RETHINKING SUBSTANCE USE PREVENTION

An Earlier and Broader Approach

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RETHINKING SUBSTANCE USE PREVENTION: AN EARLIER AND BROADER APPROACH

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INTRODUCTION

Contrary to popular belief, the majority of young people in the United States do not use nicotine, alcohol, or other drugs, and the number of those who use has declined in recent years.[1] Among those who do engage in substance use, some experiment but do not end up using regularly, others stay involved for longer but do not experience significant consequences, and still others end up with a lifetime of sickness and suffering. A common theme across addictive substances, however, is that the consequences to the person using them tend to be more intense if use begins at a young age.

A number of factors contribute to whether a young person will use an addictive substance, the age at which he or she will do so, whether it will take the form of experimentation or occasional use or frequent or intense use, and what the specific consequences will be. Given the variability in the causes, trajectories, and consequences of substance use, preventing it and mitigating its harms can seem overwhelming and daunting. However, **preventive strategies can reduce the likelihood of youth substance use and addiction, especially if they are research-based, comprehensive, age-appropriate, tailored to individual needs, and implemented across the domains of influence over a child's life, including within families, schools, and communities.**

Whereas a growing number of prevention programs have been striving to meet these goals, primarily in their efforts to reach youth in middle and high school, it is becoming increasingly clear that the seeds of addiction risk and resilience are planted very early in life, necessitating a shift in the traditional approach to substance use prevention. We now know that experiences in infancy and early-to-middle childhood, coupled with biological and larger social vulnerabilities, set the stage for how children will fare as they age. While some of these experiences and vulnerabilities – such as trauma, illness, or poverty – can seem beyond the scope of a substance use prevention program to address or reverse, research in the fields of early childhood and youth development demonstrates that even small interventions can successfully shift the course of risk for a child. **By intervening earlier and more broadly, we can better prevent substance use and its negative consequences.**

To protect children from starting down the path of substance use and addiction risk, we must put them and their families on the path to health, both mental and physical. Instead of beginning to implement prevention efforts late in middle or high school, we must start earlier – much earlier – before the foundations of risk are established. We must reimagine prevention and broaden its scope to include variables that too often are overlooked or discounted as not immediately relevant or not alterable. And, to enlarge the protective net around our nation's youth, we must enlist the talents of those who do not currently identify as specialists in substance use prevention but who engage in activities that enhance child resilience and ultimately reduce a child's risk of substance use.

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WHAT IS PREVENTION?

So, what exactly is substance use prevention? Is it helping parents have a conversation with their children about drugs? Is it a school assembly where people in recovery share their stories and hard-learned lessons? Is it counseling for a young person experiencing anxiety, stress, or trauma? Is it educating parents about the latest drug trends? Is it training physicians to screen young patients for substance use? Is it incorporating lessons about addiction science into biology and chemistry classes? Is it policies prohibiting the advertising of tobacco, alcohol, or marijuana products near schools? Is it peer education and support?

Yes, prevention can include any of these activities. But effective prevention is also easy access to diapers and affordable child care for new parents so that they can support and actively engage with their babies. It is policies that help to reduce poverty, offer paid family leave, address childhood trauma, and guarantee health insurance coverage for parents' mental illness and addiction treatment so that children grow up in a healthy and stable family environment. Prevention is engaging and accessible after-school and weekend activities for young people so that they are stimulated and challenged within a safe environment. It is literacy skills, guidance and mentorship from caring a adults, social and emotional learning, and opportunities for civic engagement so that children feel a sense of worth, hope, and belonging.

All this is not to say that traditional school- and community-based prevention programs are ineffective. Rather, they are **necessary but not sufficient** to effectively address the foremost preventable public health problem our nation has struggled with for decades: substance use and addiction.

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ADOLESCENCE IS THE TARGET OF PREVENTION FOR GOOD REASON

Adolescence is a life period of major transition, growth, and learning, both physical and psychosocial. It is a time of great opportunity and potential, when burgeoning independence allows a young person to explore new identities, interests, experiences, and relationships.[2] It is also a period of dramatic physical development, which includes not only observable changes to the face and body, but also extensive growth and development within the brain. Just as the physical changes that adolescents experience are essential for moving from a state of childhood dependence to the independence required of adulthood, the structural and functional changes that occur in the brain during this time are equally critical for setting the stage for emerging adulthood.

During adolescence, the prefrontal cortex — the part of the brain responsible for important cognitive functions such as judgment, decision-making, long-term planning, and impulse control (also known as executive functioning skills) — is still undergoing dramatic development and will not mature fully until early adulthood.[3] The prefrontal cortex and executive functioning skills are vital for regulating and inhibiting impulses from an earlier-maturing region of the brain called the limbic system. The limbic system regulates emotions, memory, and arousal and can be thought of as the reward-seeking part of the brain. While the limbic system is matured by adolescence, the prefrontal cortex and its connection to it are not yet fully developed.[4] Because of this, adolescents tend to make decisions that are disproportionately influenced by the reward-seeking regions of the brain and are not as responsive to the still-maturing regions responsible for inhibiting impulsive behavior.[5]

These changes in the brain allow young people to take more risks than they had in childhood so that they can encounter new experiences, learn from them, and be better prepared once they emerge fully into independent adulthood. On the positive side, this risk taking allows a young person to get behind the wheel of a car for the first time and try driving, take up a new sport or musical instrument, ask someone out on a date, join a new friend group, start a new school club, or become active in fighting for social or political change. But this natural growth in the tendency to take on risks also increases the potential for harm. Risky behaviors – such as substance use, certain types of sexual activity, and delinquent acts – frequently emerge in adolescence, when the developing brain allows for heightened sensation seeking but is not yet fully equipped with the cognitive controls needed to rein in those behaviors when the potential for harmful consequences is right around the corner.

Substance use during adolescence may induce changes in the structure and functioning of the prefrontal cortex that persist into adulthood and underlie substance use disorder risk.[6] Animal studies, where drugs can be introduced during specific developmental stages and changes in brain structure tracked, also support the idea that adolescence is a sensitive period for substance use.[7] For example, adolescent rats exposed to cocaine and alcohol show significant and persistent changes in their adult brain activity and structure.[8]

Those who research or practice in the field of substance use and addiction have directed most of their attention toward adolescence because **this developmental stage represents the height of vulnerability for experimentation with and initiation of substance use and for the consequences of such use, including the risk of developing addiction.**[9] This is supported by research that finds that early initiation of substance use, especially before the age of 15, significantly increases the risk of substance use problems later in life.[10] In fact, early use is one of the strongest predictors of developing a substance use disorder, or addiction.[11]

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Likelihood of alcohol use disorder as a function of age at first use of alcohol

Individuals who begin drinking at an early age have 5 times higher odds of developing an alcohol use disorder than those who wait until 21.
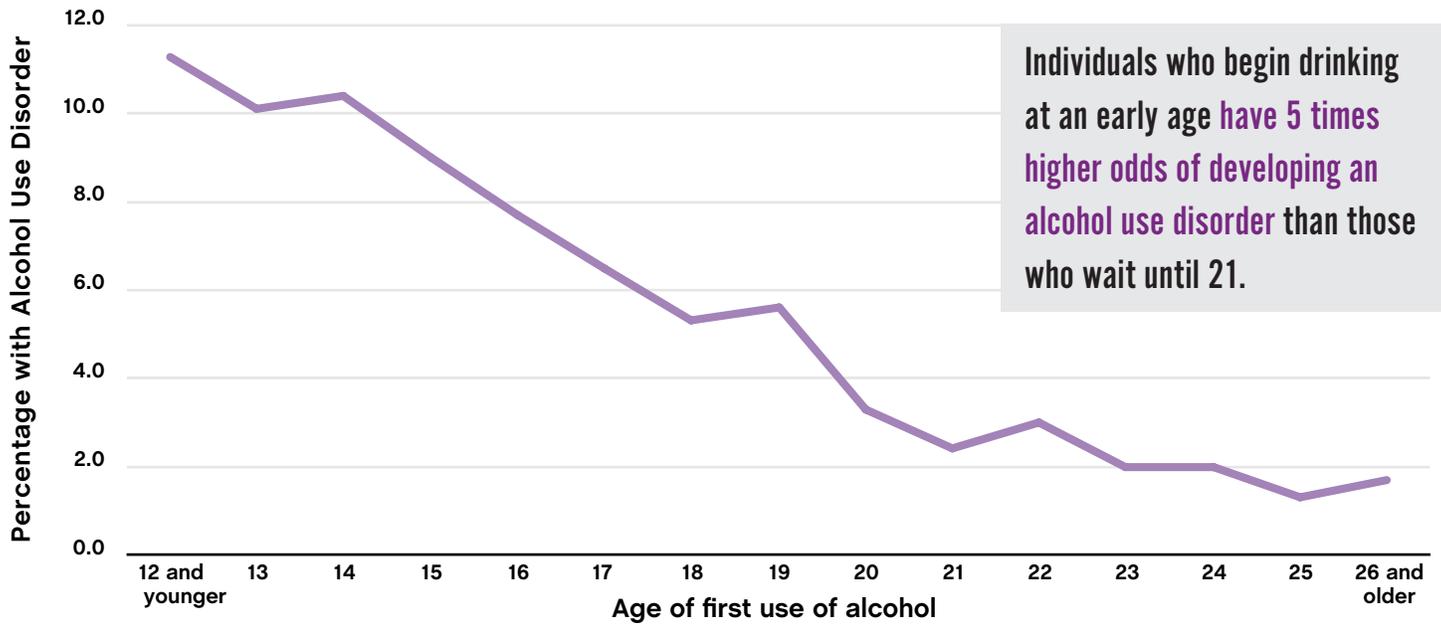
Source: Analysis of 2018 data from the National Survey on Drug Use and Health

Likelihood of marijuana use disorder as a function of age at first use of marijuana

Individuals who begin using marijuana at an early age have 8 times higher odds of developing a marijuana use disorder than those who wait until 21.
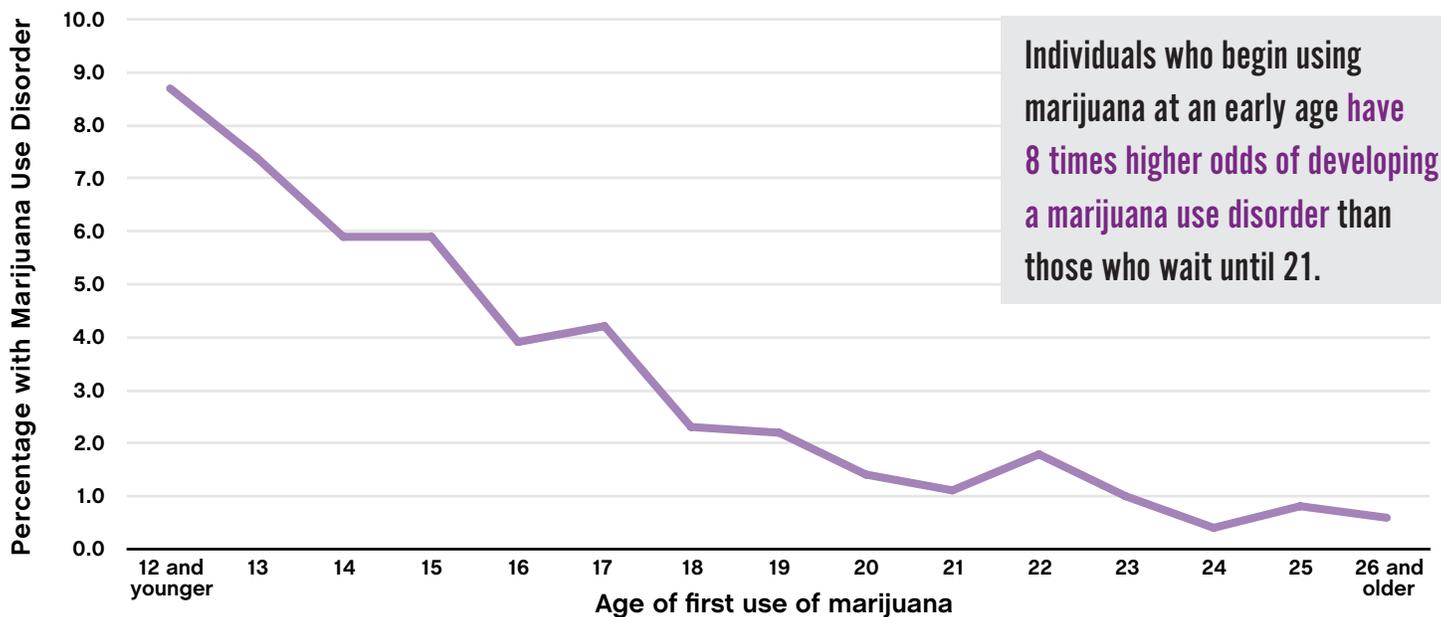
Source: Analysis of 2018 data from the National Survey on Drug Use and Health

Although teenagers engaging in harmful behaviors are in the minority, recent statistics show that the proportion of those who do so, especially with regard to substance use, remains high.[12]

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Physical health risk behavior among high school students in the United States, 2019
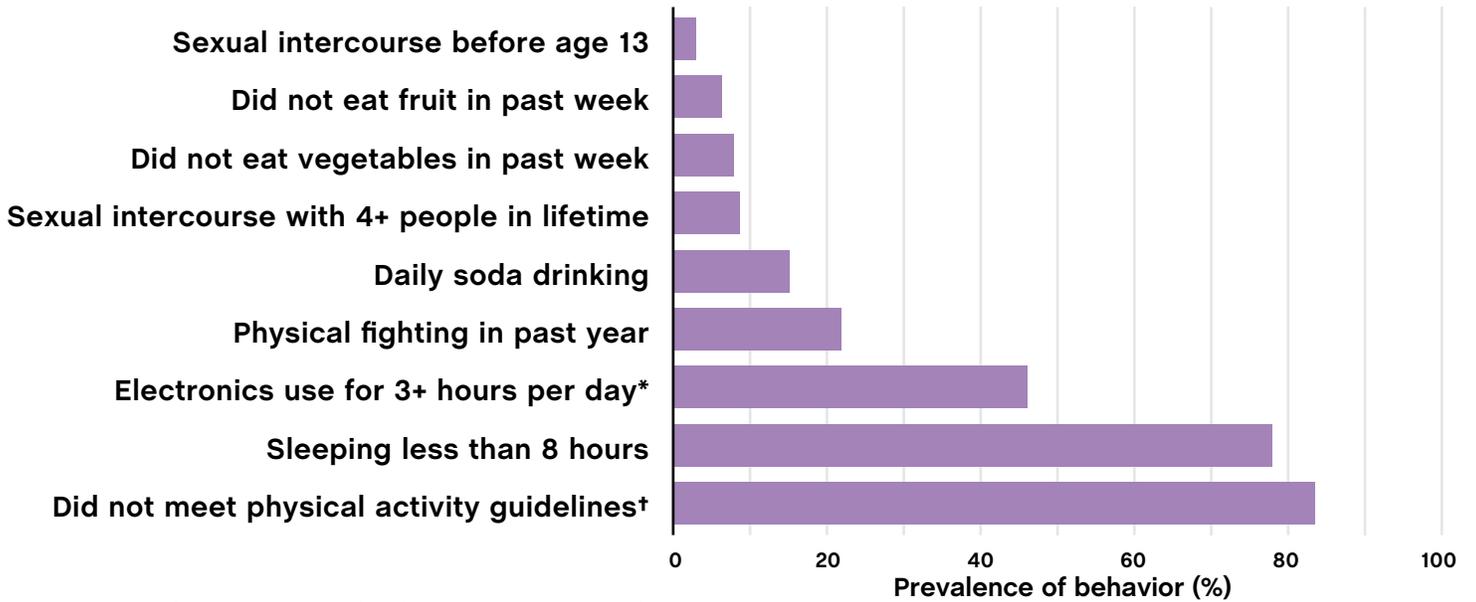
Behavior	Prevalence of behavior (%)
Sexual intercourse before age 13	~2
Did not eat fruit in past week	~6
Did not eat vegetables in past week	~8
Sexual intercourse with 4+ people in lifetime	~8
Daily soda drinking	~15
Physical fighting in past year	~21
Electronics use for 3+ hours per day*	~46
Sleeping less than 8 hours	~78
Did not meet physical activity guidelines†	~84

Source: Centers for Disease Control and Prevention (CDC), Youth Risk Behavior Among High School Students in the United States, 2019

Substance use risk behavior among high school students in the United States, 2019
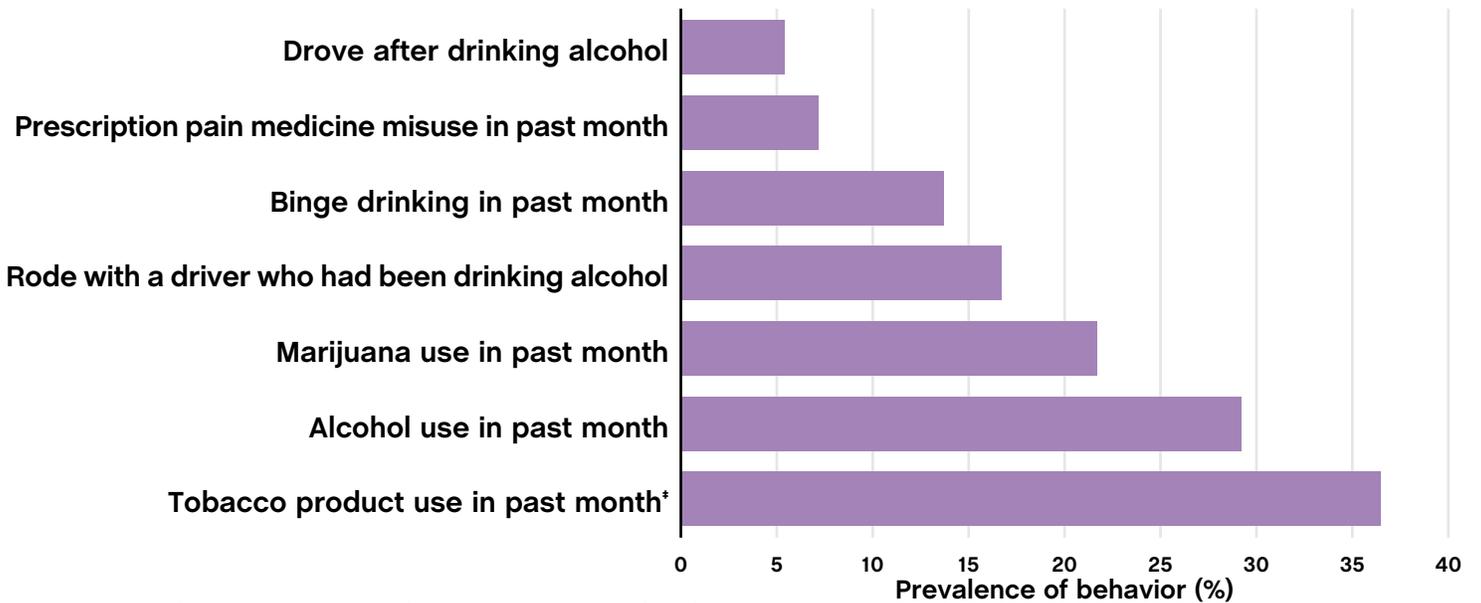
Behavior	Prevalence of behavior (%)
Drove after drinking alcohol	~5
Prescription pain medicine misuse in past month	~7
Binge drinking in past month	~14
Rode with a driver who had been drinking alcohol	~17
Marijuana use in past month	~22
Alcohol use in past month	~29
Tobacco product use in past month‡	~37

Source: Centers for Disease Control and Prevention (CDC), Youth Risk Behavior Among High School Students in the United States, 2019

* Use of electronic devices, including smartphones, computers, tablets, and gaming devices, for purposes not related to school.

