

# Substance Abuse in Children

## Prediction, Protection, and Prevention

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**Objective:** To review the latest studies on risk and protective factors for the development of substance abuse and the effectiveness of prevention interventions for the pediatric population.

**Data Sources:** Multiple bibliographic databases, including MEDLINE and ERIC, were used to develop a comprehensive review of the literature on substance abuse prevention during the last 10 years. Selected indexing terms included *substance abuse prevention*, *risk factors*, and *protective factors*. Research monographs from the National Institute on Drug Abuse and the Center for Substance Abuse Prevention were used, along with information from authors of prevention curricula.

**Study Selection:** Study populations included children from birth through adolescence who were enrolled in controlled, prospective, and/or longitudinal studies of either protective or risk factors for the development of substance abuse or response to substance abuse prevention programs. Studies of adult patients that investigated predisposing risk factors for substance abuse (eg,

genetic implications) were also used. Care was taken to ensure studies included children from diverse racial and social backgrounds.

**Data Extraction:** Information was abstracted and summarized from peer-reviewed publications. Controlled random-designed studies were used to determine prevention program efficacy.

**Data Synthesis:** Main results of the review are summarized in a qualitative format.

**Conclusions:** Factors that contribute to the emergence of substance abuse in the pediatric population are multifactorial. Behavioral, emotional, and environmental factors that place children at risk for the development of substance abuse may be remediated through prevention and intervention programs that use research-based, comprehensive, culturally relevant, social resistance skills training and normative education in an active school-based learning format.

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**T**HE DIRECT and indirect effects of alcohol and other drugs on children lead to many adverse health and safety risks for the child, family, and community. Understanding risk and protective factors that may affect the development of substance abuse is a first step in ameliorating the problem of drug use in the pediatric population. This article re-

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views the literature on the prediction, protection, and prevention of substance abuse in the pediatric population, including a list of available prevention programs for children across the age continuum.

The younger a child initiates alcohol and other drug use, the higher the risk

for serious health consequences and adult substance abuse.<sup>1-4</sup> Fatalities, accidental and intentional, that are associated with drug and alcohol use in the adolescent population represent one of the leading preventable causes of death for the 15- to 24-year-old population.<sup>5-7</sup> Alcohol and other drug use in the adolescent population carries a higher risk for school underachievement, delinquency, teenage pregnancy, and depression.<sup>8-16</sup> Inadvertent passive drug exposure in infants and toddlers has resulted in multiple medical complications including respiratory illnesses, seizures, altered mental status, and death.<sup>17-23</sup>

*This article is also available on our  
Web site: [www.ama-assn.org/peds](http://www.ama-assn.org/peds).*

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Illicit drug use is associated with an increased risk of contracting human immunodeficiency virus (HIV). The sharp rise in pediatric HIV infection from 1985 to 1990 paralleled the occurrence of the crack cocaine epidemic. In 1990, 68% of perinatally acquired HIV infection was attributable to intravenous drug abuse in one or both of the child's parents.<sup>24</sup> Even without a history of intravenous drug use, an alcohol- and drug-abusing lifestyle places the abuser, partners, and unborn children at risk for HIV infection due to impaired judgment, reduction of inhibitions, and sex-for-drugs.<sup>1,7,25</sup>

The American Academy of Pediatrics Committee on Substance Abuse recommends that pediatricians have the skills to detect drug-related problems in their patients and their patients' family members and are knowledgeable about the extent of drug use and availability of drug treatment resources (including those for alcohol and tobacco) in their community.<sup>26</sup> Pediatric health care providers are often called on to be a consultant for parents, schools, and the community on topics related to alcohol and other drug use. In this capacity, knowledge about available drug and alcohol prevention curricula and their researched effectiveness is of utmost importance. Some of the more widely available curricula have had modest to no significant improvements in drug use patterns yet, through sophisticated marketing, have been implemented in many school districts. Many prevention curricula targeted for the preschool population have limited random-design prospective research to document the programs' efficacy. Proactive approaches by pediatric health care providers to recommend the use of effective validated universal, selective, and indicated prevention curricula will assist community, public health, and school officials in their decisions to select and implement prevention programs.

