I2: 61 • C: 63	• CBCL	• Although the 2 intervention groups had significantly higher scores than the term reference group ($P < .05$), there were no differences between the 3 preterm groups • The small advantage shown at 2 years of age is no longer detectable at 5 years
Johnson et al 2006	To test Healthy Steps' impacts on child's behavior	*Design:* • RCT *Intervention:* • Healthy Steps (HS) • Or PrePare (PP) + HS	*Setting:* • At care providers and at home *Inclusion:* • Pregnant women at <22 weeks' gestation at study enrollment, <45 years old, English speaking, and planning to use a study clinic for pediatric care	• I1: 117 • I2: 122 • C: 104 • Attrition: 22%	• CBCL	• Intervention group reported higher scores than those in the control group on the aggressive behavior subscale (7.74 vs 6.80; adjusted β, 0.83, 95% confidence interval [95% CI] 0.37–1.30), although neither group reached a subscale score of clinical significance • No group differences in reported sleep problems or problems with depression or anxiety
Leung et al 2003	To evaluate the effectiveness of Triple P in Hong Kong	*Design:* • RCT *Intervention:* • Triple P • 4 weekly group sessions of 2 hours' duration • 4 weekly phone consultations of 15–30 minutes' duration	*Inclusion:* • Children aged 3–7, with behavioral problems but no disability	• I: 33 • C: 36	• ECBI • PDR • SDQ • PS • PSOC • PPC • RQI	• After treatment, a significant difference on mean PDR scores was found between the 2 groups: $F_{1,64} = 7.19$, $P < .01$ • The intervention group also had significant lower ECBI problem and ECBI intensity: $F_{2,62} = 13.94$, $P < .001$ • Significant group difference was also found in SDQ conduct problem, hyperactivity, peer problem, and emotional symptom, but not prosocial behavior

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Electronic Table 4. (*Continued*)

Individual-Level Interventions: Parent-Focused

Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/ Comments
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	• 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
Lieberman et al 2006	To assess the effect of CPP 6 months after termination of the program			*6 Months:* • I1: 6% (n = 27) • I2: 14% (n = 23)	• CBCL • SCL-90 Symptoms Checklist, Revised	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)
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:* • I1: Pairs intervention: 12-week parenting course (Incredible Years); coparenting component • I2: Usual care	*Setting:* • At agency *Inclusion:* • Foster children aged 3–10 without disabilities from New York City	• I1: 80 • I2: 48	• PPI • ECBI • CBCL	Intervention families reported children as having lower CBCL externalizing *T* score, $F_{1,97} = 2.71$, $P < .10$, and ECBI total *T* score, $F_{1,94} = 2.30$, $P < .13$, at follow-up, although the differences were not significant
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	• 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
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 *After Intervention:* • I1: 34 • I2: 41 • C: 37	• ECBI • PS	*Short Term:* • A significant intervention effect was found for child behavior problems for mothers' report, $F_{4,212} = 5.46$, $P < .001$ • 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	• I1: 22 • I2: 19	• ECBL • CBCL	• 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 CBCK 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	• I1: 17 • I2: 20 • C: 18	• The Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV Structured Interview • ECBL • HSQ-M	• 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 • Parents group sessions lasting about 2 hours each, once a week for 10 weeks	*Setting:* • Health centers and community center *Inclusion:* • Parents of children aged 2–8 years who scored in the upper 50% on a behavior inventory	• I: 60 • C: 56	• ECBI • SDQ • GHQ	• 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)
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-mintue 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	*Inclusion:* • Families with 3-year old who are at risk of behavior problems	• I1: 76 • I2: 77 • I3: 75 • C: 77	• ECBI • BDI	• 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

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Electronic Table 4. (*Continued*)