† Aerobic and muscle-strengthening physical activity guidelines, obtained from the U.S. Department of Health and Human Services, were defined as being physically active for 60 or more minutes per day and performing toning or strengthening exercises on at least three days in the past week.

‡ Includes use of cigarettes, cigars, smokeless tobacco, and electronic vapor products.

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WHY PREVENTION MATTERS

The co-occurrence of risk behaviors is common among young people, such that those who engage in one risk behavior tend to engage in multiple risk behaviors. For example, national data indicate that those who report having four or more lifetime sexual partners are less likely to use condoms. Those who report having ridden with a drinking driver are nearly 10 times more likely to also report having driven after drinking alcohol themselves. And most youth who report using a given addictive substance say they use more than one.[13]

With regard to substance use specifically, three in 10 high school students report drinking alcohol in the past month and, by the time they leave high school, nearly half (48.7 percent) have used marijuana and 17.4 percent have used other illicit drugs. Even though the prevalence of substance use behavior reflected in these data indicate that most young people do not engage in substance use on a regular basis, the majority of adolescents do

report having tried one or more addictive substance in their lifetime.[14] And a notable proportion start early: an estimated 15 percent, 8 percent, and 6 percent of students said they've tried alcohol, cigarettes, and marijuana, respectively, before age 13.[15]

Youth substance use not only increases the risk of addiction but also has profound health, social, and financial costs. It is directly linked to the three leading causes of death among adolescents – accidents, homicides, and suicides[16] – and is implicated in poor academic performance, cognitive impairment, school dropout, unsafe sex, unintended pregnancies, mental health problems, violence, criminal involvement, unsafe driving, and numerous potentially fatal medical conditions.[17] The more frequent and intense the use of addictive substances among young people, the greater the consequences. Use of more than one substance only compounds the risk of negative outcomes.[18]

CONSEQUENCES OF YOUTH SUBSTANCE USE	
IMPAIRED ACADEMIC AND CAREER PERFORMANCE	Declining grades,[19] truancy,[20] school dropout[21]
	Heightened risk of unemployment in early adulthood[22]
MENTAL AND PHYSICAL HEALTH PROBLEMS	Impaired brain development and maturation in areas related to emotion, judgement, decision making, memory, motivation, impulse control[23]
	Anxiety, depression, suicidal thoughts, eating disorders, psychosis, personality disorders[24]
	Increased cardiac, respiratory, reproductive health problems[25]
	Increased risk of substance use disorder (addiction)[26]
INCREASED RISK OF DANGEROUS BEHAVIORS	Driving under the influence[27]
	Unprotected sex and unplanned and unintended pregnancies[28]
	Violence[29]
FATALITIES	Motor vehicle fatalities[30]
	Poisonings[31]
	Accidents/unintentional injuries[32]
	Suicides linked to substance use[33]
SOCIETAL CONSEQUENCES	Prenatal exposure[34]
	Environmental tobacco smoke[35]
	Financial burden to education, health care, justice, social welfare systems[36]

Even if most young people do not use addictive substances regularly, those who do tend to do so in dangerous ways and to experience the consequences more acutely than adults. For example, most youth alcohol use can be characterized as binge drinking*[37] and adolescents who use marijuana are approximately twice as likely to develop a marijuana use disorder compared to adults.[38]

* Generally defined as consuming four or more drinks (females)
  or five or more drinks (males) on one occasion.

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ENCOURAGING TRENDS

Although the use of certain substances, specifically nicotine and marijuana, among youth has been increasing in recent years, other trends that have emerged over the past few decades are encouraging: use of cigarettes, alcohol, and certain other addictive substances has been declining among adolescents and young adults,[39] the average age of first use of any addictive substance has been increasing,[40] and more and more young people are choosing to abstain completely from substance use.[41]

TRENDS IN NO USE OF ANY ALCOHOL, CIGARETTES, MARIJUANA OR OTHER ILLICIT DRUGS

by 12th Grade Students in the US, 1976–2018

59.0%

31.4%

Past Month Non-Use

Lifetime Non-Use
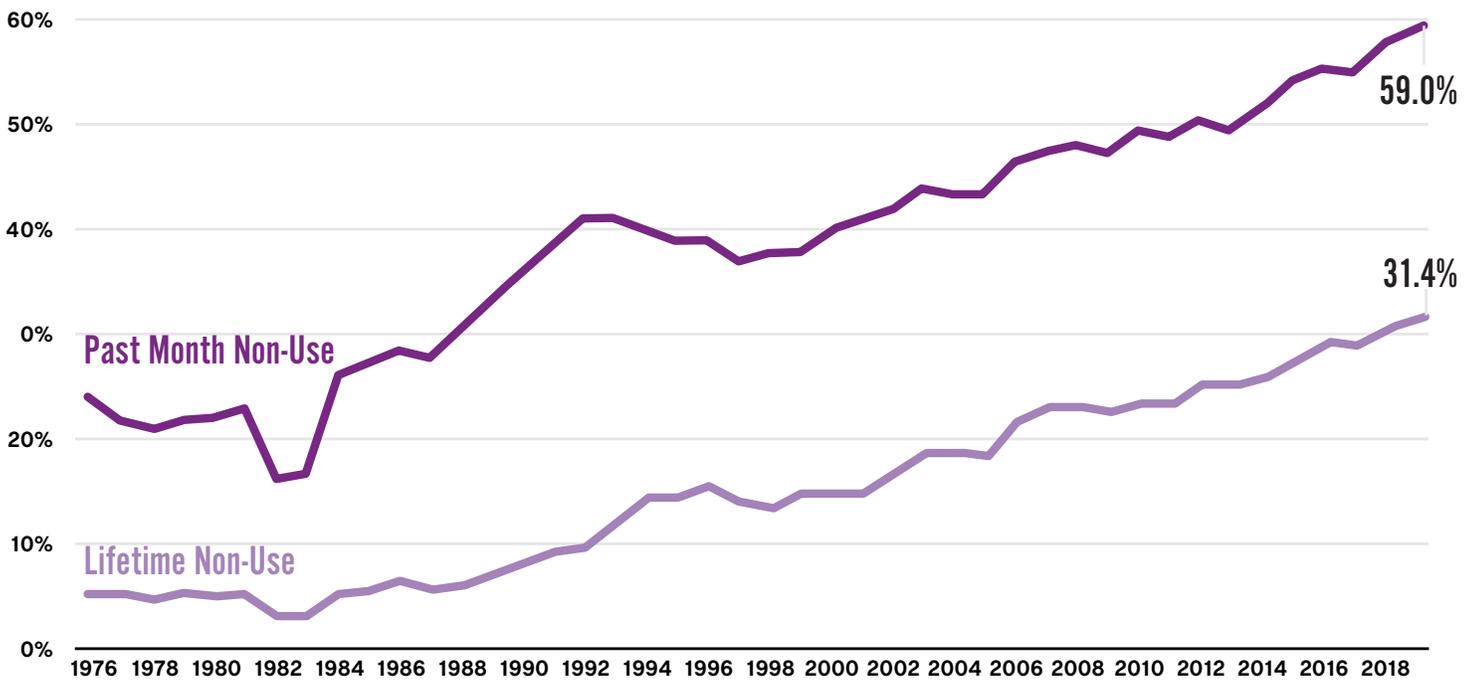
Source: Monitoring the Future, 2019; Levy, S., Campbell, M. C., Shea, C. L., DuPont, C. M., & DuPont, R. L. (2020). Trends in substance nonuse by high school seniors: 1975–2018. Pediatrics, 146(6), e2020007187.

There is no doubt that this is an encouraging pattern, and we must not discount its significance. But the reasons behind a nationwide shift in the prevalence of this sort of complex behavior are multifaceted. It is possible that the decline is due, at least in part, to the advancement of evidence-based prevention interventions and programs. Notably, however, as rates of adolescent substance use have fallen, fewer young people have reported receiving or being exposed to prevention messaging or education,[42] suggesting that prevention programming alone is likely not responsible for the downward trend.

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Examining changes in the factors that increase or decrease the risk of youth substance use might point to something larger than prevention programming as an explanation. For example, research shows that engagement in other risky behaviors, such as fighting and sexual activity with multiple partners, has also been decreasing.[43] These tandem downward trends appear to be related not to targeted prevention efforts for distinct behaviors but rather to changes in a broader phenomenon that contributes to multiple risky behaviors.[44] A number of factors that are known to be protective against youth substance use – including positive attitudes toward school, parental monitoring, engagement in extracurricular activities, and social-emotional learning – have trended upward.[45] At the same time, on the decline are several factors associated with heightened risk for substance use, including maternal postpartum depression, corporal punishment, and conduct problems.[46]

INCREASING TRENDS[47]	DECREASING TRENDS
Age at first substance use	Maternal postpartum depressive symptoms
Positive attitudes toward school	Corporal punishment (i.e., harsh discipline)
Parental monitoring	Conduct problems
Strong parental disapproval of substance use	Youth engagement in sex
Strong youth disapproval of peer substance use	Time spent without parental supervision
Parental affirmation	
Youth participation in extracurricular activities	
Youth wearing a car seatbelt	
Social-Emotional Learning (SEL) programs	

Taken together, these shifts in a generally positive direction might represent the culmination of the past few decades of public health and educational advances focused on improving youth well-being through greater attention to early childhood development and growing appreciation for the role social-emotional health plays in fostering resilient youth.

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THE PAST, PRESENT, AND FUTURE OF SUBSTANCE USE PREVENTION

For the past century, substance use has been an enduring public health concern in the United States due to its substantial and pervasive social, health, and financial burdens. While the focus has shifted over the decades to reflect contemporary and emergent drug trends, preventing substance use and its associated harms has remained a core goal of public health efforts. By targeting factors within individuals, families, schools, and communities that increase or decrease the risk of youth substance use, prevention efforts aim to stop addiction before it begins.

One of the most direct ways to prevent addiction is to limit exposure and access to nicotine, alcohol, and drugs and the extent to which these substances are made or marketed in ways that appeal to youth. However, completely eliminating exposure and access to addictive substances and their appeal is not realistic. This means that prevention efforts must address more complex realities about what leads people to use substances in the first place. How prevention is defined and what it looks like in practice have changed as new information on addictive processes and susceptibilities comes to light.

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APPROACHES TO UNDERSTANDING SUBSTANCE USE AND ADDICTION

The shifting ways in which addiction has been understood and framed – from a moral or criminal problem to a health issue rooted in both biology and life circumstances – have played a significant role in prevention and treatment efforts and in the policies that have shaped our nation's approach to this complex and challenging issue.

MORAL MODEL

According to the moral model, addiction is considered a failure of morality, character, and will power. This perspective has contributed to the stigma associated with addiction; it attaches blame to the individual, creates shame and embarrassment, increases the likelihood of discrimination, and decreases the chances that those who need help will seek it or receive effective care.[48] Individuals are considered responsible for both the development of their addiction and the success of their recovery. Prevention and treatment approaches following this model center primarily on spiritual interventions to develop good "moral" character and legal interventions to punish individuals who use substances.[49] There is no research evidence to support the moral model of addiction.

BIOMEDICAL MODEL

The biomedical or "disease" model of addiction relies on biological explanations for addiction, drawing on advances in genetics and brain research. This model was a critical reconceptualization of addiction, as it allowed for the relocation of primary prevention and treatment efforts from the legal domain to the medical domain.[50] This meant advancements in effective treatment and reduced stigma, as the model shifts some blame away from the individual and onto the disease. Prominent organizations such as the National Institute on Drug Abuse, conceptualizing addiction as a "chronic, relapsing brain disease," and the American Medical Association, declaring addiction a "disease" in 1987, gave support to this model.[51] However, critics posit that it discounts social, psychological, and behavioral factors that contribute to the development, expression, and severity of addiction, and that it could engender feelings of hopelessness regarding treatment and recovery.[52] Since the biomedical model centers on genetic and brain development processes and vulnerabilities, its prevention strategy emphasizes preventing exposure to substances, as that launches the disease process within the brain.

BIOPSYCHOSOCIAL MODEL

Although the biomedical model is widely accepted and has a substantial body of supporting research, it fails to account for the full scope of factors that contributes to addiction. The biopsychosocial model accounts for these limitations by giving equal weight to biological, genetic, psychological, and sociocultural factors.[53] This comprehensive model acknowledges that a wide range of individual and overlapping determinants can lead to addiction and helps explain research findings that do not fit neatly within a biomedical conceptualization, such as instances of spontaneous recovery and treatment success via behavioral interventions.[54] Contemporary biomedical models have begun to address some of these criticisms and include recognition of these additional factors while maintaining a primary emphasis on biological and genetic causes of addiction.[55] Currently, the biopsychosocial model best represents the research and clinical evidence regarding the risk for substance use and the development of addiction. This model underscores the importance of a broad and comprehensive approach to prevention, one that addresses all the points of influence on a young person that can either increase the risk of or protect against substance use.

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TRENDS IN SUBSTANCE USE PREVENTION

It is difficult to prove the success of a preventive intervention because the desired outcome is a non-event: no health problem emerges or, in this case, there is no use of a substance during the period of concern. Therefore, the interventions that have been used have largely been based on the principle that reducing factors in a young person's life that are known to be associated with substance use and enhancing those factors that are known to be associated with non-use or less problematic use will result in effectively preventing, or at least delaying, youth substance use. Efforts to prevent youth substance use, on the basis of this principle, have been practiced for decades, with varying degrees of fidelity to the research evidence and with varying degrees of success.[56]

Community Anti-Drug Coalitions of America (CADCA) summarized the changing approaches to substance use prevention over the past few decades. Back in the 1950s and early 1960s, interventions tended to rely on scare tactics delivered through films and speakers to discourage young people from experimenting with substances. During the later 1960s, programs continued to use films and speakers but focused more on providing information about why people use substances and why it is problematic. In the 1970s, prevention efforts became more sophisticated, relying on educational curricula to explain the various motivations for substance use; the effects of different substances; how use relates to one's self esteem, decision-making skills, and values; and how improved social and coping skills can help a person avoid substance use.

The late 1980s and 1990s saw a growing appreciation for the complexity of substance use determinants and the need to involve parents and communities in prevention efforts. This trend continued in the early 2000s, with more of a focus on comprehensive programming, including policy changes and attempts to combat environmental influences on substance use, such as in media and advertising. This was also the time when more emphasis was placed on program evaluation and grounding prevention efforts in science. Finally, interventions in the past decade have been based in the understanding of how substances affect the developing brain, how larger structural and social determinants of health play a role in substance use risk, and the importance of data-driven approaches to prevention.[57] Prevention practitioners began to rely more heavily on the comprehensive, multi-tiered public health approach to disease prevention. But, regardless of the exact approach used, the main target audiences have been fairly consistent over the decades: teenagers and, in some cases, college students.