## DRUG USE TRENDS

The trend of drug use derived from the analysis of the 10th annual survey of 147 077 students by the National Parents' Resource Institute for Drug Education for the 1996-1997 school year showed an increase in the monthly use of marijuana, cocaine, stimulants, sedatives, hallucinogens, and heroin among sixth- to eighth-graders when compared with the previous academic year.<sup>27</sup> Conversely, drug use among high school students did not show an increase for the first time since the 1991-1992 school year. The most recent data from the 23rd national survey from the University of Michigan's Monitoring the Future study also demonstrated that, although marijuana use continues to rise in older adolescents, the use of other illicit drugs has begun to level off.<sup>28</sup> Monitoring the Future data is derived from the 1997 survey of 51 000 eighth-, 10th-, and 12th-grade students located in 429 secondary schools across the nation. This study reported that, for the first time in 6 years, marijuana and other illicit drug use was unchanged among eighth-graders; in addition, there was a concurrent increase in disapproval of marijuana use among these students. Binge drinking, defined as 5 or more drinks on one occasion, remains problematic, occurring in 15%, 25%, and 31% of the 8th-, 10th-, and 12th-graders, respectively. According to the *Drug Use Among Racial/Ethnic Minorities 1995* data from the National Institute on Drug Abuse, rates of drug use are higher for white stu-

dents for all categories of drug use, with the exception of 12th-grade Hispanic youth, who had the highest annual prevalence of cocaine use from 1984 to 1994.<sup>29</sup>

Although the use of illicit drugs has leveled off in some of the adolescent population for the first time since the early 1990s, we must, as stated in the words of Lloyd D. Johnston, PhD, principal investigator for the Monitoring the Future Study,

learn[ed] from the relapse in the drug epidemic in the 1990s that drug use among kids is a persistent and recurring problem—one which needs consistent and unremitting attention. It is a long-term problem, which means that we must institutionalize prevention efforts. . . .<sup>28</sup>

The importance of this early use is that it places the child on a deleterious trajectory for future drug use. If a child smoked tobacco or drank alcohol, they were 65 times more likely to use marijuana than a child who never smoked or drank. Children who used marijuana were 104 times as likely to use cocaine compared with their peers who never used marijuana.<sup>29</sup>

## PREDICTIVE RISK FACTORS

Addiction develops from a complex interplay between the individual, the agent (drugs and alcohol), and the environment. The initiation of first drug use is determined by interactions between social, cognitive, cultural, attitudinal, personality, and developmental factors. The earliest influences to smoke, drink alcohol, or use drugs may come from the family. Factors that are related to drug use during adolescence include poor self-image, low religiosity, poor school performance, parental rejection, family dysfunction, abuse, under- or over-controlling by parents, and divorce.<sup>10,15,30-34</sup>

### Behavior, Affect, and Temperament

Risk factors for the development of externalizing disorders are found in the preschool years. McMahon<sup>35</sup> describes the development of conduct disorder, oppositional defiant disorder, and attention-deficit/hyperactivity disorder (ADHD) in the preschool years as continuous throughout the child's developmental stages. These disorders may initially present with relatively mild behavior problems and progress to severe symptoms such as stealing, aggression, and substance abuse.

Temperament difficulties may exacerbate childhood troublesome behaviors and result in an insecure attachment with the child's primary caregiver. Difficult temperament, characterized by moodiness, negativity, poor compliance, and provocativeness, may lead to the child being criticized and ostracized by parents. The resultant parent-child interactions may lead to the coercive model of parenting that is often present in families who have children with substance abuse and delinquency.<sup>35</sup>

Hyperactivity in childhood imparts a higher risk of later development of adult alcoholism and substance abuse.<sup>36-39</sup> High activity level in infancy was found to predict later substance abuse in both sexes in a large prospective study of African American subjects.<sup>40</sup> Some preliminary studies suggest that children who were treated

for ADHD were less likely to initiate drug and alcohol use in early adolescence.<sup>41-44</sup> In a recent study by Biederman et al,<sup>39</sup> rates of substance abuse in adolescents with ADHD (without comorbid conduct disorder) were not significantly different from rates of substance abuse in a control cohort without ADHD. Childhood aggression has been reported to place a child at risk for adolescent substance abuse.<sup>45</sup> High novelty-seeking and low harm-avoidance behaviors place boys at risk for early drug initiation.<sup>46</sup> In a longitudinal study, frequent early use of drugs was associated with violent behavior.<sup>9</sup>