Individual-Level Interventions: Parent-Focused

Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/ Comments
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	• I: 60 • C: 60 *2-Year 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	• 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	*Setting:* • Home *Inclusion:* • 3-year-old children with ADHD	• 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	• I: 60 • C: 56	• ECBI • SDQ • PSI • GHQ • RSE	• 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
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	• I: 120 • C: 117	• CBCL	• After receiving the intervention, mothers in the intervention group had more favorable attitudes toward sensitivity, $F(1,235) = 18.88$, $P < .01$, and toward sensitive discipline, $F(1,235) = 4.49$, $P < .05$, than control group mothers at the posttest • 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
Velderman et al 2006	To evaluate an intervention aimed at breaking potential intergenerational cycle of insecure attachment	*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	*Setting:* • Home *Inclusion:* • Insecure mothers with firstborn 4-month-old children, and with 8–14 years' education	• I1: 28 • I2: 26 • C: 27	• AAI • IBQ • SSP	Outcome is mother-infant interaction
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:* • I1: CBT for depression and parenting skills enhancement, received 16 group sessions • I2: Mothers' support group attended mother and toddler groups run by a health visitor together with an experienced clinical psychologist	*Inclusion:* • Mothers with children aged between 2 years 6 months and 4 years, and both mothers showed depression and children showed problems	• I1: 47 • I2: 44 • C: 28 • Attrition: 70%	• CBCL • ECBL	• 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 ($P = .006$) on CBCL total scores for the CBT group but not for the 2 control groups • The CBT group also displayed an improvement in ECBI problem scores from pretest to 6-month follow-up ($P < .01$) and to 12-month follow-up ($P = .007$), whereas the 2 control groups did not
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	*Setting:* • Community health services *Inclusion:* • Preschool-age children and their parents recruited from the Eastern Metropolitan Health Region of Western Australia	• I: 804 • C: 806	• ECBI • PS • PPC • ADAS • DASS	• 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 • At 12- and 24-months after intervention, this improvement attenuated but was still statistically significant, with decreases in the adjusted mean ECBI score of 11.3 (95% CI 9.1–13.5) and 12.9 (95% CI 10.4–15.4), respectively, corresponding to a medium effects

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Electronic Table 4. (*Continued*)

Individual-Level Interventions: Child-Focused						
Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/Comments
McLaughlin et al 2007	To evaluate effects of early childhood interventions on young adult depressive symptoms	*Design:* • RCT *Intervention:* • Abecedarian study • Full-day, year-round, center-based, free, educational child care from infancy through age 5	*Setting:* • Center based *Inclusion:* • Infants at high risk for poor cognitive/academic outcomes due to environmental factors such as poverty	• I: 57 • C: 54 • Age-21 follow-up: 104 of 111 participated	• 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						
Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/Comments
Barkley et al 2000	To examine the effectiveness of a multimethod psychoeducational intervention for preschool children with disruptive behavior	*Design:* • RCT *Intervention:* • 4 groups: • (1) No treatment (n = 42) • (2) Parent training only (n = 39) • Full-day treatment, classroom only (n = 37) • Combination of parent training with classroom treatment (n = 40)	*Setting:* • Worcester Public Schools *Inclusion:* • 158 children at kindergarten having high levels of aggressive, hyperactive, impulsive, and inattentive behavior	• C = 42 • I1 = 39 • I2 = 37 • I3 = 40	• 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 to poor attendance
Berlin et al 1998	To examine the effectiveness of early intervention	*Design:* • Longitudinal randomized trial *Intervention:* • Infant Health and Development Program • Home visiting • Extrafamilial education from 12 months for 20 hours per week • Parent groups	*Setting:* • 8 medical institutions between January 7, 1985, and October 9, 1985 *Inclusion:* • Low-birth-weight premature infants	• I: 377 • C: 608	• 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