HISTORY OF PREVENTION

Year	Approach
1950	Scare Tactics
1960	Information Dissemination
1970	Affective Education & Alternatives
1980	
1990	Research-based Curricula/Programs
2000	Evidence-based Prevention & Comprehensive Approach
2010	

Source: CADCA National Coalition Academy

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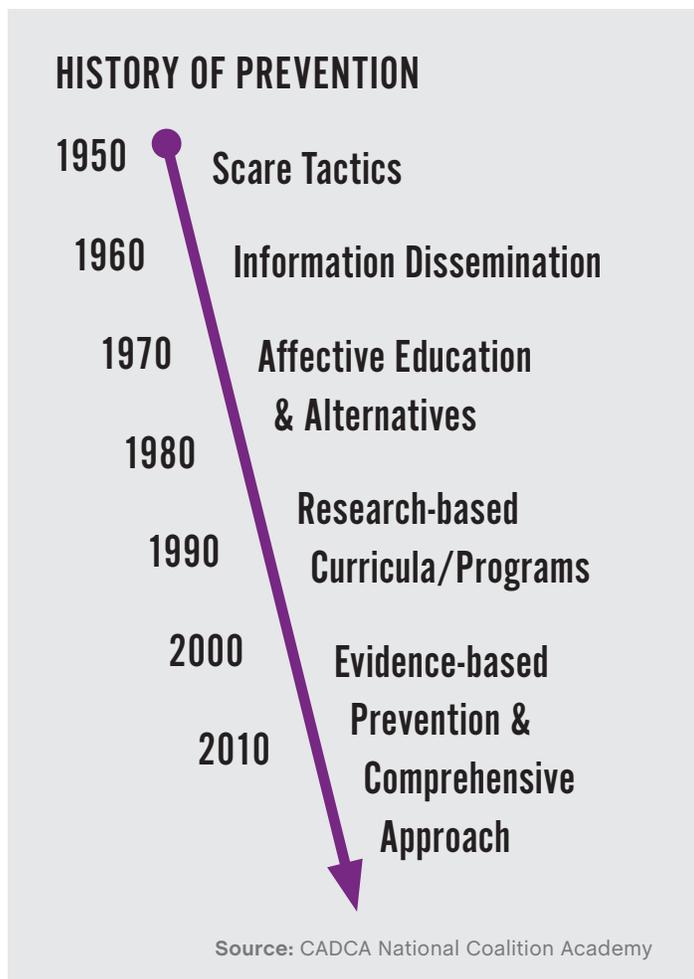
THE PUBLIC HEALTH APPROACH TO PREVENTION

Currently, most substance use prevention strategies are based on the public health approach, which involves a broad and comprehensive framework for prevention that aims to reduce the likelihood of harm, injury, or disease in the whole population, while focusing additional attention on those who are particularly susceptible to engaging in substance use or developing addiction. Presently, in the case of substance use and addiction prevention, the key target group is adolescents because the vast majority of adults with a substance use disorder began using nicotine, alcohol, or other drugs during adolescence[58] and because of the broad range of social and health consequences associated with adolescent substance use.

The public health approach typically consists of four primary steps to prevent or reduce the incidence of a disease or health issue in the general population:

1. Defining the scope and nature of the problem,

2. Identifying factors that increase risk ("risk factors") or increase protection ("protective factors"),

3. Developing and testing prevention strategies and modifying approaches to enhance effectiveness, and

4. Disseminating the knowledge and bolstering systems to assure widespread adoption.

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Within the public health approach to substance use prevention, there are three main types of interventions or strategies based on either who the intervention targets (universal, selective, and indicated) or at what point in a person's involvement with substances the intervention is made (primary, secondary, and tertiary).[59] At each of these levels of intervention, the goal is to minimize factors that increase the risk of substance use and bolster factors that protect against engaging in substance use and developing addiction. Such public health-based prevention programs have been shown to diminish the risk of substance use and addiction.[60]

UNIVERSAL OR PRIMARY PREVENTION

is implemented on a broad basis to reach as many individuals within the program's sphere of influence as possible. For example, all students in a specific school might receive information about substance use and addiction in a required health class or assembly. These programs or interventions are designed to forestall the onset of a problem. Many seek to educate students about the effects and harms of addictive substances, give them the tools needed to confront social pressures to use, and help them develop healthy coping skills so that they do not turn to substances to self-medicate feelings of stress, anxiety, or depression. The hope is that the development of stronger interpersonal and coping skills and general knowledge about the risks will limit early engagement in substance use. Other common measures for implementing universal prevention include media and health campaigns and routine screening of all youth for substance use by health professionals. These interventions are designed to prevent substance use within a broad group of individuals before it begins.

SELECTIVE OR SECONDARY PREVENTION

intervenes with sub-populations identified as having higher than average risk of engaging in substance use or developing addiction. These groups are provided with intervention services that go beyond the programming offered in universal prevention, but intervention is still not individualized; recipients are identified simply based on their membership in a group known to have elevated risk factors relative to the general population. Examples of those who may be considered high risk include students who have mental health, behavioral, or academic difficulties; those with a family history of addiction; or members of a social group with high rates of substance use, such as some college fraternities or athletes. Schools or community organizations might implement selective prevention by offering specialized after-school activities, enhanced screening for risk, or brief interventions to certain subgroups. Given that this level of prevention is specific to a given subgroup, it is more targeted than universal prevention, and fewer people receive it.

INDICATED OR TERTIARY PREVENTION

is the most specialized form of prevention. It is for individuals who exhibit major risk factors and/or signs of substance use. These interventions attempt to discourage initiation of use and prevent the progression from use to addiction to avoid increasingly adverse consequences. For example, young people who exhibit mental health problems, trauma, or academic or social difficulties might use substances to cope with these problems and, therefore, could be identified as targets for indicated prevention. Unlike universal and selective prevention, indicated prevention usually requires interventions to be delivered by professionals with a clinical or counseling background. Indicated interventions are presented to a limited population and can be quite intensive.

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EMERGENCE OF PREVENTION SCIENCE

The shifting focus of prevention toward a public health approach was an essential precursor to the birth of what is now known as prevention science. Prevention science emerged in the 1990s and remains the predominant paradigm for preventing public health problems.[61] It was conceived as an integration of efforts from psychology, criminology, epidemiology, human development, and education "to prevent or moderate major human dysfunctions … focused primarily on the systematic study of hypothetical precursors of dysfunction or health, called risk factors or protective factors, respectively."[62]

Prevention science centers on identifying risk and protective factors associated with the health outcome of interest and developing and testing programs targeting those factors.[63] In recent decades, this push to utilize research-based practices gave rise to the formation of lists of substance use prevention programs that met certain criteria for effectiveness and are, therefore, considered "evidence-based programs" (e.g., the U.S. Substance Abuse and Mental Health Services Administration's Evidence-Based Practices Resource Center and the Institute of Behavioral Science's Blueprints for Healthy Youth Development).

| DEFINE AND MONITOR THE PROBLEM | IDENTIFY RISK AND PROTECTIVE FACTORS | DEVELOP AND TEST PREVENTIVE STRAGEGIES | ASSURE WIDESPREAD ADOPTION |

Source: www.cdc.gov/violenceprevention

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LIMITATIONS TO CURRENT APPROACHES

Although great strides have been made in prevention science over the past few decades, significant obstacles to effective prevention remain.

STIGMA

Stigma continues to be one of the most pervasive barriers to progress in both the prevention and treatment of substance use disorders and other mental health problems. The recent shift away from a moral and criminalized approach toward a more health-based approach has been essential to reducing stigma. Although the stated aim of most prevention programs currently in use is to mitigate risk factors and enhance protective factors associated with substance use, in practice, most emphasize risk reduction, sidelining the more general promotion of child mental and emotional health. A focus on risk deemphasizes the importance of positive development and resilience in protecting against substance use and other unhealthy behaviors and, more generally, fostering well-being. There is also an inclination to target programs to those at high risk, which can have the unintentional consequence of shifting stigma to individuals or groups identified as such.[64] While researchers are careful to avoid claims that any particular risk factor is causal or that a certain individual's future substance use can be predicted definitively, labeling individuals, groups, or communities as "at risk" can be stigmatizing.[65] A focus on targeted programs can also deprive individuals, groups, or communities – who are deemed to be at low risk – of interventions that might benefit them.[66]

LACK OF COLLABORATION AND INDEPENDENT EVALUATION

Prevention science sought to define a field that was multi-disciplinary by uniting efforts across various research fields (e.g., psychology, criminology, epidemiology, education). The hope was that this would result in a cyclical feedback process between science and practice wherein knowledge about risk and protective factors would inform prevention strategies, and implementation of interventions would inform our understanding of causal factors.[68] Yet, truly collaborative efforts between researchers and practitioners are rare. More commonly, program developers (usually researchers) design an intervention based on risk and protective factors identified in the research, implement and evaluate the program, and then disseminate the program if found effective. The same group of researchers often serves as the developer, implementer, assessor, and disseminator, and the extent to which knowledge gained from intervention evaluations feeds back into or informs subsequent research and practice is not always clear. True interdisciplinary and collaborative efforts to advance effective prevention strategies still seem to be the exception rather than the norm.[69]

"The best we can say about most drug prevention programs is that they will prevent some level of some type of drug use among some subgroup of individuals at some point in time."[67]

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NARROW AND DIFFICULT TO REACH STANDARDS OF EVIDENCE

Another limitation to current approaches is that what became recognized as "legitimate" or "evidence-based" prevention is narrowly defined in practice as interventions targeting individual factors, such as a child's mental health, self-esteem, coping skills, and peer influences. Less emphasis was placed on the social and structural determinants of risk and protection – such as family economic stability or local policies regulating the accessibility of addictive substances – which are harder to control and measure but no less important.[70] The result has been a proliferation of programs targeting individual behavior change, rather than changes on the family, community, and societal levels. Structural factors are less amenable to change (either in responsiveness to interventions or political will to address them) and more difficult to measure. Prevention programs' emphasis on individual-level factors can create a perception that risk and protection operate independently of the broader social and structural context in which an individual lives.[71]

Prevention science has certainly led to significant improvements in the development and identification of effective prevention programs through the application of rigorous research methods. However, the evidence base of many programs deemed effective is questionable, given an overall publication bias towards positive results, the fact that most evaluations are conducted by program developers with potential conflicts of interest, a lack of independent replication trials, and some doubt regarding the practical significance of certain study outcomes to real-world settings.[72] In addition, because the desired outcome of prevention is, by definition, the absence of an outcome (in this case, substance use), the time frame for seeing a real, measurable impact is long and typically beyond the scope of most studies of program effectiveness. As a result, many studies measure changes in youth attitudes toward substances and intentions to use in the future, which are important predictors of future use but not tantamount to measuring actual use. Programs that avoid these issues and are truly evidence-based can be hard to identify in a vast field of available prevention programs, and even those demonstrate only small to moderate effects on substance use.[73]

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WHO IS – AND WHO SHOULD BE – RESPONSIBLE FOR PREVENTION?

If the factors associated with substance use and future addiction cross multiple domains and the targets of prevention efforts include the general population, those with known risk factors, and those already experiencing problems, who is responsible for prevention efforts? Who is tasked with taking knowledge gained in prevention science and putting it into practice? It seems the answer should be everyone. However, when everyone is responsible for acting, there can be a diffusion of responsibility and, even among those willing to take on the responsibility, efforts can become siloed and insular.

While the definition of prevention is largely consistent across silos – that substance use can be avoided or delayed through efforts aimed at reducing risk factors and fostering protective factors – the approach, implementation, and prioritization of strategies often reflect the background, expertise, and organizational structure of the silo. For example, schools are more suited to adopt prevention strategies aimed at promoting education and skill-based learning, while health care providers focus more on screening for risk and conducting interventions with those identified as being at risk. This may be desirable in some ways. Implementing prevention efforts in various settings, through various modalities, and with various targets promotes a comprehensive approach. It also reflects the reality of substance use: just as risk is not contained to one area of life, neither are opportunities for protection and prevention. Therefore, **the most identifiable providers of substance use prevention interventions are those with frequent and close interaction with young people: parents and other adult caregivers, educators, health care providers, and community leaders.** Importantly, the benefit of these groups acting in concert rather than in isolation far outweighs the benefit each can have working independently of one another.

PARENTS, CAREGIVERS, AND FAMILIES

Parents and families are common targets for prevention efforts that center on building healthy parent-child relationships through education and skill-building.[74] Home life is critical in creating nurturing environments for children, which allow for healthy child development.[75] Positive family relationships, parental involvement and supervision, and strong parent-child communication are all protective against substance use.[76] Accordingly, family prevention programs often encourage nurturing environments and teach parents how to best monitor and communicate with their children.[77]

There is no doubt that parents play one of the most influential roles in children's substance-related attitudes, decisions, and behaviors. However, their outsized role should not mean that they must carry the full burden of preventing youth substance use. Research shows that the public tends to default to parents as the sole responsible party for ensuring positive early childhood development, downplaying or dismissing critical environmental structures and systems that encourage and foster healthy families and children.[78]

Barriers to reaching and engaging families and addressing the environmental and structural context within which parenting occurs necessitate a broader view of prevention. Even in families in which parents and other caregivers surround the child with protective influences and mitigate those that confer risk, a child might still be at risk for substance use due to influences outside of the home. Therefore, parents cannot be solely responsible for creating a protective environment to help deter children from substance use.

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EDUCATORS

Children, adolescents, and young adults are the primary focus of prevention, since inherent in preventing addiction is reaching individuals before they have been exposed to or begun to use substances. As young people spend the majority of their time in school, educators are well positioned to influence the prevention messages and approaches to which they are exposed. Therefore, it is not surprising that school-based efforts are the cornerstone of prevention research and programming.[79]

School-based programs that are effective tend to be those that work toward improving key life skills – such as self-regulation, coping, problem-solving, drug resistance, and effective communication – and bolstering healthy peer relationships, school connection, and academic supports.[80] However, the development of these school-based prevention programs and strategies frequently does not occur in coordination with schools or educators; instead, most programs are developed by psychologists and prevention scientists, based on their expertise in behavior change and mitigating risk for substance use. This disconnect can make it challenging to translate effective prevention principles into real world school settings, which are often strapped for time and resources.[81]

A school's impact on a child extends far beyond the scope of a curriculum or specific program. Schools are multifaceted environments that shape children's developmental experiences through climate and culture, policies, and relationships among students, between students and faculty, and with the broader community. School environments are primary drivers for children's socialization and can influence their development of beliefs and values about themselves, others, and the world in ways that affect risk for substance use.[82] Most prevention programs implemented through schools emphasize targeted learning and individual behavior change, but there is a growing awareness of the role of the school in also creating a climate that can promote the critical protective factors of child security, stability, and a healthy sense of community.[83]

While schools have long been tasked with delivering prevention messages and curricula to young people, they function within a complex mix of local, state, and federal government funding and regulations that can be challenging to coordinate toward these efforts.[84] These complexities, coupled with the decentralized nature of the Unites States public education system, make it difficult to evaluate the full scope of prevention efforts to which children are exposed through school. Available data show a discouraging picture about dissemination and adoption of effective school-based programs. One evaluation of state educational standards for public schools' prevention curricula showed that most states, while requiring instruction, did not meet the evidence-based criteria for content and delivery.[85] A U.S. Department of Education analysis found that, in middle schools and high schools, less than 10 percent of implemented programs were evidence-based and more than 90 percent had no research supporting their effectiveness.[86]

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HEALTH CARE PROVIDERS

Although treatment for addiction is slowly becoming integrated into mainstream health care, substance use prevention has not seen the same gains. Prevention efforts still mostly reside in the school and community domains. Those that have advanced within health care are focused primarily on selective (secondary) and indicated (tertiary) strategies. For example, prevention of opioid misuse primarily involves more careful prescribing practices, such as assessing patients for additional risk factors when prescribing controlled medications, reducing the amount of medication a patient has at one time, closely monitoring patients while they are taking medications, and providing education about addiction risk when prescribing.

Medical and health care settings are increasingly utilizing Screening, Brief Intervention, and Referral to Treatment (SBIRT), which is a structured approach to providing universal, selective, and indicated prevention services.[87] Settings that employ SBIRT as part of routine preventive care couple substance use screenings with psychoeducation about the harms associated with substance use. Depending on the risk level identified through screening, health care professionals might simply discuss substance use risk with patients, deliver a brief intervention aimed at reducing existing risk, or refer patients to treatment if warranted. SBIRT has been adopted across numerous health care settings, including primary and pediatric care, emergency departments, and community settings.

While health care utilization and access are not as widespread as public education in the United States, health care providers offer an additional setting outside school for implementing prevention strategies. Pediatricians in particular can play a vital role in prevention,[88] due to their proximity to parents and children and their status as knowledgeable, trustworthy adults.[89] Yet there are several barriers to screening in this setting: physicians report concerns about funding and reimbursement,[90] most children see a pediatrician only once a year, parents are usually present and may limit a child's openness to screening questions, and pediatricians' time with patients and training in screening and brief intervention typically are limited.[91]

COMMUNITIES AND POLICYMAKERS

Community prevention efforts are focused on population-based approaches to reducing substance use and its associated problems. They tend to be less concerned with targeting individual risks and more focused on cultural, social, and environmental changes that can promote health within the community.[92] This might include social marketing* and public awareness campaigns, health and wellness promotion, and public policy changes.[93] Community approaches to prevention also emphasize collective action across community sectors, including strategies aimed at the school and health care environments. Communities can engage in prevention efforts that combine evidence-based programs and policies for increased impact on the population and ensure prevention reaches groups of people in a variety of settings (e.g., schools, media, community-serving organizations) and with varying levels of risk.[94]

Local substance use prevention policies also commonly target the population more broadly by imposing taxes on legal addictive substances, restricting tobacco and alcohol retail outlet density, limiting days and hours of sale of legal substances, raising the minimum legal age of sale or purchase, and instituting prescription drug monitoring programs. Communities' and policymakers' prevention efforts have the potential for large scale influence on substance use behaviors. Unfortunately, these efforts and policies are rarely implemented widely or enforced adequately, tend to change over time, and are subject to resource limitations, political will, and competing interests.[95]

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* Social marketing uses successful commercial marketing methods to promote public health or other social goals.

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IMPROVING UPON CURRENT APPROACHES

Recent shifts in research and practice have begun to place more emphasis on a health promotion and strengths-based approach to youth development.[96] For example, the **developmental assets framework** emphasizes the importance of fostering cumulative factors to protect against risk rather than prioritizing individual factors in a child's life. This framework is comprised of external assets such as support and empowerment, as well as internal assets such as social competence and positive identity, all of which can be provided and enhanced by the adults in a child's life.[97] Likewise, a recent report by the National Academies of Sciences, Engineering, and Medicine presents adolescence as a time of growth and promise, rather than its traditional framing as a life stage of great risk and peril. It lauds the adolescent brain for its unparalleled ability to adapt and change and calls for "policies and practices that will better leverage the developmental opportunities offered by adolescence."[98]

Given these promising developments, including the finding that substance use rates among youth generally have been declining over the past few decades, one can argue that the current mix of prevention efforts has been effective in attaining its goal. However, rates of use among youth remain high, and a significant proportion of those who do use tend to do so intensely and excessively, increasing their risk for the many consequences of substance use, including developing a substance use disorder. The ongoing opioid epidemic and emerging stimulant misuse crisis further highlight the need for effective prevention to avoid addiction crises like these in the future. **So, what are we still missing when it comes to effective prevention?**

"We need to reframe adolescence from eye roll to opportunity. ... The public narrative on adolescence frames young people as dangerous threats and adolescence as an unfortunate time of life. ... We need to move our thinking from adolescence as a time when we close our eyes and just hope a young person gets through -- without being arrested, addicted, or otherwise damaged -- to a time of opportunity when lifelong skills and relationships are built and passions spark and ignite. We need to move from policies that prioritize protection to those than enable engagement and empower young people."[99]

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SHIFT PREVENTION EARLIER

Prevention researchers and public health professionals have long acknowledged the developmental etiology of substance use disorder; not only that the majority of cases of addiction begin with substance use during adolescence, but that the foundations of risk for adolescent substance use appear earlier in childhood.[100] Yet, in practice, activities understood to fall within the rubric of prevention are usually initiated in adolescence, when substance use behaviors typically emerge and when the causes and short-term consequences of such behaviors are considered most salient.