### Peer Group

Peer influence plays a pivotal role in the initiation of tobacco and drug usage.<sup>10,47</sup> Peer pressure may be a factor not only in drug use but also in drug abstinence. Peer cross-pressure,<sup>48</sup> that is, the opposing influences on individuals exerted by the choices they make or by their socioeconomic standing or social group membership, may play a role in initiation of drug use. The study by Robin and Johnson<sup>49</sup> on peer cross-pressure found adolescents believed their peers' general attitude was against drug use. With the exception of alcohol, there was a direct relationship between peer cross-pressure and subsequent drug use; the lower the acceptance of drug use, the less frequent the drug use. The higher the perceived risk, the lower the drug use.<sup>28</sup> Other studies suggest that children predisposed to use drugs may seek out others with similar inclinations. Adolescents whose drug use is influenced by peer pressure, in the absence of psychological dysfunction, are more likely to stop using drugs.<sup>50-52</sup>

### Genetics

Biological children of alcohol-dependent parents who have been adopted continue to have an increased risk (2- to 9-fold) of developing alcoholism.<sup>53-57</sup> Researchers discovered differences in inheritance patterns between type I, "milieu-limited," adult-onset alcoholism (that is associated with a passive-dependent personality) vs type II, "male-limited," early-onset alcoholism (that is more associated with criminal behavior). The transmission of type II alcoholism, from father to son, demonstrated a high heritability despite environmental factors.<sup>58</sup> Behaviors such as frequency of drinking and amount consumed demonstrate moderate heritability of 0.39 and 0.36, respectively.<sup>59</sup> Further, studies of siblings and twins born to parents who are drug dependent have confirmed the existence of a genetic predisposition not only for alcohol abuse but also for other drugs of abuse.<sup>60-62</sup> Researchers have found a relationship between the presence of the A1 allele of the dopamine D<sub>2</sub> receptor gene and alcoholism.<sup>63</sup> The presence of the A1 allele correctly identified 77% of the alcoholics in a study of brain tissue taken from 70 nonalcoholic and alcoholic cadavers. It was hypothesized that this receptor gene, located on the q22-q23 region of chromosome 11, may confer increased probability for the development of alcoholism. Other studies suggest that the dopamine D<sub>2</sub> receptor locus may serve as a gene that modifies expression of severe psychiatric disorders, rather than being a marker for alcoholism.<sup>64</sup>

### Sex

Illicit drug use by men has twice the reported prevalence rate of women's drug use.<sup>29</sup> Heavy alcohol use is almost 3 times more frequent in men. The trajectory for these patterns of drug use may be found in childhood, where drug use is generally higher in boys than in girls.<sup>65</sup> Heavy alcohol and tobacco use is found more frequently in male students than in their female peers.<sup>65</sup>

In their long-term study, Block et al<sup>30</sup> found that there were remediable psychosocial and behavioral risk factors in 3- and 4-year-olds that predicted drug use during adolescence. Notably, risk factors differed by sex. In short, for girls, the absence of resiliency (ie, skills that allow a person to cope with adverse situations) and the lack of self-control during early childhood predict both marijuana and hard drug use in adolescence. In boys, lack of self-control is strikingly important. Involvement with harder drugs seemed to represent an extension of the behavioral characteristics that predisposed to marijuana use in boys, while in girls additional psychopathological characteristics were usually present when harder drug use was evidenced. In another study, Luthar et al<sup>66</sup> reported that women who abused drugs had a higher incidence of internalizing problems, eg, depression, anxiety, and withdrawn behaviors, during childhood and had more severe psychiatric symptoms as adults. Conduct disorders were found more frequently in men who were in treatment for drug abuse.