Blair et al 2003	To examine maternal control strategy and child compliance as a function of early intervention	*Design:* • Longitudinal randomized trial *Intervention:* • Infant Health and Development Program • Home visiting • Extrafamilial education from 12 months for 20 hours per week • Parent groups	*Setting:* • 8 medical institutions between January 7, 1985, and October 9, 1985 *Inclusion:* • Low-birth-weight premature infants	• I: 377 • C: 608	• BCL • CBCL • HOME • ICQ	Among children in the intervention group, consistent maternal guidance was related to lower externalizing and to lower internalizing
Brotman et al 2003	To review a pilot study testing a prevention program promoting families at risk	*Design:* • RCT *Intervention:* • Combined Incredible Years with additional components, including: • Home visit • Parenting groups • Child groups • Parent and child group activities	*Setting:* • Home and clinic *Inclusion:* • Children age 2.5–5 with older relatives with criminal record or with conduct disorder or ODD	• I: 16 • C: 14 • Attrition: 0%	• DSM-III-R • DPICS	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
Brotman et al 2005	To examine the potentialbeneficial effects of a family-based preventive interventionon the older siblings of targeted preschoolers at risk forconduct problems	*Design:* • RCT *Intervention:* • 22 weekly 90-minute concurrent groups for parents and preschoolers • An additional 30 minutes of guided parent-preschooler interactions at the end of each group • 10 biweekly home visits, and 5 booster sessions • Program elements for siblings	*Inclusion:* • All families in the trial with at least one older sibling (5–17 years old) living in the family	• I: 26 • C: 21	• NYPRS • NYTRS • CPRS-R • CTRS-R	In all domains with significant interactions, there were intervention effects for adolescent siblings but not for school-age siblings
Brotman et al 2005	To investigate the immediate impact of an 8-month center- and home-basedprevention program for preschoolers at high risk for conduct problems	*Design:* • RCT *Intervention:* • Incredible Years Series • Parenting groups • Child groups • Home visits	*Setting:* • Center- and home-based *Inclusion:* • 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	• I: 50 • C: 49 • Attrition: 25%	• PPI • Observation (OPPUS)	The intervention yielded significant effects on negative parenting, parental stimulation for learning, and child social competence with peers
Feinfield and Baker 2004	To evaluate the efficacy of a manualized multimodal treatment program for young externalizing children	*Design:* • RCT *Intervention:* • Parent and child together groups • Parent groups • Individual meetings • Child groups	*Inclusion:* • Families of children with externalizing behavior problems, aged 4–8, not developmentally delayed	• I: 24 • C: 23	• CBCL • ECBI • HSQ • SSQ • TRF	• Treatment parents reported significant reductions in child behavior problems, improved parenting practice • 5 months after treatment, teachers reported significant improvements in child behaviors

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Electronic Table 4. (*Continued*)

Family-Level Interventions

Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/Comments
Greene et al 2004	To examine the effectiveness of a cognitive-behavioral model of intervention of collaborativeproblem 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	• I1: 28 • I2: 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

Authors	Study Question	Intervention	Population and Setting	N	Measures	Outcomes/ Comments
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 *Inclusion:* • High-risk children screened from kindergarten	• I: 445 • C: 446 • I: 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	• I: 83 • C: 66 • Attrition: 10%	• CBCL • SSRS • C-TRF	• 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	• I1: 72 • I2: 69 • 1-year attrition: 18%	• ECBI • BDI	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	• I1: 22 • I2: 19	• CBCL • BDI • Parenting scale	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	*Inclusion:* • Children aged 5–15 who met criteria for school refusal	• I: 17 • C: 17	• Fear thermometer • R-CMAS • CDI • CBCL • GAF	• 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
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	• PKBS • Observation	• Teacher reports on the PKBS showed great improvements in both groups • Both parent and teachers' reports found greater improvement in community treatment control group

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Electronic Table 4. (*Continued*)

Community-Based Interventions						
Authors	Study Question	Intervention	Population and Setting	N	Measures	Outcomes/ Comments
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 parenting 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:* • I1: 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	*Setting:* • Head Start centers *Inclusion:* • 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 postassessment, 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