Given the significant overlap between the factors known to impede healthy childhood development and those known to increase the risk of youth substance use, it is important for substance use prevention strategies to absorb knowledge and lessons from the field of child development. A greater focus on promoting early childhood health and well-being and addressing early signs of risk can improve the reach of prevention by targeting the root causes of substance use. Examples of relevant risk factors include early exposure to substance use prenatally or in the home,[101] poor school readiness,[102] low parental affection and monitoring,[103] childhood conduct problems,[104] and mental health problems.[105] An earlier focus can also reduce the burden of risk that children carry into adolescence, as early childhood risk factors often are precursors to other risk factors that appear later in development.[106]

BROADEN THE SCOPE OF PREVENTION

In addition to an earlier focus, how we define and practice substance use prevention must expand to include a broader set of strategies and stakeholders. This means broadening the scope beyond targeting individual characteristics through behavioral interventions to include systemic or structural risks that increase the chances of substance use as well as a broad range of related adverse outcomes. **While it may seem counterintuitive, strategies and interventions within substance use prevention tend to be too narrowly focused on substance use.**

Evidence points to common factors underlying the development of multiple behavioral health problems, of which substance use might be one.[107] The substance use prevention field can be more effective by including strategies focused on positive developmental outcomes beyond (but associated with) the prevention of substance use. A recent comprehensive review by the U.S. Surgeon General identified a number of prevention policies that have been effective in reducing the harms associated with substances, including higher taxes, tobacco and alcohol retail outlet density restrictions, and policies to reduce driving under the influence and underage drinking.[108] While policies focused directly on substance use access and behaviors are necessary, the prevention policy arsenal should include efforts tackling broader structural factors linked to the development of a range of risk factors throughout childhood.[109]

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This broader scope of prevention recognizes the strengths of current prevention approaches and deems them necessary, but also reckons with the fact that they may not be sufficient to make enough progress to reduce substance use and end addiction. Prevention efforts that are familiar in schools, families, and communities, and among health care providers and policymakers are not to be discarded but rather fortified with broader efforts. Multi-faceted substance use prevention continues to include strategies like helping parents sit down with their children to have a conversation about tobacco, alcohol, and other drugs; training physicians to screen for substance use in their young patients; educating students in schools about how addictive substances affect brain development; and policies that restrict tobacco, alcohol, and marijuana advertising near areas where youth congregate or in media outlets seen by young people.

But these efforts should be expanded to include interventions and strategies less obviously or directly associated with youth substance use, such as supporting new parents to reduce stress so that they are less anxious in their early parenting years, or providing engaging after-school and weekend activities for children and teens so that they can take healthy risks and participate in empowering challenges.[110] Seemingly even more remote, but no less important, are efforts to reduce poverty and childhood trauma, provide universal child care for working parents, and guarantee health care coverage for pre- and post-natal care as well as adult mental health and addiction treatment. **These kinds of structural improvements help set the stage for healthy and stable families, which is essential for protecting youth from substance use, as well as other health risk behaviors that can interfere with a child's healthy development and future well-being.**

BREAK DOWN SILOS AND ENHANCE COLLABORATION

Expanding prevention beyond current definitions and strategies will mean connecting with and learning from the many national and community-based organizations that are engaged in this work without the label of substance use prevention. There are many opportunities for substance use prevention specialists to work collaboratively with individuals and organizations that address healthy youth development, share resources, and address broader social determinants of health and risk. The goals and work of substance use prevention and healthy youth development appear to be two sides of the same coin. While individual-level prevention programs have recognized this overlap and do target aspects of positive development, such as resilience and social-emotional skills,[111] it is not clear that this has translated to strategic collaboration between the fields on broader efforts.

If we are to overcome the current limitations of substance use prevention, it is essential that we collaborate with others working to mitigate larger policy and systemic problems that increase children's vulnerability to adverse experiences and ultimately contribute to substance use. Doing so, while continuing to rely on existing substance use prevention research and practices, will forge a path forward for a coordinated and comprehensive effort to improve the health of young people and prevent behaviors that compromise their health.

Intervening earlier and more broadly can interrupt potential risk pathways, move children towards protective pathways, and create a better foundation for substance use prevention and health promotion in adolescence and beyond.

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SHIFT PREVENTION EARLIER

The seeds of addiction risk and resilience are planted very early in life. Yet most of our interventions for preventing youth substance use do not begin until a child enters adolescence, once the effects of those early risk factors have become entrenched and much more difficult to reverse or address. That is not to say that all prevention should occur early in life and terminate in adolescence; regardless of how effective earlier interventions are at mitigating risk, adolescence remains a critical life stage for preventing substance use.

THE BUILDING BLOCKS OF RISK AND PROTECTION

Early adverse childhood experiences (ACEs) are important indicators of both risk factors related to adolescent substance use and to substance use itself.[112] This means that risk factors present in adolescence typically suggest that a child has been exposed to other risk factors in the past. Therefore, while targeting adolescent risk factors is a vital component of substance use prevention, it is not sufficient, as such interventions must contend with lengthy and complex developmental processes that have already taken place. **By beginning prevention earlier in development, we can target foundational risk factors before they are entrenched and compounded.**

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DEVELOPMENTAL MODELS OF CASCADING RISK AND PROTECTION

Developmental models of addiction risk aim to identify factors present at critical stages of life that will predict particular outcomes in the following developmental stage.[113] These models consider how the interaction of risk factors in infancy may lead to risk factors in toddlerhood, which then interact to lead to risk factors in childhood, then adolescence, and so on. Knowing why the presence or absence of a particular factor at a specific developmental stage increases or decreases a person's risk for substance use or addiction allows for more effective interventions.

"The risks associated with substance use begin long before an individual smokes the first cigarette, has a first drink of alcohol, or tries an illicit substance."[114]

Developmental models begin with the interaction of environmental and individual risk factors present in infancy and early childhood that are known to be linked to adolescent substance use. For example, early risk factors like difficult temperament[115] and low socioeconomic status[116] are related to adolescent substance use because they increase the likelihood that infants and young children will be exposed to another known risk factor, early parenting problems.[117] Children with difficult temperaments are more likely to elicit frustration in caregivers and children born into poverty are more likely to have caregivers who are stressed, have fewer resources for support, and have mental health problems. These children have greater odds of experiencing inadequate or negative parenting practices,[118] which in turn can lead to the development of other risk factors as children grow.[119]

Children who experience early parenting problems, especially in the first five years of life, are more likely to develop early behavioral problems, one of the childhood risk factors most strongly predictive of adolescent substance use.[120] Conduct and behavioral problems in children entering school can lead to problems with peers, and peer rejection at a young age makes children less likely to be exposed to positive social influences. This can exacerbate existing conduct problems and increase the likelihood that, as adolescents, these children will associate with peers who engage in substance use and other unhealthy behaviors.[121] Early peer problems can set the stage for delinquent behaviors, problems in academic performance, and fraught parent-child relationships in adolescence. Ongoing conflict can lead parents to "burn out" and neglect to monitor their children during adolescence, a major risk factor for problem behavior and substance use.[122] This progression comprises just one potential developmental pathway, demonstrating how multiple factors can interact and cascade to influence risk for youth substance use.

By following children from young ages into adolescence, researchers can study the relationships between risk and protective pathways. A better understanding of these developmental pathways will help to identify the most influential targets for prevention and the ideal timeline for intervention. For example, one research-supported risk pathway reveals a progression from maternal depression in early childhood to children's development of behavioral problems in early adolescence, to lower parental awareness of their child's whereabouts, peers, activities, and academic problems in adolescence, to subsequent youth substance use. The same study also found evidence of a protective pathway from nurturing parenting in early childhood, to increased parental knowledge of their child's whereabouts, peers, and activities in adolescence, to decreased substance use.[123]

Another study found evidence that parental alcohol and mental health problems were associated with low parental warmth and sensitivity during the infant and toddler years. Low parental warmth and sensitivity was associated with lower child self-regulation at preschool age, which was associated with lower social competence

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and more behavioral problems in kindergarten through middle childhood. These early-middle childhood problems were associated with having delinquent and substance-using peers in early adolescence, and then to substance use in late adolescence. Conversely, high parental warmth and sensitivity were associated with a protective pathway, predicting higher parental monitoring in middle childhood and early adolescence and decreased adolescent engagement with delinquent and substance-using peers and later substance use.[124] Other studies have similarly highlighted the developmental effects of parental substance use and depression on a child's early symptoms of behavioral problems and later substance use.[125]

A recent study linking adolescents' electronic health records to those of their mothers found that children who were diagnosed with certain medical, mental health, or behavioral problems before age 12 were at higher risk of developing substance use problems in adolescence.[126] Some of the diagnoses (after statistically adjusting for relevant demographic characteristics) included attention-deficit/hyperactivity disorder (ADHD), conduct disorder, oppositional defiant disorder, headache, injury/poisoning, and trauma- or stress-related disorders. Maternal diagnosis of substance use or psychiatric disorders prior to a child's twelfth birthdate was also associated with higher risk of substance use problems in the adolescent child. Children who grew up in poorer neighborhoods, had lower average educational attainment, and were covered through Medicaid had a higher risk of developing substance use problems. Those whose risk factors began prior to age 12 and were ongoing and persistent into adolescence were at especially high risk. Children with diagnosed headache, trauma/stress-related disorders, and self-harm remained at elevated risk for adolescent substance use regardless of whether those conditions persisted into adolescence. Importantly, however, children with most other risk factors in childhood that were no longer evident in adolescence were not at elevated risk for substance use problems in adolescence, **suggesting that interventions that minimize those risks in earlier childhood can confer substantial protection against future substance use in adolescence.**

INFANCY-EARLY CHILDHOOD

Parental addiction/mental health problems

Difficult temperment

Low SES

Abuse, Neglect, Low warmth, Harsh parenting, Insecure attachment, Toxic stress

EARLY-MID CHILDHOOD

Poor parent child relationship

Low self-regulation

Mental health problems

Behavioral broblems, Aggression, Poor interpersonal functioning, Low school readiness, Peer rejection

ADOLESCENCE

Low school /community bonding

Deviant peer affiliation

Low parental knowledge/ monitoring

Poor academic achievement, SUBSTANCE USE

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NEUROBIOLOGICAL MECHANISMS UNDERLYING RISK AND PROTECTION

The U.S. National Institutes of Health has launched two longitudinal studies exploring childhood and adolescent brain development and the factors that influence it: the Adolescent Brain Cognitive Development (ABCD) Study® and the HEALthy Brain and Child Development (HBCD) Study. Data from these and other studies are demonstrating associations between early stress and adversity and atypical brain development. When the body is exposed to a stressor – anything from conflict with a peer to physical or emotional abuse – it activates its stress response system and secretes stress hormones. Intense, repeated, or prolonged stressors, such as neglect, maltreatment, or poverty, can result in toxic stress wherein the stress response system is activated for extended periods of time.[127] This dysregulation of the natural stress response can lead to cascading effects on the brain, affecting attention, decision making, reward processing, learning, emotion, and impulsivity, among other critical functions.[128]

Early adversity is associated with neurodevelopmental defects via multiple mechanisms.[130] One factor that has been directly linked to brain development is socioeconomic status, a multi-dimensional measure incorporating family income, parental education and employment, and perceived social position.[131] Poverty can physically alter a child's brain structure and size, resulting in observable socioeconomic disparities in critical neurocognitive functioning.[132] Researchers suggest that environmental factors related to poverty affect brain development through deprivation of cognitive and social stimuli and exposure to threatening input.[133] Numerous studies associate low socioeconomic status with impairments in brain structures and functions supporting a host of critical functions, such as threat and emotion processing, learning and memory,[134] attention,[135] language,[136] reading,[137] affect and mood,[138] executive functioning,[139] and self-regulation.[140] In some cases, these effects can be observed even before a child's first birthday.[141]

"The detrimental effects of traumatic stress on developing neural networks and on the neuroendocrine systems that regulate them have until recently remained hidden even to the eyes of most neuroscientists. However, … this veiled cascade of events represents a common pathway to a variety of important long-term behavioral, health, and social problems."[129]

Early exposure to other forms of adversity, some beginning even before birth, also can affect a child's developing brain.[142] For example, adequate prenatal and postnatal nourishment is critical for several neurodevelopmental processes that take place during gestation and infancy; nutritional deficiencies can disrupt these processes leading to long-term developmental effects.[143] On the other hand, prenatal exposure to addictive substances can cause persistent structural changes in a child's brain.[144]

Home life can also play a role in brain development. Negative parenting practices,[145] family conflict, and low parental monitoring[146] are associated with deficits in brain size and composition. Early exposure to parental substance use is linked to impairments in the brain that affect attention and executive functioning.[147] Parental stress[148] and depression[149] can alter children's neural activity and brain development, even within the first year of life, with negative developmental and neurocognitive outcomes. Other studies have found that social deprivation and neglect can alter the brain's electrical activity[150] and stress response system.[151] **While any child may experience any of these adverse situations, those of lower socioeconomic status generally have heightened exposure to risk factors and fewer protective factors, which puts them at heightened risk of developmental problems.[152]**

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CURRENT RESEARCH

THE ADOLESCENT BRAIN COGNITIVE DEVELOPMENT (ABCD) STUDY

"*The Adolescent Brain Cognitive Development (ABCD) Study®* is the largest long-term study of brain development and child health in the United States. … [Twenty-one research sites across the country] have invited 11,878 children ages 9-10 to join the study. Researchers will track their biological and behavioral development through adolescence into young adulthood. Using cutting-edge technology, scientists will determine how childhood experiences (such as sports, videogames, social media, unhealthy sleep patterns, and smoking) interact with each other and with a child's changing biology to affect brain development and social, behavioral, academic, health, and other outcomes. The results of the ABCD Study will provide families; school superintendents, principals, and teachers; health professionals; and policymakers with practical information to promote the health, well-being, and success of children."[153]

THE HEALTHY BRAIN AND CHILD DEVELOPMENT (HBCD) STUDY

"*The HEALthy Brain and Child Development (HBCD) Study* will establish a large cohort of pregnant women from regions of the country significantly affected by the opioid crisis and follow them and their children for at least 10 years. Findings from this cohort will help researchers understand normative childhood brain development as well as the long-term impact of prenatal and postnatal opioid and other drug and environmental exposures... Knowledge gained from this research will be critical to help predict and prevent some of the known effects of prenatal and postnatal exposure to certain drugs or environmental exposures, including risk for future substance use, mental disorders, and other behavioral and developmental problems."[154]

THE NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM (NIAAA)

"The National Consortium on Alcohol and Neurodevelopment in Adolescence, which started in 2012, is a nation-wide effort to determine the effects of alcohol exposure on the developmental trajectory of the human adolescent brain, and to identify neurobehavioral vulnerabilities that may place an adolescent at risk for the subsequent development of alcohol use disorders."[155]

Childhood characteristics and experiences that increase the odds of adolescent substance use exert their influence in a multifactorial, cascading way across the developmental lifespan. Longitudinal research like the ABCD and HBCD studies seek to provide new insights into these processes and shed light on the most opportune time and circumstances for intervention.

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PROMOTING CHILD HEALTH AND RESILIENCE REDUCES RISK

Understanding risk and protective factors for substance use, as well as their interactions with one another, can help to identify fundamental or "cornerstone" targets in early development that steer children down a path of either risk or resilience. One such critical target is self-regulation, the ability to manage one's emotions and behavior in accordance with the demands of a given situation. Self-regulation has long been understood to be a central component of resilience and positive youth development.[156] **Ensuring the healthy development of self-regulation early in childhood can provide a strong basis for substance use prevention efforts through its underlying impact on resilience.**

The parent-child relationship is an important focus in early development, as it is associated with a range of known risk and protective factors.[157] Prenatal maternal health and behavior can influence a child's genetic makeup, biology, and temperament, which can also influence parents' interactions with the child. These dynamic interactions and the environmental factors that influence them are important targets during the prenatal period, in infancy, and in toddlerhood, as they set the stage for the healthy development of self-regulation and resilience. Targets in early to late childhood also center on children's relationships with parents, as well as with teachers and peers.

Children raised by parents with an authoritative (rather than an authoritarian, permissive, or uninvolved) parenting style* are most likely to develop the skills (resilience, grit, perseverance, impulse control, politeness) needed in both the short and long term to succeed in school, social relationships, the workplace, and the community. Fostering these skills in the early years while the brain is rapidly developing is critical for future life success, and can be fostered outside the home through early childhood education that promotes critical social and emotional skills.[158]

Research supports the intergenerational transmission of problem behavior. For example, one study found that emotional distress, alcohol problems, and harsh parenting in the first generation were all associated with their respective behaviors in the second generation, and second generation emotional distress and harsh parenting were associated with increased aggressive behavior in third generation children.[159] These findings elucidate the long-term effects of negative parenting behaviors on children, **highlighting the importance of addressing parental mental health and parenting practices to stop the intergenerational transmission of harmful behavior, including substance use.**

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* According to the American Psychological Association, *authoritative parenting* is when the parent or caregiver encourages a child's autonomy yet still places certain limitations on behavior; *authoritarian parenting* is when the parent or caregiver stresses obedience, deemphasizes collaboration and dialogue, and employs strong forms of punishment; *permissive parenting* is when the parent or caregiver is accepting and affirmative, makes few demands, and avoids exercising control; and *uninvolved or rejecting/neglecting parenting* is when the parent or caregiver is unsupportive, fails to monitor or limit behavior, and is more attentive to his or her needs than those of the child.