### Family Ecology

Childhood abuse has been implicated as a significant risk factor for later substance abuse.<sup>67,68</sup> Women who were physically abused were 1.58 times as likely to abuse drugs than their nonabused adult counterparts, even after controlling for family history of substance abuse.<sup>68</sup>

Girls seem to be more influenced by environmental factors in the home. Unkempt, crowded, noisy, disorderly conditions where there is little emphasis on conventions and religion are very potent predictors of later drug use in girls.<sup>30</sup> For boys, family environment had only chance association with later marijuana use.<sup>30</sup>

Eighth-graders who took care of themselves after school had a significantly higher risk of using alcohol, tobacco, and marijuana.<sup>69</sup> Risk increased with longer duration of self-care, such that the relative risk for alcohol use for children in self-care for 11 hours per week or more was 2 for alcohol, 2.1 for tobacco, and 1.7 for marijuana. Children who were quick to anger, perceived themselves to be stressed, were resentful of parents' absence, or from families with conflicts had high drug use rates. These findings were confirmed by later studies including that of Chilcoat and Anthony<sup>70</sup> who studied 926 youths and found children in the lowest quartile of parent monitoring initiated drug use at earlier ages.

### Community Environment

The percentage of children aged 12 to 17 years who have seen people selling drugs is higher in the African American community than in communities with a majority of

white or Hispanic children (41.2% vs 7.4% and 23.9%, respectively). More African American children aged 12 to 17 years are exposed to people who are high or drunk (55.7%) than children of other ethnic groups.<sup>29</sup> The percentage of children reporting that obtaining illicit drugs is fairly or very easy is higher among African American and Hispanic youth when compared with their white peers. Despite this exposure, African American adolescents have a lower reported rate of drug use than their white peers.<sup>29</sup> The work of Crum et al<sup>71</sup> found an association between neighborhood disadvantage and exposure to cocaine. Youths living in the most disadvantaged areas were more than 5 times as likely to be offered cocaine as compared with those in more advantaged areas.

## PROTECTIVE FACTORS

Protective factors are characteristics within the individual, the family, and the environment that advance one's ability to resist adverse outcomes. Protective factors for the pediatric population include growing up in a nurturing home with open communication with parents and positive parental support.<sup>72-74</sup> Teacher commitment to didactics and maintenance of low dissension are also protective.<sup>75</sup> Positive self-esteem, self-concept, self-control, assertiveness, social competence, and academic achievement all promote resistance to drug use.<sup>74,76,77</sup> In addition, regular church attendance and a sense of morality have been shown to be protective against drug abuse.<sup>78,79</sup>

Protective factors instill the individual with resiliency. Resiliency is the property of an individual to overcome a negative set of life circumstances. Adolescent resiliency is associated with high intelligence, low novelty-seeking behaviors, and avoidance of friendships with delinquent peers.<sup>80</sup>

The Challenge Model<sup>81,82</sup> uses the principles of resiliency to focus on individuals' capacity to respond and manage their lives. A chaotic family environment does not necessarily cause a child to be forever damaged. Where the risk-protective equation implies the tallying of factors, the Challenge Model asserts that individuals can achieve beyond the negative factors in their lives; in essence, resiliency. The Challenge Model delineates 7 principles that facilitate an individual's adaptive and healthy development. These include insight, independence, relationships, initiative, humor, creativity, and morality. As conceptualized in the work of Newcomb and Felix-Ortiz,<sup>83</sup> consideration and attention to both protective factors and risk factors are fundamental in developing effective prevention strategies.

## PREVENTION INTERVENTIONS

Prevention efforts prior to 1970 were based on an information-deficit approach. The assumption was that children lacked adequate knowledge regarding the effects of drug use. Thus, prevention efforts involved the dissemination of information. During the 1970s through 1980s, prevention efforts focused on social and interpersonal influence models. The theory underlying this approach postulated that youth experimented with drugs and alcohol because they had not fully developed their own internal

value system to resist external pressures. The prevention programs of the 1990s offer a comprehensive systems approach. They are research-based, age-appropriate, culturally relevant interactive resistance models. These prevention programs promote protective factors while reducing risk factors using school-based curricula that include social resistance skills training and normative education.<sup>84-92</sup> Social resistance skills training seems to be readily adapted for multiple ethnic groups.<sup>85,93-95</sup> Normative education teaches students that most youngsters do not use drugs. Active learning techniques are the primary teaching modality, as opposed to passive didactics. Small-group, role-playing, and interactive learning techniques are imperative in these programs.

Prevention curricula have been developed for children from preschool ages to young adulthood. Young children are increasingly likely to feel pressure to drink alcohol and use drugs.<sup>96</sup> Children are also increasingly vulnerable to the temptation of drug usage during periods of transition. The adolescence period represents the greatest risk for substance abuse.<sup>97</sup>

Programs in prevention have developed a new nomenclature to denote the target audience and focus of the program. Programs are designated as *universal*, *selective*, or *indicated*. Universal interventions are designed to address a general population, such as a community or school. Selective curricula target an at-risk population, such as those curricula that are designed for children whose parents have drug or alcohol dependence. *Indicated* programs target individuals who already demonstrate the problem behavior or have other high-risk behaviors related to initiating the target behavior.