Webster-Stratton et al 2001	2 types of parenting programs with Head Start mothers were compared	*Design:* • RCT *Intervention:* • I1: Experiment group (Incredible Years) • 12-week 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 • 6 monthly 1-day teacher training workshops • I2: regular Head Start curriculum	*Setting:* • Head Start centers *Inclusion:* • Children in the Head Start program at risk for developing problems	• I1: 191 • I2: 81	• CES-D • CBCL • ECBI • DPICS-R • CII	• Short term: Analyses of the children of intervention attenders compared with the control children revealed significant intervention effects at home, $F_{1,171} = 4.47$, $P < .05$, and at school $F_{1,32} = 4.63$, $P < .04$ • Long term (1 year): 80% of the experimental children were below at-risk cutoff (<9 problems per 30 minutes) for conduct problems at home
Webster-Stratton et al 2004	To compare 4 different intervention strategies	*Design:* • RCT *Intervention:* • Parent training (PT) • PT + teacher training (PT + TT) • Child training (CT) • CT + TT • PT + CT + TT	*Inclusion:* • Families with 4–8-year-old children with ODD	• PT: 31 • PT + TT: 24 • CT: 30 • CT + TT: 23 • PT + CT + TT: 25 • C: 26	• ECBI • DPICS-R • CII	After the 6-month intervention, all treatments resulted in significantly fewer conduct problems with mothers, teachers, and peers compared with controls
MTA Cooperative Group 1999	To compare long-term effects of 4 treatment strategies on ADHD of school-aged children	*Design:* • RCT *Intervention:* • Medication (M) • Behavioral treatment (B) • Combined medication and behavioral treatment (CT) • Community care (CC)	*Setting:* • Community/school-based *Inclusion:* • Children aged 7–9.9 years with ADHD combined type	• M: 144 • B: 144 • CT: 145 • CC: 146	• DSM-IV • DISC	Children in the CT and M groups showed significantly greater improvement than those in the intensive B and CC groups
Jensen et al 2005	To compare the cost-effectiveness of the 4 ADHD treatments	*Design:* • RCT *Intervention:* • Medication (M) • Behavioral treatment (B) • Combined medication and behavioral treatment (CT) • Community care (CC)	*Setting:* • Community/school-based *Inclusion:* • Children aged 7–9.9 years with ADHD combined type	• M: 144 • B: 144 • CT: 145 • CC: 146	• DSM-IV • DISC	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

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Electronic Table 4. (*Continued*)

System-Level						
Authors	Study Question	Intervention	Population and Setting	N/Attrition	Measures	Outcomes/ Comments
Huston et al 2005	To review the long-term impacts of New Hope on children's outcomes	*Design:* • RCT *Intervention:* • New Hope: provided 3 financial benefits o Earnings supplement o Health insurance o Child care subsidies	*Setting:* • Community *Inclusion:* • Families had 1 or more children between the ages of 13 months and 10 years 11 months	• 840 *5-Year Attrition:* • I: 23% • C: 27%	• Positive Behavior Scale • Problem Behavior Scale from the SSRS • Loneliness and Social Dissatisfaction Questionnaire	• 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 • 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

Economic Studies					
Authors	Study Question	Perspective	Study Type and Design	Population and Setting	Outcomes/ Comments
Currie and Stabile 2004	To estimate effects of ADHD	Societal	Using data from Canadian National Longitudinal Survey of Children and Youth and American National Longitudinal Survey of Youth	Children with ADHD in USA and Canada	• ADHD symptoms increase the probability of future grade repetition and special education and reduce future reading and mathematics test scores • 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 • Income has little effect on the probability of treatment
Dretzke et al 2005	Effectiveness and cost-effectiveness of parent training/ education program for the treatment of child conduct disorder	Cost-effectiveness		Child with conduct disorder	No significant difference in either effectiveness or costs between the community- and hospital-based group parental education programs

Jensen et al 2005	The only study on cost-effectiveness of major ADHD treatments	Cost-effectiveness	National Institute of Mental Health's (NIMH) Multimodal Treatment Study of Children with ADHD (MTA study)	Children with ADHD	• 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 medical 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
McAuley et al 2004	To evaluate the effectiveness of Home-Start support	Cost-effectiveness	UK Home-Start program	Children from disadvantaged backgrounds	• 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
Muntz et al 2001	To compare a standard and an intensive parent-child interaction training program	Cost-effectiveness	6-month RCT	Child with severe behavior problems	• The study suggested that treatment using videotaped recordings of parent-child interactions may be more cost-effective than the standard parent-training programs
Romeo et al 2006	To identify the costs incurred by children with antisocial behaviors in UK	Cost of care	Using the Client Service Receipt Inventory for Childhood	Child (3–8 years old) referred to mental health services	• Mean annual total cost was £5960, ranging £48–£19 940 • The greatest cost burden of £4637 was borne by the family
Scott et al 2001	Estimate effects of treating antisocial behaviors	Societal	Costs applied to data of 10-year-old children from the inner London longitudinal study selectively followed to adulthood	Child with conduct disorders	• 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
Thompson et al 1996	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	Cost-effectiveness	3-month follow-up control-trial comparison	90 families referred to Common Sense Parenting	• 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