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PRENATAL AND POSTNATAL PERIOD

The building blocks of child health and resilience emerge before birth, as prenatal health and environmental factors affect fetal development.[160] Therefore, **the prenatal environment is a critical early prevention target.** While this includes targeting parent behaviors that directly affect the developing fetus, such as ensuring healthy prenatal nutrition and eliminating maternal substance use, the prenatal period can also be a time to target known risk factors that will affect the parent-child relationship after birth. Prevention efforts should center on identifying and treating substance use and mental health disorders present in parents and providing them with education and support to reinforce positive parenting practices once the child is born. Screening for ACEs in expecting mothers and their partners can identify individuals in need of additional support, which can protect the next generation of children from the negative effects of their parents' adverse experiences.[161]

CURRENT RESEARCH: USING PREVENTION MESSAGING TO ADDRESS PERINATAL SUBSTANCE USE

Partnership to End Addiction has two projects that address perinatal substance use via evidence-based prevention messaging.

HOME VISITATION ENHANCING LINKAGES PROJECT, THE HELP STUDY, is designed to develop and test a digital, confidential screening and brief intervention tool for alcohol and drug use for home visiting clients. These home visitation programs connect expectant mothers/ families with a support worker who delivers case management, family support, caregiver skills training, and screening services. The current intervention tool includes psychoeducation components about the mother's own health and the baby's health, personalized goal-setting based on motivational interviewing, and links to local resources. The intervention, available in English and Spanish, is completed over two sessions on the client's own internet-enabled device. For the purposes of this project, the targeted population is pregnant and postpartum women whose past or current substance use is not serious enough to pose a danger to their child, but who could benefit from confidential assistance when it comes to forming and sustaining healthy habits.

BABYSTEPS (SUPPORTIVE TEXTS TO EMPOWER PARENTS) is a micro-randomized clinical trial that is pilot testing text message-based interventions for postpartum risky drinking. The aim is to understand the factors that affect a mother's risk of drinking in the postpartum period and develop message content based on those factors. Supportive texts will be piloted with mothers recruited through New Jersey's Department of Children and Families central intake system. The goal is to encourage mothers, targeting their stress levels and negative moods while increasing self-efficacy and parenting confidence.

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Substance use in the perinatal period is a critical public health challenge that is associated with negative birth outcomes, poor maternal and child health, and increased risk for child maltreatment.[162] Recent national data indicate that 5.8 percent of pregnant women report illicit drug use, 9.6 percent report tobacco use, and 9.5 percent report alcohol use in the past month.[163] Less than 20 percent of women who need addiction treatment receive it, and this gap is greater for low-income, ethnic minority women.[164] Among women who reduce their substance use during pregnancy, up to 50 percent relapse in the first three months postpartum, making this a critical period for intervention.[165] Risk for relapse is heightened during the postpartum period due to hormonal changes, the stress of caring for a newborn, sleep deprivation, and social isolation.[166] Significant stress associated with poverty, co-occurring mental health problems, the profound stigma associated with maternal substance use, and the stress from child welfare involvement or the threat of such involvement, compound this risk.

Infants exposed to substances in utero are at higher risk for sleep problems, developmental delays, behavior and learning problems, speech problems, and earlier initiation of substance use relative to non-exposed peers.[167] Prenatal exposure to addictive substances is associated with a higher risk of adolescent substance use and lifetime addiction due to biological responses to being exposed to teratogens* in utero and the behavioral and social stressors of being born to a parent who uses substances.[168]

INFANCY AND TODDLERHOOD

At birth, infants bring to the parent-child relationship personal qualities that may be associated with later substance use risk, including genetic predispositions and biological vulnerabilities.[169] Early prevention at this developmental stage primarily focuses on how the environment interacts with these childhood characteristics to influence the development of self-regulation.

During infancy and toddlerhood, the formation of a secure attachment to a caregiver is associated with the development of self-regulation.[170] A secure attachment relates to a caregiver's ability to be sensitive and responsive to a child's needs, which allows for trust and feelings of safety in the child. Secure attachment is characterized by children who are visibly upset when caregivers leave, are happy when they return, and show a preference for them over strangers. An insecure attachment between a parent and child is associated with the emergence of additional risk factors in later childhood and behavioral problems and substance use in adolescence.[171]

Infants have little capacity for self-regulation and are dependent upon consistent positive interactions with caregivers to facilitate their development. As infants become toddlers, their physical and cognitive maturation enhances their capacity for self-regulation, but it still depends on positive and consistent exchanges with caregivers and the environment.[172] Since parenting behaviors have been found to be predictive of a child's self-regulation, they are cornerstone targets for prevention and resilience building during this developmental period.[173]

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*   An agent that interferes with normal embryonic development.

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Key parenting skills to target in infancy and toddlerhood are those essential to the development of both a secure attachment and self-regulation: parental sensitivity and warmth. **Warm and sensitive caregiving serves as a scaffold to regulate distress and behavior in early childhood**, when young children's ability to do so on their own is not yet mature. Such external support and feedback are essential for facilitating the formation of a secure attachment and the successful development of self-regulation.[174] Parental sensitivity consists of reading a child's cues and being responsive to their needs while exhibiting flexibility, consistency, and predictability. Parental warmth consists of displaying positive affect, animated mood, enjoyment or pleasure, and social initiative and involvement.[175]

Helping parents develop or increase their sensitivity and warmth involves educating new and expecting parents about the mechanics of infant/child care, the importance of parental sensitivity and warmth, and developmentally appropriate expectations. It also entails addressing external structural barriers to the establishment of these vital parenting skills, such as poverty, poor child care support, and limited access to health care.

One individual-level barrier to warm and sensitive parenting is having an infant or child with a difficult temperament. Such children have higher levels of arousal, reactivity, and distress, which can elicit in the parent frustration and possible avoidance, neglect, or abuse.[176] Difficult temperament is an early predictor of adolescent substance use[177] and it is associated with greater vulnerability to negative peer influence,[178] which can lead to a host of risky behaviors. However, there is evidence that the influence of temperament on later behavior is moderated by parenting behaviors.[179] In other words, difficult temperament in early childhood may only represent an increased risk for later substance use when that child is also exposed to negative parenting practices. Conversely, positive parenting practices can be especially protective for children with difficult temperaments.[180] Therefore, **managing difficult temperaments with positive parenting practices, characterized by warmth and sensitivity, is an important target for early prevention efforts.** Early intervention for parents of children with a difficult temperament may include psychoeducation about temperament, skill-building for managing parental frustration and children's challenging behaviors, and linkage to professional support if needed.

Another barrier to warm and sensitive parenting is parents' substance use or mental health problems. Some parents with untreated substance use disorder exhibit lower parental warmth and sensitivity, more negative affect, and an increased likelihood of child abuse or neglect.[181] Likewise, parents with untreated depression may be less responsive and sensitive to their infants and engage in more negative parenting practices, consequently developing insecure attachments with their children.[182] There is a strong link between untreated parental depression and substance use during this developmental period and an increased risk for adolescent substance use.[183] One response to these findings might be to remove children from homes where parents have substance use or mental health disorders in order to protect them. However, punitive policies directed at struggling parents only serve to interfere with positive parenting and further exacerbate the instability and suffering of children. Instead, **treating parents' substance use and mental health problems should be important targets for prevention in infancy and early childhood, before they become so ingrained as to undermine positive parenting.**

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EARLY AND LATER CHILDHOOD

During early and later childhood development, a foundational capacity for self-regulation continues to be shaped through the interaction of individual and environmental factors, including parenting practices. Helping parents develop skills such as effective discipline and behavioral management practices can bolster children's development of healthy self-regulation and resilience during early and late childhood.[184] Other relevant targets for early intervention include characteristics or external influences that interfere with a child's self-regulation – such as physical aggression, disobedience, cheating, or stealing – as well as those associated with improved self-regulation, such as school readiness and social-emotional competence.

As children acquire the developmental maturity to interact in increasingly complex ways with their environment, they rely on parents and caretakers to guide them. Parental discipline, which involves setting limits and expectations for behavior, helps children organize themselves and develop self-regulation skills. Parental warmth and sensitivity are still essential during this developmental stage, as effective discipline takes place within the context of a trusting and loving parent-child bond. Positive discipline practices predict lower levels of behavioral problems in children.[185] Conversely, harsh discipline practices, such as spanking, threatening, yelling, or screaming in response to misbehavior, contribute to more behavioral problems from early childhood through adolescence.[186] Since behavioral problems are a significant risk factor for later substance use, **parental discipline practices are an important target for prevention during early childhood.**

It is important to provide early interventions for children exhibiting behavioral problems in this developmental stage. These interventions should focus on educating parents and caregivers about effective discipline and behavioral management practices and helping them to build skills in this area. It may also involve further assessment, diagnosis, and treatment if behavioral problems are reflective of an underlying condition such as ADHD or conduct disorder. **Helping parents manage behavioral problems in children while supporting the development of a healthy parent-child relationship serves to bolster child resilience and prevent future substance use.**

School readiness and social-emotional competence are key developmental skills of early childhood. School readiness is when children possess the skills, knowledge, and attitudes necessary to succeed in school. In addition to achieved knowledge landmarks (e.g., knowing colors, numbers, letters), school readiness also encompasses social-emotional competence, which is the ability to interact effectively with others, regulate one's own emotions and behavior, solve problems, and communicate successfully. These skills allow children to meet the attentional and emotional demands of school, adapt to school-related routines and expectations for behavior, and form positive relationships with teachers and peers, all of which are foundational for academic achievement in the first few years of schooling.[187] **School readiness and social-emotional competence are important targets as children transition to school.** Low school readiness and poor social-emotional competence are associated with later academic failure and peer rejection, which in turn are linked to adolescent substance use.[188] In contrast, early math and vocabulary skills and classroom engagement predict a wealth of later benefits, including those related to academic achievement, mental and physical health, and decreased substance use.[189]

As with parenting skills, underlying the link between school readiness, social-emotional competence and later risk factors and substance use is the capacity for self-regulation.[190] **Prevention efforts during this developmental stage should include identifying deficits in self-regulation and providing interventions aimed at increasing social-emotional competence.** The focus of these interventions should be broad and include parents, teachers, and the larger school environment.

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THE IMPORTANCE OF SUSTAINED SUPPORT

The previous sections have detailed the need to focus on early targets of risk and protection, primarily within the family, to help foster the early development of self-regulation and resilience. Targeting the earliest stages of development, when the building blocks of risk and protection emerge, address root problems before they have a chance to grow into larger, more insurmountable problems. That said, interventions implemented in later childhood, adolescence, and early adulthood are essential as well, especially those that are age appropriate and target the evolving causes and manifestations of risk and protection.

"The first 1,000 days after conception are highly important for child development, but the next 7,000 days are likewise important and often neglected."[191]

Prevention can only succeed if it addresses societal, cultural, and structural supports and barriers to positive youth development and healthy parenting. It is not reasonable to expect prevention initiatives to help parents be warmer and more nurturing if the broader environmental contexts in which parents exist do not support and reward these practices. For example, encouraging parents to get treatment for a mental health or substance use disorder does not constitute a successful prevention intervention if access to affordable and quality treatment is restricted or limited. **Policies, resources, and sociocultural values that support positive and healthy parenting can help ensure that children get started early on a path of resilience instead of risk.**

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To be effective, prevention efforts must address the larger environment in which children are developing and parents are parenting. Prevention focused on earlier, broader, and more collaborative efforts aimed at the individual and environmental factors that shape risk exposure is vital to protecting youth from substance use and addiction. Many of these factors can be described as social determinants of health, a term that refers to the environmental conditions in which we live that affect our health across the lifespan. Social determinants of health can be grouped into five categories: Economic stability, Education access and quality, Health care access and quality, Neighborhood and built environment, and Social community context.[192]

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1. ECONOMIC STABILITY:

Socioeconomic variables like employment, food, and housing security play a critical role in determining whether a person will have access to resources that can reduce harm and foster healthy child development.[193]

2. EDUCATION ACCESS AND QUALITY:

Child development is significantly affected by the quality of early education, as well as non-academic supports, such as strong social-emotional learning or having a trusted adult mentor.[194]

3. HEALTH CARE ACCESS AND QUALITY:

People's health and well-being are directly connected to their access to health services, insurance, and health literacy. For example, uninsured children are less likely to receive preventive services like routine checkups and immunizations, and are more likely to have avoidable hospitalizations.[195]

4. NEIGHBORHOOD AND BUILT ENVIRONMENT:

A number of variables in a child's physical environment can affect health and well-being, including the safety of the neighborhood and the quality of the home where a child lives, the quality of the air they breathe, the cleanliness of the water they drink, the presence of mold or toxins, access to transportation and green space in which to play, and the presence of neighborhood crime. An unsafe or poor-quality living environment has been linked to chronic disease and poor mental health, among other negative outcomes.[196]

5. SOCIAL COMMUNITY CONTEXT:

The environment in which people live, learn, work, and play provide the context for their health and well-being. Children's home life can fundamentally shape their developmental path, such that positive parenting practices are associated with emotional health and reduced risk behaviors.[197] In the same vein, adverse childhood experiences precipitate poor physical and mental health and behavioral outcomes.[198]

The effects of these social determinants of health can be felt from the very beginning of a child's life, and indeed even before they are born. Social determinants of health contribute to disparities in quality of life, health, and social opportunity, which often fall across racial and ethnic lines. White Americans are less likely than racial/ethnic minorities to live in poverty[199] and more likely to benefit from having health insurance,[200] living in an area with easy access to grocery stores,[201] and growing up without an incarcerated parent.[202] These far-reaching and deep-rooted inequities affect childhood development and health and put many non-white children at a social and economic disadvantage compared to their white peers.[203]

The categories of social determinants of health, encompassing factors such as parental warmth,[204] parental substance use,[205] adverse child experiences,[206] and a family's socioeconomic status,[207] affect young people's intentions to try substances and their likelihood of using substances and developing addiction. The similarities in the factors important to both healthy child development and reducing the risk of substance use demonstrate that the two outcomes are intertwined.

Despite a heightened focus in recent years on facilitating healthy development in early childhood, substance use prevention is typically not part of the conversation until children are in middle or high school. Due to silos in research and programming, a wealth of knowledge belonging to organizations and fields of study that specialize in early development is largely unrecognized and underutilized in the substance use prevention field; welcoming the tools and resources of such organizations and fields could greatly benefit the cause of substance use prevention.

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FACTORS RELEVANT TO PREVENTION WITHIN CHILD DEVELOPMENT WORK

Healthy child development occurs when favorable structural, environmental, family, and individual factors interact and build upon one another beginning in the first years of life. Recently, the Centers for Disease Control and Prevention (CDC) described evidence-based strategies that can prevent ACEs or mitigate their harm to children.[208] If implemented effectively, these strategies would likely decrease not only ACEs, but the risk of youth substance use as well:

- Strengthening economic supports for families (e.g., strengthening families' financial security through tax credits, child care subsidies, family-friendly work policies, paid leave)

- Promoting social norms that protect against violence and adversity (e.g., public education campaigns, policy changes)

- Ensuring a strong start for children and paving the way for them to reach their full potential (e.g., early childhood home visitation, high-quality child care)

- Teaching parents and youth to handle stress, manage emotions, and tackle everyday challenges (e.g., social-emotional learning, parenting skills courses)

- Connecting youth to caring adults and activities (e.g., mentoring and after-school programs)

- Intervening to reduce immediate and long-term harms (e.g., family-centered treatment for substance use disorders, enhanced primary care through brief screening, intervention, and referral to support services)

Organizations that focus on early childhood development directly target these factors to facilitate and support positive growth. They conduct and support research, engage in or lead policy and advocacy work, and/or offer programming to improve children's lives and opportunities. Based on our review of more than 30 organizations with early development-focused missions, we found significant overlap in the primary goals of these organizations, including:

- Providing support services for parents and other caregivers of young children, often targeted at those in need of resources or with identified risk factors (e.g., first-time parents, young parents, low-income parents)

- Working with families affected by adverse structural or environmental impediments to healthy child development (e.g., low socioeconomic status, low access to health care, exposure to bias or discrimination)

- Mitigating the negative effects of adverse childhood experiences that can put children at a developmental disadvantage

- Implementing and advocating for social-emotional learning and other holistic educational practices in schools that can buffer the effects of risk factors and bolster healthy development

- Fostering resilience and self-regulation in children, particularly those with a high number of personal, familial, or environmental risk factors

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These core goals significantly overlap with those of the substance use prevention field. Both fields seek to facilitate healthy youth development and prevent unsafe or unhealthy outcomes and both target many of the same underlying risk and protective factors. Where the fields differ is when they tend to initiate interventions. Organizations that focus on substance use prevention, while covering a broad age range, often direct most of their programming to the adolescent stage of development. Organizations that address broader issues within child development, on the other hand, tend to target their interventions and programming at a younger age range, supporting children and families from before birth to elementary school. While it is important to begin prevention efforts as early as possible, it is ideal to start early and continue throughout adolescence and early adulthood. For this reason, we include some child development organizations that target older children and adolescents in our discussion below.

It is evident in the ways these organizations promote health and resilience in early childhood that their work can ultimately help to prevent youth substance use, even though they do not explicitly identify substance use prevention as a target. There is, therefore, great potential for collaboration and coordination between childhood development organizations and substance use prevention efforts.

"The science of substance use prevention is embedded in the science of human development."[209]

Below, we highlight many organizations and programs that represent the goals listed above. **Our inclusion of a given initiative is not an endorsement of it.** Some programs and initiatives have been evaluated extensively, while others have not or have yielded promising but not definitive results to date. We nevertheless feature the below initiatives to illustrate how principles within the child development field are relevant to substance use prevention.