Research on the effectiveness of prevention curricula have generally focused on universal programs that target children in junior high and high school. One researched intervention that targets the elementary school child is the Seattle Social Development Project. Based on the theory that the greater the number of childhood risk factors the greater the likelihood of child delinquency and drug use, the Seattle Social Development Project employed a model of intervention focusing on both family- and school-based interventions in grades 1 through 4 to enhance protective factors against delinquency and substance abuse. The study by Hawkins et al<sup>98</sup> supports the presence of reduced incidents of drug use, antisocial and disruptive behaviors, and improved school performance following the implementation of the Seattle Social Development Project.

Among the most widely disseminated and promoted curricula are the Drug Abuse Resistance Education curricula (DARE). Despite DARE's popularity in US schools, studies have found little difference in drug use patterns among students who have participated in the curriculum compared with cohorts who have not received the DARE program.<sup>99,100</sup> Significant differences, however, were noted in students' attitudes toward drug use, knowledge regarding drugs, social skills, and attitudes regarding police officers.<sup>100</sup> Though the data on drug use patterns following the initiation of the DARE program are disappointing, a solution to this dilemma may be to integrate DARE with broad-based, research-proven prevention programs.

## Pediatric Substance Abuse Prevention Programs

Program	Author/Contact Person (Phone Number)	Description	Address
Preschool			
Early Beginnings: An Early Years Substance Abuse Prevention Curriculum for Infants, Toddlers, 'N Twos	Catherine Steele, EdD/Pat Wood (518-270-2827)	Instructed prevention curriculum to promote healthy living, social skills, problem solving, etc. Curriculum is designed to teach educators, parents of preschool children, and preschool children aged 3 mo to 3 y. Age-specific activities are included.	Rensselaer County Unified Services Substance Abuse Services 1700 Seventh Ave Troy, NY 12180
The Early Years—Substance Abuse Prevention Education	Catherine Steele, EdD/Pat Wood (518-270-2827)	Curriculum designed for teachers of preschool children. The curriculum fosters language development, decision making, social skills, and healthy living.	Rensselaer County Unified Services Substance Abuse Services 1700 Seventh Ave Troy, NY 12180
Feelings, Body Changes, & Stress: A Curriculum for Preschoolers on Stress Education	Jennie Trotter, Executive Director (404-755-0068)	This teacher-led curriculum instructs high-risk preschool students in methods to reduce stress and promote positive coping strategies. Curriculum includes activities using puppets, audio and video cassettes, coloring books, and stickers. Alcohol and drugs are specifically mentioned in the curriculum. More than 300 teachers and teachers' aides and 575 parents of Georgia Head Start students have been trained in the curriculum. The program was the recipient of the 1990 Center for Substance Abuse Prevention Exemplary Program Award.	Preschool Stress Relief Program PO Box 42481 Atlanta, GA 30331
The Foundation Curriculum	Diane Scanlon (412-537-4590)	This 40-session teacher-led curriculum targets children, aged 3 through 5 y, to develop positive life skills and alcohol and drug abstinence. The curriculum includes learning activities and teaching objectives.	Saint Vincent College Prevention Projects 300 Fraser Purchase Rd Latrobe, PA 15650
PANDA: Preventing the Abuse of Narcotics, Tobacco, Drugs, and Alcohol	Pat Biggar/Mike Mathers (919-490-5577)	The PANDA curriculum teaches safety, drug prevention, and healthy lifestyles by using cartoon characters in vignette presentations, play activities, and audio cassette songs. This program was designed to be used in Head Start programs in North Carolina. It is also being used in Head Start programs in several other states including Florida and Maryland. Pretest and posttest screening resulted in significant ( $P \leq .01$ ) improvement of children's self-concept following curriculum implementation (H. E. Belcher, unpublished data, 1998).	Chapel Hill Training Outreach Project 800 Eastowne Dr, Suite 105 Chapel Hill, NC 27514
Purple Turtle Says No, No to Drugs	Gilson Henry (800-888-7853)	Through an illustrated story book presentation young children are taught how to say "no" to drugs.	Scott Publishing 420 Fifth Ave S, Suite D Edmonds, WA 98020
Elementary school			
Drug Abuse Resistance Education (DARE)	Los Angeles, Calif, Police Department and the Los Angeles Unified School District/Ralph Lochridge (800-223-3273)	School-based curriculum taught by a trained uniformed police officer. Several adaptations of the curriculum are available for elementary school to high school students. The curriculum has been adopted by about 50% of the school districts in the United States and focuses on providing education on drugs, promoting peer resistance and decision-making skills, and enhancing self-esteem.	DARE America PO Box 512090 Los Angeles, CA 90051-0090
Drug Free 1	Joyce L. McKay, Don Dinkmeyer, Sr, and Don Dinkmeyer, Jr (612-786-4343)	Curriculum consists of parent, teacher, and lap easel book and cassettes for instruction of children in kindergarten through fourth grade. Curriculum reinforces practical skills needed to help protect children from using drugs. Skill building includes ways to deal with peer pressure, rejection, low self-esteem, etc.	American Guidance Service 4201 Woodland Rd Circle Pines, MN 55014
Drug Free 2	Joyce L. McKay, Don Dinkmeyer, Sr, and Don Dinkmeyer, Jr (612-786-4343)	Curriculum consists of parent, teacher, and lap easel book and cassettes for instruction of children in fourth through sixth grades. Curriculum reinforces practical skills needed to help protect children from using drugs. Skill building includes ways to deal with peer pressure, rejection, low self-esteem, etc.	American Guidance Service 4201 Woodland Rd Circle Pines, MN 55014