"For all children, the single most important factor in promoting positive psychological, emotional, and behavioral well-being is having a strong, secure attachment to their primary caregivers. … This strong attachment presupposes effective parenting behaviors. … Effective parenting presupposes the caregivers' own well-being. … It is critical to ensure that children's mothers have the necessary supports for maintaining good mental health and psychological well-being."[210]

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SUPPORT PARENTS AND OTHER CAREGIVERS

Children are born into existing family and social systems that can influence their development in important ways. The extent to which parents have access to prenatal care, parenting resources, and child care contributes to whether an environment is primed to support or hinder healthy child development.

Several organizations focused on early childhood development champion parental health, education, and confidence and supply families with tangible resources to facilitate healthy child development.

- Nurse-Family Partnership is a program that provides support to pregnant women and mothers until their children are two years old. Nurses are directly assigned to families, visit their homes and provide them with education and other needed support.[211] These visits have demonstrated benefits for the short- and long-term developmental outcomes of children, including better mother-child responsive interaction, lower levels of infant emotional vulnerability, reduced rates of child abuse and neglect, improved cognitive and language development, higher academic achievement, and a reduced risk of behavioral problems and substance use.[212]

- March of Dimes is a national organization with the stated mission to "give all families the best possible start." It promotes programs, initiatives, research, and advocacy to support the health of mothers and babies during the prenatal and postnatal periods.[213]

- ZERO TO THREE works to implement effective practices and provide resources and support to parents of children in their first few years of life, asserting that "emotionally nourishing relationships lay the foundation for lifelong health and well-being." Programming focuses on helping families in the welfare system, bolstering pediatric primary care, and supporting general early childhood development.[214]

- The MOMS Partnership program model, developed by the Yale Elevate Policy Lab, supports under-resourced pregnant women and mothers, specifically targeting mental health issues and depression.[215] Participating mothers reported reduced depressive symptoms and parenting stress, as well as increased perceived social support.[216] The program is an example of a model that uses very early intervention to improve downstream outcomes; the underlying principle is that positive maternal mental health can uplift the social and economic mobility of the whole family.

Integrating Prenatal and Postnatal Care into Addiction Treatment

The Pew Charitable Trusts supports initiatives to encourage broader adoption of successful, innovative models. One example, is the Clinic for Acceptance, Recovery, and Empowerment (CARE) in Pregnancy program. The clinic is one of two in St. Louis that provide opioid use disorder treatment simultaneously with prenatal care. The program ensures that high-risk patients are seen by obstetricians trained to provide both specialized prenatal and routine care.[217]

Another initiative is based in Mountain Area Health Education Center, located in Asheville, North Carolina, which has supported hundreds of pregnant and parenting people with substance use disorders since its launch in 2014 through Project CARA (Care that Advocates Respect, Resilience, and Recovery for All). Project CARA provides three tiers of care. Under Tier 1, patients get a single substance use disorder treatment consultation, but the rest of care is provided elsewhere. Tier 2 offers "shared care" so patients can receive their specialized substance use disorder treatment from Project CARA and their obstetric care elsewhere. Tier 3 is meant for those who need Project CARA to provide all aspects of obstetric and substance use disorder care. The team also offers behavioral health care and wraparound services, for example, assistance with housing and Medicaid. Project CARA's primary goals are to remove obstacles to care delivery and to improve health and social outcomes for persons with substance use disorder and for their babies.[218]

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Many organizations focused on childhood development specifically target children through age eight, a period especially important for developing healthy skills that will support continued positive growth. The family environment has a big influence during this time in a child's life. Positive parenting practices give children a foundational capacity for resilience and self-regulation, skills necessary for academic, social, and emotional success. As such, almost all development-focused organizations highlight family and parenting support and resources as core components of their work.

- The National Head Start Organization names "parental involvement" as one of its four pillars to facilitate positive development, and it provides parents with tools and other educational materials to help support their children's intellectual and emotional development.[219] Head Start is a federal program designed to support low-income families in their children's social and emotional development by combining services including home visits, child care, parental education, and health care. Parents enrolled in the Early Head Start program, for families with children from birth to age three, were found in one study to have provided more emotional support and language and learning stimulation while spanking less, and their children displayed less aggression and greater emotional engagement with them.[220] The benefits of Head Start reach many years into the future and extend to the next generation; those enrolled as children demonstrate improved academic achievements, increased self-control and self-esteem, and more positive parenting practices, which in turn leads to developmental advantages for their children.[221]

- The Strengthening Families Program (SFP) is an evidence-based program for youth and their parents, who attend weekly training sessions both separately and together. The goal is to build strong parent-child relationships by increasing protective factors and reducing risk factors in the home. The workshops help parents learn to create warm and sensitive relationships, set clear boundaries, and monitor their children's activities and well-being.[222] Enrollment in SFP has been associated with reduced depressive symptoms a decade later, mediated by decreased use of illegal substances and relationship problems.[223]

Even when the main emphasis of a child development organization is not on working with families, nearly all have a collection of resources aimed at fostering good parenting practices. These efforts can go beyond direct guidance to parents, advocating for policies that support parents and promote family stability. These more distal efforts to relieve parental stress are important for helping to create a family environment that promotes healthy cognitive and social development in children.

Experimenting With Parent-Child Dyadic Care

Despite the well-documented relationship between parental well-being and capacity to parent effectively (and thus child well-being),[224] there is little coordination between preventive care in pediatric and adult settings for families. An examination of Medicaid data for mother-infant pairs in the first year postpartum showed that most preventive care visits took place within pediatric settings, and that 38 percent of the pairs received no preventive care in adult settings.[225] This points to the potential for intergenerational family services in the context of pediatric health care settings. In a pilot project at the Children's Health Center in San Francisco, a pediatrician performs an evaluation on an infant and a clinical social worker also meets with the caregiver, covering anything from the challenges of parenting to substance use treatment to housing assistance. This type of dyadic care is rare because it is not covered by insurance. But that will change in the state of California beginning in July of 2022, when a government initiative will allow pediatric health settings to match caregivers with professionals offering a wide array of services. Approximately 5.4 million children enrolled in Medi-Cal, the Medicaid program for low-income Californians, and their parents stand to benefit from this initiative. "A baby is not showing up by themselves to the pediatrician's office. The caregiver is coming in with their own strengths and stressors," said Dr. Kathryn Margolis, the pediatric psychologist behind the program at the Children's Health Center. "Without a healthy caregiver, we can't have a healthy baby."[226]

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BROADEN THE SCOPE, BREAK DOWN SILOS, ENHANCE COLLABORATION: FACTORS RELEVANT TO PREVENTION WITHIN CHILD DEVELOPMENT WORK

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LESSONS FOR SUBSTANCE USE PREVENTION

Substance use prevention programs have educational materials for families, but their main goals do not necessarily include family support or direct family services. These programs more often emphasize working directly with children, usually within a school setting. For example, LifeSkills Training, one of the predominant evidence-based substance use prevention programs in the United States, provides resources for parents and educators but does not offer direct services or parental interventions to the same extent as general child development organizations.[227]

While it is reasonable not to explicitly address youth substance use with parents of very young children, early childhood interventions aimed at bolstering resilience and self-regulation and mitigating risk are likely to have beneficial effects on a child's substance-related attitudes and behaviors as they grow older. For example, the work conducted by the Nurse-Family Partnership with infants and toddlers has been associated with reduced risk for substance use in the longer term, despite substance use prevention not being a core goal of the program. A study conducted on data from 1996-2013 found that youth substance use was significantly reduced among children whose families had participated in the nurse visitation program.[228] This is only one example of an early development program that has a downstream impact on youth substance use, but its success underscores why early interventions with parents should be a key element of substance use prevention.

An important early intervention that can improve parenting practices, and thereby reduce substance use risk among youth, is addressing parents' mental health and substance use directly. Nearly 1 in 10 children aged 5-17 in the United States had lived with someone who was mentally ill or severely depressed or who had an alcohol or other drug problem.[229] Children with parents who have mental health disorders are more likely to develop substance use or other psychiatric disorders.[230] Likewise, those whose parents have a substance use disorder are at an increased risk of medical problems, behavioral issues, and substance use disorder themselves.[231] Even less disordered but still problematic parental substance use behaviors are predictive of adolescent use.[232]

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MITIGATE STRUCTURAL AND ENVIRONMENTAL IMPEDIMENTS TO HEALTHY CHILD DEVELOPMENT

Addressing structural and environmental threats to healthy child development means both eliminating risk factors and mitigating the potential negative outcomes of exposure to those risk factors. The primary goal is to ensure that children experience the best possible developmental environment and, when they do not or when doing so is impossible, the secondary goal is to provide support and resources to reduce the impact of the risky environment. There is a long list of structural and environmental contributors to healthy childhood development, but two that are common focal points for organizations and programs are poverty and racial discrimination.

• National Center for Children in Poverty (NCCP) considers poverty "the single biggest threat to children's healthy development." Accordingly, they conduct research that informs their recommendations for policies to minimize the number of families experiencing poverty and improving outcomes for vulnerable children. Specific areas of interest include public housing, parental engagement, preschool education, early mental health, Medicaid, and family resilience.[233]

• National Center for Families Learning (NCFL) uses education for families as a means to reduce poverty. It emphasizes a multi-generational approach, considered crucial for strengthening families and communities. NCFL offers programming that helps families directly engage in children's education, as well as training and resources for community leaders and professionals in the field of family learning.[234]

• National Black Childhood Development Institute (NBCDI) is dedicated to "achieving positive outcomes for vulnerable children who suffer from the dual legacies of poverty and racial discrimination." NBCDI works toward this end by creating relevant programming and advocating for policies that improve the education, care, and health of Black children. Its areas of focus include policy, early childhood education, health and wellness, family engagement, and literacy.[235]

• Strong African American Families (SAAF) Program, developed by the University of Georgia's Center for Family Research, aims to support children and parents through early adolescence and focuses on reducing risky behaviors, like substance use, in youth.[236] Adolescents who receive the family-based intervention show lower levels of alcohol use and conduct problems.[237] Research suggests that participation in the program moderates the effects of poverty on brain development, specifically reduction in volume of certain brain areas related to learning, memory, mood, and stress response. This supports the link between effective parenting and healthy development, and it suggests that family-based programs can mitigate the negative effects of poverty on the brain.[238]

Poverty Reduction and Early Childhood Development

Baby's First Years is examining the links between family income and early childhood development in the first three years of life. For 40 months after their children are born, 1,000 low-income mothers receive either $333 or $20 each month. Researchers measure children's development, health, stress, and behavior around their first three birthdays, as well as variables they hypothesize are related to poverty, like parental stress, family routines, and parenting practices. The aim is to provide insight into the direct impact of cash gifts on early childhood development and other aspects of home life that affect children with the hope of informing economic policy designed to benefit families, such as the Child Tax Credit.[239]

LESSONS FOR SUBSTANCE USE PREVENTION

A primary aim of many substance use prevention organizations and programs is addressing the risks posed by a particular unhealthy aspect of children's environments. The Reclaiming Futures program, for instance, focuses its substance use prevention efforts on youth in the juvenile system, who are at especially high risk for or may have already initiated substance use. The program incorporates awareness of racial and ethnic disparities, gender-specific treatment, and cultural competence in its prevention programming. While there is growing attention to at-risk populations and exposure to structural and environmental risks in the substance use prevention field, and while programs like Reclaiming Futures are important, the field can benefit from earlier efforts to mitigate risk factors within a child's developmental milieu.

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MITIGATE THE EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES

Adverse childhood experiences (ACEs) – such as abuse, neglect, trauma, or other toxic stressors – have a clear negative impact on child development and are associated with a broad range of poor health outcomes throughout the lifespan, including substance use initiation at an early age and the development of a substance use disorder. As the number of ACEs increases, so too does the risk of smoking, alcohol misuse, and illicit drug use.[240]

Fortunately, protective factors can mitigate the negative effects of ACEs on social and emotional development. Parental warmth, for example, moderates the effect of childhood emotional abuse as it relates to later alcohol use problems, suggesting that even when a child is exposed to maltreatment from a caregiver, the presence of a warm parent is protective.[241] Positive parenting practices, such as engaging one's child in reading a book or sharing a family meal, are effective buffers to ACEs in young children.[242] Similar results have been found in adolescents, for whom positive childhood experiences, like connection to a parent, teacher support, and close friendship, predict less substance use; this association was even stronger than the one between ACEs and increased substance use.[243]

Several studies have shown that parental support and monitoring have a significant protective effect against substance use for adversity-exposed children.[244] Protective factors can exist outside the family, too. Having close relationships with peers or adult mentors, pursuing a hobby, or volunteering in one's community, among other positive experiences, all protect against adversity.[245]

Several child development organizations and programs seek to identify children who have suffered from ACEs and ensure that they receive trauma-informed treatment and support to mitigate the adverse effects.

- Center for Youth Wellness, whose primary mission is to address ACEs, conducts research on how to increase the use of screening and early intervention to identify and modify adverse situations for youth. It aims to improve pediatric health care by expanding universal ACEs screening to all primary care settings, allowing for early intervention.[246]

- Safe Environment for Every Kid (SEEK) is an evidence-based model for screening for ACEs in the primary care setting that was developed by the University of Maryland School of Medicine. SEEK aims to support parents, improve children's well-being, and strengthen families by helping health care professionals address social determinants of health and ACEs.[247] SEEK has been shown to produce a range of positive outcomes, including fewer child protective services reports, less harsh punishment, better medical care,[248] and reduced maternal aggression.[249]

LESSONS FOR SUBSTANCE USE PREVENTION

As is true of the importance of addressing structural risk factors in substance use prevention efforts, it is also important to take individual ACEs into account in prevention programming. One large study conducted in 2003 found that ACEs could account for up to two-thirds of all cases of substance use disorder.[250] According to a 2008 study, children with ACEs are at higher risk of initiating drinking at an early age than their peers and are more likely to so in order to cope.[251] A 2012 study identified a significant association between childhood maltreatment and chances of developing a substance use disorder.[252] While substance use prevention programming has not historically addressed ACEs explicitly, there is growing recognition of the importance of doing so.

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SOCIAL-EMOTIONAL LEARNING

Social-emotional learning (SEL) is an educational practice that helps students gain the competencies they need to succeed in life, including managing their own emotions, engaging in sound decision-making, building healthy relationships, and achieving academic and career goals. A framework created by the Collaborative for Academic, Social, and Emotional Learning (CASEL) divides SEL into five areas of cognitive, affective, and behavioral skills:[258]

1. **Self-awareness** is the ability to recognize one's own feelings and thoughts, as well as their influence on behaviors.

2. **Self-management** is the ability to regulate these feelings, thoughts, and behaviors, which might include controlling impulses and motivating oneself.

3. **Social awareness** is the ability to empathize with others, especially trying to understand different perspectives, and be aware of cultural and behavioral norms.

4. **Relationship skills** allow for the formation of strong interpersonal connections founded on communication, cooperation, and mutual support.

5. **Responsible decision-making** is the ability to make informed and considered choices about one's actions in a variety of contexts.

Children's social-emotional development is influenced not only by their teachers and classroom material, but also by their peers and parents.[259] Ideally, SEL should begin early, continue through secondary education, be comprehensive and systematic, promote equity, and integrate curricula with school climate and family and community involvement.[260] Several existing school-based SEL programs incorporating similar goals have been shown to improve social, emotional, and academic outcomes for participating students of a broad age range.[261]

IMPLEMENT SOCIAL-EMOTIONAL LEARNING PROGRAMS

Schools are central to shepherding children through development, and many early childhood development initiatives take place in school settings. The vast majority of organizations whose missions focus on helping children thrive in educational settings either seek to build holistic and equitable educational systems or make education a key component of their advocacy or programming. Social-emotional learning (SEL) has become a key element of many of these programs and initiatives. SEL is a process that facilitates the development of critical skills needed to successfully manage challenges in academic, professional, and social settings. Many early development organizations focus on creating supportive school environments and curricula for students from preschool through high school, often using SEL as a guiding principle:[253]

- Collaborative for Academic, Social, and Emotional Learning (CASEL) is perhaps the best example of an organization that promotes SEL through education, focusing exclusively on creating supportive school environments that infuse SEL into all aspects of education. Its goal is to use SEL in the academic setting to advance "equity and excellence" inside and outside of school, calling for preK-12 schools to educate "the whole child."[254]

- Positive Action provides an SEL-focused curriculum for preK-12 students. The program emphasizes self-concept and self-esteem, with its core message that positive actions lead to positive feelings. Its long list of goals includes improving mental health, parental involvement, and thinking skills and reducing substance use, violence, and school discipline problems, among many others.[255] Participants in the Positive Action program have been shown to engage in less substance use and violence in adolescence.[256]

- Building Assets, Reducing Risks (BARR) is an educational model designed to help schools meet the broad needs of their students, whether academic, social, or emotional. Their mission is to create equitable schools to ensure that all youth have equal access to quality education. BARR operates through a strengths-based lens; its philosophy is that all students have the capacity for success and that schools can help them achieve it.[257]

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LESSONS FOR SUBSTANCE USE PREVENTION

Many substance use prevention programs incorporate SEL into their work or overlap with its core components.[262] For example, the keepin' it REAL substance use prevention program is grounded in SEL, as it targets numerous aspects of social development that can contribute to the risk of developing a substance use disorder. LifeSkills Training has aligned its programming with CASEL's SEL principles in order to better address the broader factors of development related to risk and protective factors. It and other school-based programs that incorporate SEL principles, like the Good Behavior Game and Promoting Alternative THinking Strategies (PATHS), have shown longer-term benefits in reducing youth substance use and mental health and behavioral problems.[263]

A meta-analysis reviewing 82 school-based, universal SEL interventions involving 97,406 students in kindergarten to high school found that SEL was associated with enhanced positive youth development, including reduced drug use, across students' race, socioeconomic background, and school location.[264]

SEL INTERVENTION	SOCIAL AND EMOTIONAL ASSETS	POSITIVE AND NEGATIVE INDICATORS OF WELL BEING
• Student-centered SEL competencies instruction • Environmental focus: 　- Integration with curriculum or practices 　- Improvement of classroom, school, or family environment	• Social and emotional skill acquisition • Improved attitudes about self, others, and school	• Positive social behavior • Academic success • Fewer conduct problems • Less emotional distress • **LESS DRUG USE**

Source: Taylor, R. D., Oberle, E., Durlak, J. A., & Weissberg, R. P. (2017). Promoting positive youth development through school-based social and emotional learning interventions: A meta-analysis of follow-up effects. *Child Development,* 88(4), 1156–1171.

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FOSTER RESILIENCE AND SELF-REGULATION

Positive youth development is centered on the concept of building resilience to risk factors that can arise during the course of child development. Resilience, the ability to respond to life challenges in a healthy and productive way, is critical at every stage of human development. Children considered to be "at risk" are those who are vulnerable to engaging in unhealthy or dangerous behaviors due to adverse life experiences and limited family, community, or larger structural support. Instilling resilience in these children early in life helps equip them to face challenges that would otherwise interfere with and compromise their development.

Many organizations that facilitate positive youth development, including those highlighted in the previous sections, aim to bolster children's resilience. For example, organizations that serve higher-risk populations, such as the National Center for Children in Poverty, strive to put children with fewer opportunities on a level playing field with their more privileged peers in order to reduce their susceptibility to unhealthy behaviors.

A central component of resilience is self-regulation, or the ability to understand and manage one's reactions to challenging circumstances or feelings. It is important to foster self-regulation starting in infancy by ensuring that children have positive interactions with their environment (e.g., via warm and sensitive parenting practices). Organizations that focus specifically on the prenatal and postnatal periods (e.g., Nurse-Family Partnership, ZERO TO THREE) help first-time and at-risk parents learn positive parenting skills that promote the development of self-regulation and resilience in children. Other organizations offer resilience programming later in childhood or adolescence, when interventions can still yield benefits. The development of self-regulation is also a key goal of child development organizations that focus their efforts within the education arena:

- HighScope, with programming from infancy through preschool, helps children build strong problem-solving and decision-making skills and cultivates confidence, social-emotional competence, and self-regulation skills. It emphasizes the pivotal role of teachers in a child's development, while also engaging parents by offering many resources for developing strong relationships and skills.[265]

- MindUp is a school-based SEL program from CASEL that utilizes mindfulness exercises to improve self-regulation, in addition to social-emotional understanding and positive mood, for children ages three through adolescence. The program provides students the tools they need to control their stress and emotion and to develop strong interpersonal skills.[266] Participants have demonstrated improved stress-regulation, emotional and cognitive control, self-concept, empathy, and prosocial behavior.[267]

LESSONS FOR SUBSTANCE USE PREVENTION

The goal of building children's resilience and self-regulation skills is integrated into most substance use prevention programs, yielding downstream benefits in health, behavior, and academic performance.[268] The PROSPER Partnerships (PROmoting School-community-university Partnerships to Enhance Resilience) program places emphasis on resilience in its mission to reduce and prevent risky youth behaviors.[269] Components of the LifeSkills Training substance use prevention program include developing self-management and social skills. This is a common strategy in both the early development and substance use prevention fields. As in SEL, these commonalities demonstrate the benefits of integrating child development research and practice into broader substance use prevention programming.

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Comprehensive Child Development Interventions

Many of the organizations and programs discussed above focus on one or two specific modes of intervention, such as home visits or SEL curricula in the classroom. Other programs employ a holistic strategy, uniting various approaches that may cover the domains of the individual child, family, and school environment. Evaluations suggest that interventions incorporating multiple prevention strategies are generally more effective.[270]

- The Incredible Years is a series of programs designed to foster positive youth development. Its comprehensive approach combines positive parenting practices training, classroom management teacher workshops, and a social skills component for children.[271] The parent training program has demonstrated improved positive parenting practices and reduced harsh parenting and child conduct problems and negative social behaviors.[272] Positive effects largely persist in the years following the intervention.[273] In classrooms where the teacher training and social skills programs were implemented, researchers observed better classroom management strategies, as well as students with fewer conduct problems and improved social competence and self-regulation.[274]

- Fast Track is an extended intervention that takes place between grades 1-10. Programming evolves over the course of the intervention and includes parent training, home visits, child social skills group training, literacy tutoring, workshops on parent monitoring and problem-solving, and lessons on identity and goal setting.[275] Participation in Fast Track is associated with less antisocial behavior and a decreased likelihood of conduct problems among at-risk children.[276] A follow-up study of participants at age 25 found reduced risk of harmful behaviors, including suicidal ideation, serious drinking, and opioid use. This suggests that interpersonal, academic, emotional, and self-regulatory improvements from participation in Fast Track were associated with less risky behavior in the future.[277]

- The Raising Healthy Children (RHC) intervention, created by the Social Development Research Group at the University of Washington, provides classroom management workshops for elementary school teachers, training in family management and supporting children's success for parents, and social-emotional development for students.[278] At age 18, students who had participated in RHC in grades 1-6 reported less risky behavior, including substance use and violent and sexual acts, and more academic engagement and improved performance.[279] Participants continued to demonstrate better education, employment, socioeconomic status, and mental health outcomes in early adulthood.[280] A new study suggests that these benefits extend into the next generation; children of RHC participants showed improvements in early developmental functioning, including in communication and motor skills. In later childhood and adolescence, they also exhibited fewer behavioral problems in school and greater academic skills and achievement, and were less likely to engage in substance use.[281] "People have long noted that early adversity can have long-term negative cascading effects," said Dr. Karl Hill, the study's lead author. "This study suggests that interventions to improve development may similarly trigger positive developmental cascades across generations."[282]

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BARRIERS TO CHANGE

It is clear that targeting substance use prevention efforts earlier and more broadly is important and that many of the core missions and goals of early childhood development organizations and youth substance use prevention efforts are aligned. Since the two fields generally share a goal of facilitating positive child development, target similar life factors, and employ overlapping principles in their work, they should enhance collaborative efforts and benefit from each other's insights, resources, and experiences. So, what stands in the way of making these and other needed improvements to prevention?

The ongoing opioid crisis and the significant toll of substance use on public health have raised awareness of the need for a stronger emphasis on prevention. However, the definition of prevention and the scope of accepted approaches have remained narrow, constraining innovation and broader thinking about how best to reduce youth substance use. While this narrow conceptualization has occurred mostly in the name of good science – to identify evidenced-based practices through rigorous scientific methodology – it has had the unfortunate consequence of concentrating prevention efforts on those target variables that are most easily defined and measured within a relatively short time period. **This has resulted in a predominant focus on school- and family-based programs that are largely intended for adolescents and that center on changing individual attitudes and behaviors.**

The need for an evidence base for prevention programming is real, as is the need for scientific approaches to help ensure that programs are delivered and implemented in the intended manner, with fidelity to the approach demonstrated to be effective in research studies. This helps to limit the adoption of interventions based primarily on anecdote and intuition. While there has been progress in ensuring that interventions are evidence based, broader structural, environmental, and social conditions that influence substance use risk continue to be underemphasized, referenced primarily as ways to identify "at-risk" target populations for more intensive individual programming, or as barriers to implementing effective programming. The narrow focus of many prevention approaches makes current efforts necessary but not sufficient.

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PREVENTION STARTS TOO LATE AND IS TOO NARROW

Perhaps it is time to recognize that many commonly lamented barriers to the implementation and adoption of effective prevention programming are inherent limitations of our current approach. **Indeed, the larger structural and societal barriers to effective implementation that seem insurmountable are actually the foundational layers of prevention that demand greater attention and emphasis.** This is not to discount the current work being done on environmental and structural factors that influence the risk for substance use; organizations focused on healthy childhood development and serving children and families more broadly are often engaged in this area. But the substance use field tends to focus its efforts on adolescents and individual-level changes. Improving collaboration with organizations working and advocating for programs, services, and policies that support healthy child development is a way to build more layers of protection and to advance the goals of substance use prevention.

It might help to look to models of protection and accident prevention within workplace systems and environments. One such model, the "Swiss Cheese Model" of system accidents, posits that accidents and harmful outcomes occur when flaws and failures align across multiple layers of defense or protection within a system.[283] Mitigation measures for COVID-19 relied on this "Swiss Cheese" approach, layering (multi-layered) mask-wearing requirements on top of social distancing requirements on top of stay-at-home recommendations on top of international border crossing restrictions, on top of vaccine mandates, with the goal of putting many layers of protection between the individual and the virus. This way, if any given layer was breached, alternative protective measures would remain in place (e.g., if a COVID-positive person coughs when not wearing a mask, the six-foot social distancing requirement would reduce the risk of the virus spreading to others in the vicinity).
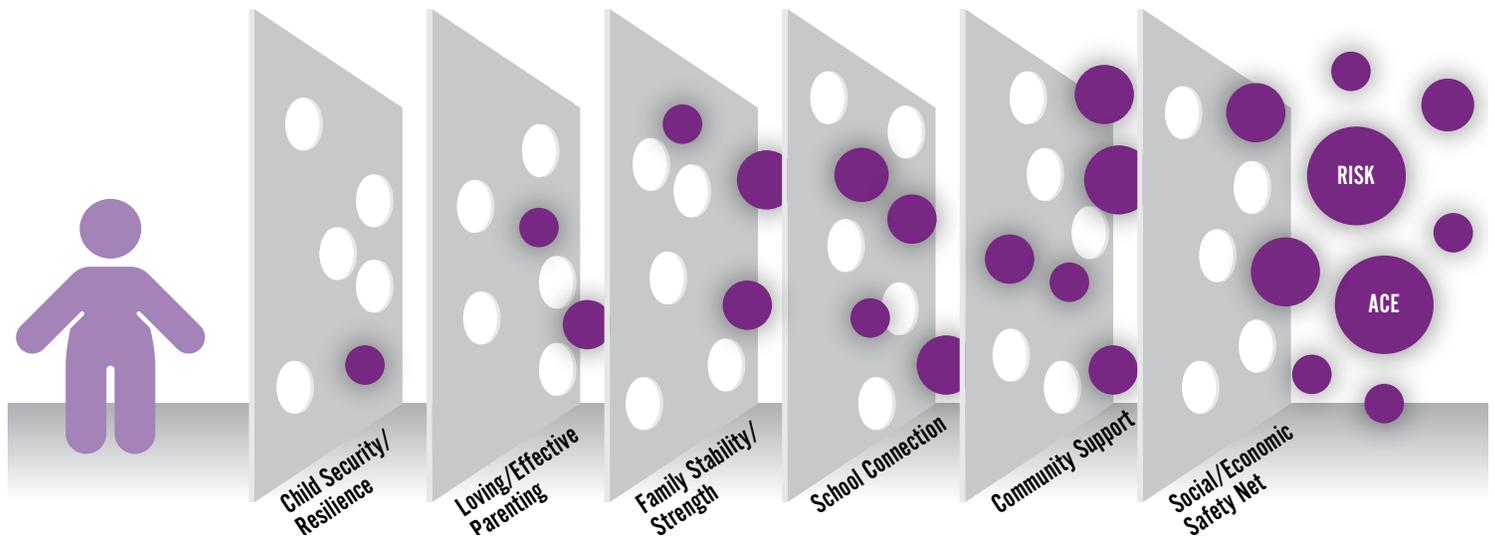
We can apply this model to substance use, thinking of prevention efforts targeting each level of risk exposure – individual, family, school, community, sociocultural – as layers of protection, each with inherent shortcomings or holes, that together form a comprehensive prevention approach. Similarly, across the lifespan, each developmental stage – prenatal, infancy, toddlerhood, childhood, adolescence, and young adulthood – can be viewed as a layer that builds on the previous one(s) to create a foundation of development. While the discrete layers are imperfect, when superimposed upon one another they provide the most robust protection possible. The more layers of protection working together, the less likely risk factors present at any one level will ultimately result in the development of a substance use disorder. Making further progress in prevention efforts, therefore, will entail adding and bolstering earlier and broader layers of protection. Although the need for an earlier, more comprehensive approach to substance use prevention will certainly not seem revolutionary to those in the prevention, child development, and public health fields, the actual practice of such an approach could be. Despite available research on the overlap in goals and the existence of many organizations doing important prevention work, there remains a gap in actual execution of collaborative solutions.

As the emergence of prevention science brought necessary scientific rigor to the field, it also narrowed funding, research, and perceived legitimacy to the types of efforts amenable to the gold standard of research: randomized controlled trials (RCTs)* of interventions primarily aimed at individual behavior change.[284] When considering how many early childhood and structural and environmental conditions cannot be randomized in a study, it's no wonder that broadening the scope of prevention to include these critical factors has not yet become standard practice.

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* A study design that randomly assigns participants into an experimental group or a control group such that the only expected difference between the two groups is the intervention's outcome variable of interest.

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EARLY CHILDHOOD-BASED PREVENTION DOES NOT SEEM RELEVANT

Unlike prevention efforts targeting adolescents, those that start earlier and address broader structural changes do not focus as explicitly on substance use outcomes. Stakeholders funding, adopting, delivering, or receiving prevention likely expect that the content and goals of the intervention will clearly relate to substance use.

Most school-based prevention programs, for example, include psychoeducation about substance use and/or skill-building directly linked to preventing use, such as drug refusal skills. However, the earlier in life the intervention begins, the less these explicit components are effective or practical (i.e., it would not make sense to talk with first graders about the effects of heroin on the brain and body). It is difficult to fully appreciate the importance of prevention efforts in early childhood because substance use is not a salient health concern for young children. Thus, it appears logical to address substance use with older children and adolescents given their increased chance of exposure.

BENEFITS TAKE TOO LONG TO MANIFEST AND MEASURE

A common barrier to adoption of prevention practices, magnified for early childhood prevention, is the natural desire to focus on efforts that produce immediate and visible results. Because early prevention efforts are rooted in facilitating positive child development and targeting broad structural risk factors, the effects are not readily apparent or measurable. With addiction at the forefront of national conversation, more direct and demonstrable solutions tend to be preferred over longer-term investments.

When it comes to substance use prevention, the desired result is the absence of a negative outcome (i.e., no substance use or addiction) rather than the presence of a distinct outcome, making it more difficult to recognize and measure success. It is, therefore, not surprising that substance use treatment tends to receive the most attention and investment and that substance use prevention often directly targets adolescents, the group at most immediate risk of substance use initiation.

STRUCTURAL CHANGE SEEMS OVERWHELMING

Larger structural issues – such as poverty, inadequate child care, and limited access to health care – are the most difficult to change but hold the most promise for effective prevention. Effective structural changes make smaller, more immediate or direct interventions more beneficial. For example, educating adolescents about the ways in which drug use can impair their academic performance will resonate more with those who are not struggling with multiple life stressors than with those living in the throes of a parent's mental illness. Yet the structural problems at the core of the foundations of risk can seem intractable and, as such, receive less attention within the field of substance use prevention.

Structural changes will require sustained and coordinated efforts across all stakeholders in substance use prevention and early childhood development. Fortunately, there are substance use prevention and early childhood development organizations undertaking different components of the necessary work. If brought together, they can better advocate for programs, resources, and policies that support healthy child development on multiple planes, including reducing the risk of substance use.

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DISTINCT INSTITUTIONAL AND FUNDING STREAMS

Substance use prevention is largely funded by the federal government through block grants to states from the U.S. Department of Health and Human Services' Substance Abuse and Mental Health Services Administration (SAMHSA). These grants stipulate that at least 20 percent of the funds must be allocated to primary prevention and the remainder can be used for treatment. Prevention efforts are required to target the general population (universal prevention) as well as higher-risk sub-groups (selective prevention) and must include the following: information and awareness campaigns, direct education to youth about substance use, life and social skills training, alternative activities to substance use for youth, measures for identifying youth engaged in substance use, referrals to interventions, and community engagement and environmental strategies to reduce substance use.[285] This "prevention set-aside" accounts for the majority of primary prevention funding in most states.[286]

States also receive federal funding specifically to prevent opioid and stimulant use through the State Opioid Response (SOR) grants, formerly known as the State Targeted Response to the Opioid Crisis (STR) grants. As a condition of receipt of SOR grants, states must develop strategic plans that address universal and selective prevention methods.[287] There are a number of other small federal grant programs, administered by various federal agencies (e.g., Department of Education, National Institutes of Health), that may provide funding for prevention activities. Most are specific to opioids and mainly prescription opioids. Other funding streams for prevention come from state and local grants as well as private and corporate foundations.

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Recently, there has been an unprecedented increase in federal funding and attention to address the social determinants of family health and welfare that may ultimately affect children's risk for substance use and addiction. Legislation passed in response to the COVID-19 pandemic, including the Families First Coronavirus Response Act, the Coronavirus Aid, Relief, and Economic Security Act (CARES Act), the Consolidated Appropriations Act, and the American Rescue Plan, have created opportunities to tackle many structural problems that have historically impeded true progress in preventing youth substance use and addiction.[288] Although prevention is not the main aim of these laws, the funding they provide is critical to making real progress in reducing substance use and addiction in that they help to alleviate burdens on families and communities that directly and indirectly contribute to the risk of youth substance use and addiction. These include:

- Supporting child mental health and education with funding for child care, early childhood education, and school-based mental health services;

- Improving families' income and reducing child poverty with the enhanced child tax credit, direct payments, paid sick leave, and unemployment benefits;

- Addressing hunger and nutrition through funding for child nutrition and emergency food assistance programs and expanding the Supplemental Nutrition Assistance Program; and

- Creating housing security through rental and utility payment assistance programs and a temporary moratorium on evictions and foreclosures.