## Pediatric Substance Abuse Prevention Programs (cont)

Program	Author/Contact Person (Phone Number)	Description	Address
Drugs and Addiction Drugs and Fitting In Drugs and Trouble at Home Drugs Mean Alcohol Too Drugs Mean Nicotine Too Drugs on the Street	J. Gillespie (800-328-9000)	Short brochures on alcohol and other drug prevention and related topics that target elementary (ages 5-12 y) and junior high school youth (ages 13-15 y) and community service organizations.	Hazelden Educational Materials Pleasant Valley Road PO Box 176 Center City, MN 55012
McGruff's Drug Abuse Prevention Kit	(202-466-6272)	Program includes instructional materials, video tapes, and audio cassettes. Instructor-led alcohol and other drug prevention curriculum that presents games, puzzles, songs, and other activities. Information is also included for parents.	The National Crime Prevention Council 1700 K St NW, Second Floor Washington, DC 20006
Seattle Social Development Program*	J. David Hawkins/Sally Christie (206-543-6382)	A universal elementary school intervention that endeavors to promote protective factors and reduce risk factors through a variety of interactive teaching strategies. Parent curriculum is included.	Developmental Research and Programs 130 Nickerson St, Suite 107 Seattle, WA 98109
Strengthening the Families Program*	Karol Kumpfer (801-581-7718)	This selective prevention program targets children aged 6 to 10 y who have parent(s) with alcohol or other drug dependence. The curriculum is family-focused and includes family, children, and parent training components. The program has been modified for various cultures. The primary outcomes of the program include reductions in family conflict, improvement in family communications, and reduction in behavior disorders and substance abuse in children. <sup>109</sup>	Department of Health Education 215 HPER-N University of Utah Salt Lake City, UT 84112
SEALS + PLUS Resource Pak	(800-669-9208)	This program consists of a game, 2 books, and a poster that promote self-esteem, self-awareness, goal planning, nutrition, assertion, and anger management in elementary school youth. It is designed to be used by parents and teachers in planning age-appropriate activities to foster life management skills.	Wellness Reproductions Inc 23945 Mercantile Rd Beachwood, OH 44122
Junior/senior high school			
Adolescent Transitions Program*	Thomas Dishion (541-485-2711)	Provides 3 levels of intervention: universal, selective, and indicated, for middle school parents. Universal interventions include a video and Parent Resource Room. Selective intervention includes a family assessment and professional consultation. At the indicated level of services, direct professional support is available for parent and family.	Oregon Social Learning Center Inc 207 E Fifth Ave, Suite 202 Eugene, OR 97401
Life Skills Training*	Gilbert Botvin (212-746-1270)	Universal 3-year curriculum that targets junior high school students. The program addresses self-management skills, drug resistance, and social skills.	Institute for Prevention Research Cornell University Medical Center 411 E 69th St, Room KB201 New York, NY 10021
Project ALERT*	Phyllis Ellickson (310-393-0411)	Universal classroom-based social resistance program designed to be implemented in 11 sessions spread over the seventh and eighth grades. The project endeavors to correct misperceptions about the prevalence of drug use and skills to resist drug use.	RAND 1700 Main St Santa Monica, CA 90407
Project STAR*	Mary Ann Pentz/Luanne Rohrbach (213-342-2686)	Universal comprehensive community, family, and classroom-based program that is presented over a 2-year period to middle school students. The project strives to maintain effects of the intervention through mass media, legislative enactments, and collaboration with community organizations.	USC/IPR 1540 Alcazar St, Suite 210H CHP Building Los Angeles, CA 90033

\* Abstracted from references 109-113.

Life Skills Training was found to be effective in lowering tobacco, alcohol, and marijuana use in a 6-year long-term randomized field trial involving 3597 New York State students in 56 high schools.<sup>101-103</sup> Beginning in the seventh grade and continuing until the ninth grade, Life Skills Training integrates up to 18 sessions in the initial year, 10 booster sessions in the second year, and 5 booster sessions in the third year of implementation. Life Skills Training uses resistance skill training in a broader framework of self-improvement and interpersonal social skills development. Recent studies supported the effectiveness of the program in minority inner-city populations.<sup>93-95,104,105</sup> Project ALERT<sup>106</sup> and STAR<sup>107,108</sup> are universal prevention programs that have demonstrated efficacy in the reduction of drug use. Project ALERT includes normative education and resistance skills development to promote drug abstinence. Project ALERT spans seventh and eighth grade with 8 and 3 sessions, respectively. Project STAR, using a resistance skills model, was integrated into 15 Kansas City, Mo, communities, involving more than 22 000 adolescents. Interestingly, the programs both have a classroom component. In addition, Project STAR endeavors to involve the media, community organizations, and health policy officials as well as parents in a comprehensive network of activities.

Efficacy of preschool prevention curricula are largely undocumented in controlled randomized outcome studies. Curricula that target elementary school students have not been studied with the same fervor as curricula designed for adolescents. Included in the **Table** are a representative sample of some of the more widely available and used prevention materials as noted in Center for Substance Abuse Prevention and National Institute on Drug Abuse publications. An asterisk has been placed by curricula that have proven efficacy in peer-reviewed outcome studies. There are many sources for obtaining information regarding available prevention materials for children and adolescents. Recommended federal resources include the Substance Abuse and Mental Health Services Administration's National Clearinghouse for Alcohol and Drug Information (1-800-729-6686 [www.health.org]); National Institute on Drug Abuse (1-800-729-6686 [www.nida.nih.gov]); and National Institute on Alcohol Abuse and Alcoholism (1-800-729-6686 [www.niaaa.nih.gov]). Inclusion of prevention programs in the Table is not meant to represent endorsement or approval of programs by the authors or this journal.

Knowledge development and dissemination in the field of substance abuse prevention relies, in part, on the review of studies outside general pediatric literature. Multiple disciplines, including public health, psychiatry, psychology, education, and criminal justice have participated in developing a body of knowledge on the risk and protective factors and the effectiveness of prevention programs. This review provides a synopsis of pertinent studies and available prevention programs for the pediatric population.

Although much is known about the risk factors that lead to initiation of drug abuse, early intervention strategies targeting preschool and elementary school students are underrepresented in research literature. Further studies are necessary to develop alcohol and drug

prevention programs that will have sustained effects across the age continuum. Understanding the risk factors that lead to substance abuse is paramount for the early identification and prevention of substance abuse in children. Active participation by pediatric health care providers in promotion of programs that enhance protective factors and social skills development through interactive child and parent curricula, while collaborating with communities and schools, will indemnify children against drug abuse. Careful evaluation of prevention program effectiveness for preschool to high school students is of utmost importance. Finally, to echo the words of Johnston, substance abuse in children is a complex multifactorial challenge that requires "consistent and unremitting attention."<sup>28</sup>

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