Knowing what we know about the proximal and distal causes of substance use and addiction, there is little doubt that the success of these efforts will have measurable and positive downstream effects on youth substance use risk. Studying the impact of these initiatives on youth substance use can help break down the longstanding silos around the field of substance use prevention by highlighting the importance of collaborating with those in fields such as early childhood development, poverty reduction, nutrition, child welfare, and others that have a direct impact on youth health and resilience.[289]

Additional opportunities to increase funding for substance use prevention may arise from the forthcoming settlement funds from the litigation brought by states and municipalities against opioid manufacturers and distributors. Even though the settlement funds are related to opioids, funding for prevention efforts should not focus solely on preventing opioid use. Instead it should aim to prevent all forms of substance use because the factors that increase or reduce a child's likelihood of misusing opioids overlap considerably with those that predict all forms of substance use and other health and behavioral problems.

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RECOMMENDATIONS FOR ESTABLISHING AN EARLIER AND BROADER APPROACH

Substance use prevention, along with treatment and recovery support, is perhaps the most critical component of the public health approach needed to transform how our nation addresses addiction. Until recently, most prevention research and initiatives concentrated on the adolescent years, when youth risk behaviors are most likely to manifest. However, researchers, public health professionals, and some health care providers increasingly are acknowledging the broader social determinants of substance use and other health risks that appear earlier in life and influence the trajectory of a child's developmental path toward or away from substance use and other health risk behaviors.[290]

Despite clear signs pointing to the need for an earlier and broader approach to prevention, our country continues to under-invest in comprehensive prevention approaches and overlooks how substance use prevention is so closely intertwined with healthy youth development. This leaves us in the repeated and tragic position of having to respond in an urgent and costly fashion to addiction crises such as the recent vaping, ongoing opioid, and emerging stimulant epidemics.

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Research shows that addiction is preventable. Yet, we have failed to widely implement and provide necessary resources for enacting commonsense, sustainable strategies. **To effectively prevent addiction, we must fundamentally rethink our approach.** We must promote child, family, and community health; look beyond the traditional targets of substance use prevention; collaborate with and learn from others in the child health and development fields; and break down silos between related but disparate substance use prevention and child health promotion efforts.

Current evidence-based prevention strategies are necessary, but not sufficient. They primarily target the individual child, rather than parents, families, and communities. They begin in late middle school or high school, rather than in early childhood when the seeds of risk and resilience are planted. They focus primarily on risk reduction, rather than on promoting health and resilience. They address only a small portion of individual factors associated with substance use, rather than the broader social determinants of risk and protection that, while seemingly beyond the scope of substance use prevention, are essential for achieving significant, equitable, and sustainable outcomes.

Implementing effective prevention will require the collective effort of families, communities, schools, and health care providers; professionals in the juvenile justice and child welfare systems; and local, state and federal policymakers, all of whom shape the factors that contribute to substance use and other unhealthy behaviors.

Effective prevention strategies are those that reduce risk factors and bolster protective factors that contribute to or protect against negative outcomes such as substance use, mental health problems, school drop out, and involvement with the juvenile justice system. Strategies typically have emphasized preventing or avoiding particular negative youth outcomes, with less attention paid to more generally promoting healthy youth development. As a result, prevention efforts tend to be siloed and fragmented, with outcomes that are difficult to measure and affirm, since success typically means the absence of the undesired outcome. **To achieve healthy development for a broader population of children, prevention must be better integrated and coordinated across domains of influence in a child's life and expanded to include initiatives that promote health and resilience rather than just avert negative outcomes like substance use.**

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KEY POLICY PRIORITIES

To achieve the goal of a broader and earlier approach to preventing substance use and promoting health and resilience among youth, the following key policy priorities should serve as foundational guidelines:

PROMOTE COLLABORATION AND COORDINATE FUNDING AND MANAGEMENT OF YOUTH PROTECTIVE SERVICES

Policymakers should employ their funding leverage to break down current silos in substance use prevention, child mental health, and healthy child development work and encourage collaboration between these fields and among the various agencies responsible for funding these efforts. A number of disparate government agencies are responsible for programs and initiatives that promote healthy youth development, but these efforts are not well coordinated. To increase collaboration, reduce redundancies, and ensure multiple, informed perspectives on ensuring healthy child development – including substance use prevention – policymakers should encourage, incentivize, or require strategic collaborations and improve cross-agency collaboration by:[291]

- Establishing a "federal coordinating body" focused on children and youth to coordinate policy implementation, develop policy recommendations, and promote collaboration among federal agencies. Such a body has recently been proposed – a White House Office on Children and Youth[292] – and every effort should be made to implement this recommendation;

- Streamlining federal grant application requirements for prevention-related activities; for example, by braiding federal funding streams that seek to promote healthy youth development to encourage collaboration and maximize impact;[293]

- Conducting a thorough review and evaluation of existing and proposed early childhood interventions to determine whether they take a holistic approach and include youth substance use as an outcome measure; do the same for substance use prevention programs to determine whether they target an earlier and broader set of factors in their efforts;

- Requiring and supporting data sharing among funded programs;

- Requiring and supporting prevention education and programming in schools and other settings to be evidence-based or, when not practical, evidence-informed;* and

- Including data reporting requirements in policies aimed at addressing social determinants of health (e.g., housing, income, child care, employment, health coverage, racial equity) to evaluate long-term effects on youth substance use.

* Not all interventions can be evaluated through the gold standard of evidence-based research, which requires a randomized control trial. Such trials can be resource intensive and, in many cases, unfeasible to conduct. In those cases, evidence-informed programs are those that are based on sound research principles and solid evidence and are designed and implemented in accordance with those principles and evidence.

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INCREASE AND ALIGN FUNDING FOR SUBSTANCE USE PREVENTION AND ITS EARLY INDICATORS

Policymakers should prioritize substance use prevention by increasing and allocating funding in a way that better aligns with the evidence. Substance use prevention has been substantially underfunded and investments in prevention have decreased in recent years, in the midst of the worst addiction crisis in our nation's history – the opioid crisis.

Most states only invest in substance use prevention in the amount required by the federal government in the Substance Abuse and Mental Health Services Administration (SAMHSA) block grants. The federal government has made noteworthy increases in funding in recent years for traditional substance use prevention services through large legislative packages to address the opioid crisis, including the Comprehensive Addiction Recovery Act of 2016 and the SUPPORT for Patients and Communities Act of 2018. Still, initiatives funded by these laws have been narrowly focused on preventing prescription opioid misuse and reducing opioid overdoses. While helpful and necessary, this approach does little to invest in the comprehensive prevention strategy needed to prevent the country's next addiction crisis. Such a strategy requires:

Bolstering the quality and reach of traditional substance use prevention strategies.

Policymakers should ensure sustainable funding for primary prevention by:[294]

- Increasing the prevention set-aside in the SAMHSA block grant to a level higher than the currently required 20 percent;

- Utilizing a significant portion of opioid settlement funds for primary substance use prevention;

- Scaling up the Drug Free Communities (DFC) Support Program and including funding to address adverse childhood experiences (ACEs) in its prevention work;

- Supporting school and community coalition efforts to incorporate family education and support services in youth-focused prevention;

- Supporting engaging after-school and weekend activities for children to take healthy risks and participate in empowering challenges;

- Supporting the inclusion of racial equity and cultural considerations in funding and programming;

- Investing in program infrastructure and implementation, by:

  - Creating or supporting a community advisory board/council to ensure the community is represented in (1) identifying the community's needs and priorities in preventing youth substance use and allocating necessary funds, (2) creating and developing school- and community-based programming that meet predetermined requirements and are subject to assessment and evaluation, and (3) cultivating and sustaining community support;

  - Hiring or training a sufficient number of qualified prevention specialists to deliver prevention programming to the community;

  - Providing training in substance use prevention and early intervention to school mental health counselors and community health professionals;

  - Establishing methods for data collection, monitoring, and evaluation of prevention programs to ensure they are having their intended effect; and

  - Providing technical assistance to promote fidelity in implementation.

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Alleviating structural and environmental factors linked to youth substance use risk.

Policymakers should expand funding for programs and services that address early indicators of youth substance use risk, such as ACEs, poverty, and unsafe or polluted neighborhoods. They can do this by building upon, making permanent, and expanding policies that provide families with resources and support to help reduce family instability through investments in:[295]

- Income security/stability (e.g., expanding the Earned Income Tax Credit; making the Child Tax Credit permanent);

- Housing stability (e.g., housing vouchers);

- Nutrition/food security (e.g., expanding SNAP, WIC benefits; investing in reducing "food deserts");

- Early childhood education (e.g., funding universal/expanded child care and pre-K); and

- Health insurance coverage, including for pre- and post-natal care, psychoeducation related to parenting skills for new parents, and mental health and addiction treatment.

Supporting direct services to parents to strengthen effective parenting practices.

Policymakers should expand funding for direct services for parents – starting from the prenatal stage through a child's early adulthood – to reduce family dysfunction and support effective parenting. This will help ensure a safe and healthy developmental environment for all children. Funding priorities include:[296]

- Improving insurance reimbursement for important health care services for parents that reduce the likelihood of an unhealthy and unsafe home environment for children, such as:
  - Screening for pregnant and post-partum substance use and expanded access to evidence-based, non-punitive addiction treatment for pregnant and post-partum women with a substance use disorder;
  - Parent-child dyadic care in pediatric clinical settings so that pediatricians, behavioral health specialists, or social workers can be reimbursed for providing the whole family unit with needed services within an integrated framework. Such services should include counseling or guidance to a child's parent or guardian, screening and interventions for parents' mental health and substance use problems, and linkage to family support services (e.g., food vouchers, housing);[297] and
  - Family therapy as a component of all mental health and addiction treatment.

- Utilizing Medicaid to reimburse family-based care and address social determinants of health that affect family stability and functioning;

- Increasing enforcement of the Mental Health Parity and Addiction Equity Act, Affordable Care Act, and other federal and state laws that prohibit discriminatory coverage of mental health and substance use disorder benefits;

- Utilizing the Child Care and Development Block Grants to provide resources to help parents support their children's mental and behavioral health;

- Supporting parenting skills programs, including:
  - Home visiting programs to teach positive parenting skills to new mothers;
  - Programs that support meaningful parent-child relationships and communication skills and that are tailored to the child's age; and
  - Telehealth/online/text-messaging services for parent education and resources, such as those offered by Partnership to End Addiction.

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Supporting direct services to children to promote health and reduce risk.

Policymakers should expand funding for direct services for children to promote mental and physical health and reduce risk factors for youth substance use, including untreated mental health problems. The American Academy of Pediatrics, American Academy of Child and Adolescent Psychiatry, and the Children's Hospital Association recently declared a National State of Emergency in Children's Mental Health due to the lack of sufficient services for youth mental health and the increased need for such services as a result of the COVID-19 pandemic. Funding priorities to address this need include:[298]

- Incentivizing the use of routine pediatric screening for a range of risk factors for children, starting at an early age and continuing into early adulthood. To facilitate enhanced primary care measures like this, it is important to:
  - Standardize reimbursement codes/mechanisms for pediatricians to conduct early screening for ACEs and implement or provide referrals for interventions;
  - Increase reimbursement for pediatric screening of ACEs and other early risk factors for substance use and mental health problems; and
  - Train and incentivize pediatricians to screen for substance use and provide brief interventions and referral to treatment when needed.[299]

- Expanding and making permanent the funding provided in COVID relief bills for school-based mental health services for children[300] and Head Start programs;[301]

- Investing in social-emotional learning interventions, including those focused on fostering child resilience, starting in preschool and continuing throughout a child's academic career; and

- Training for school psychologists and counselors in primary prevention activities and in the use of evidence-based screening for substance use in schools.

Prioritizing prevention research that assesses the benefits of an earlier and broader approach.

Policymakers should ensure sustainable funding for research that:[302]

- Documents the short- and long-term effects of investments in family health and stability specifically on youth risk for substance use and addiction;

- Deliberately measures and tracks changes in the prevalence of known risk factors, including ACEs,* for substance use among youth as well as interventions historically not considered within the direct scope of substance use prevention, such as those that reduce financial strain on families and support child and parental mental health;

- Collects data on and monitors the longer-term effects of prevention programs to determine their impact on actual youth substance use (and not only youth substance-related attitudes and beliefs, as many shorter-term studies document);

- Explores the efficacy of programming for a broad range of racial/ethnic and cultural groups; and

- Reduces bias and conflicts of interest in evaluations of effectiveness by ensuring that initiatives are evaluated for effectiveness by researchers independent of the development of those programs.

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* The U.S. Centers for Disease Control and Prevention (CDC) now provides funding and resources for preventing ACEs (https://www.cdc.gov/violenceprevention/aces/preventingace-datatoaction.html).

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CONSIDER DOWNSTREAM EFFECTS OF FUNDING CUTS TO PROGRAMS AND SERVICES

Policymakers should be careful to ensure that funding cuts to seemingly unrelated initiatives do not have unintended adverse consequences for youth substance use. For example, as demonstrated by the Icelandic Prevention Model,[303] offering engaging recreational and extracurricular after-school and weekend activities for children and teens that allow them to take healthy risks and participate in empowering challenges are an important strategy for reducing youth substance use.

Annual Percentage of Self-Reported Substance Use Among Icelandic Adolescents, 1998–2018
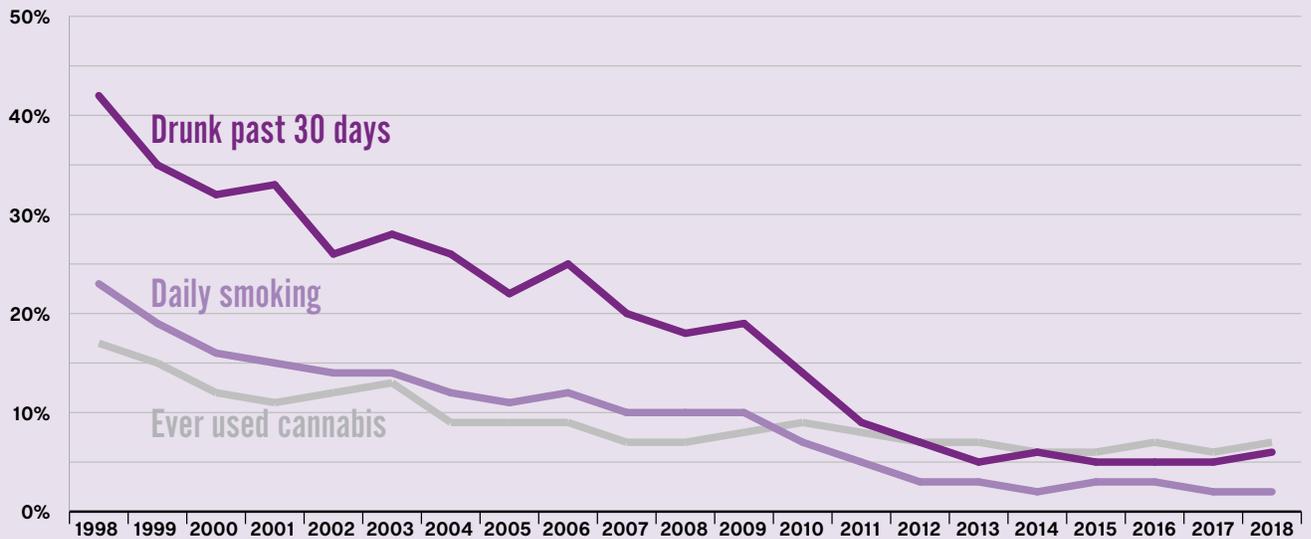
Source: Kristjansson, A. L., Sigfusdottir, I. D., Thorlindsson, T., Mann, M. J., Sigfusson, J., & Allegrante, J. P. (2016). Population trends in smoking, alcohol use and primary prevention variables among adolescents in Iceland, 1997-2014. *Addiction*, 111(4), 645–652.

Yet, these after-school and extra-curricular activities are often the first to get cut during budget shortages. Even in Iceland, where the program was so successful, researchers found that limited funding and personnel with protected time to devote to primary prevention were main challenges to program success. Therefore, policymakers should carefully evaluate the potential impact of cuts to youth services on substance use prevention.

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KEY PRACTICE PRIORITIES

With the right policies and funding in place, the work of achieving the goal of a broader and earlier approach to preventing health risks and promoting health and resilience among youth falls on the adults who surround and influence children: their parents, other caregivers in the family and community, educators, and health care providers. The following key priorities for improving prevention practices among these sources of influence should serve as foundational guidelines:

PARENTS AND OTHER CAREGIVERS IN THE FAMILY AND COMMUNITY

The extent to which ACEs or other risk factors will compromise a child's healthy development depends on many things, including the presence of protective factors to buffer the impact of those risks. Protective factors serve primarily to foster a child's resilience, or the ability to cope effectively with life challenges and gain strength and wisdom from those challenges. Parents and other caregivers cannot possibly eliminate all obstacles to healthy development for children, but research shows that they are the most important influence on children's attitudes and behaviors and a critical source of their resilience.

Through specific skills and practices, parents and other caregivers can support and empower children, promote resilience, and protect their health, safety, and well-being. The consequent protective and compensatory experiences (PACEs) that this provides children can outweigh or reduce the impact of ACEs and other risk factors they might face. There are certain research-based protective strategies that can be used by parents and other important adults in a child's life to promote resilience and healthy development. Some might seem like simple, common-sense practices; but implementing them in an effective and sustained manner actually requires a lot of dedication, time, patience, and drive. Specific actions for parents and other caregivers to promote healthy child development and prevent substance use include:[304]

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START EARLY.

It's never too early to promote healthy attitudes, emotions, and behaviors in children. The development of resilience is an incremental process, in which the early establishment of healthy skills creates a foundation upon which future adaptive skills and experiences are built. It's also never too early to be on the lookout for risk factors that can interfere with a child's healthy development and to respond quickly and effectively if they emerge.

KNOW THE FACTS.

Parents and other caregivers should be well-informed about the factors in children's lives that can promote or impede their healthy development and what can be done to promote protection and reduce risk. Different development stages require different strategies, and all require flexibility and adaptability.

BE A GOOD MODEL FOR HEALTH AND RESILIENCE.

Parents have the greatest influence over their children's attitudes and behaviors, so it's very important for them to model safe, appropriate, and healthy attitudes and behaviors. This includes modeling good coping skills when faced with challenges and failures, as well as how to apologize, forgive, be honest about shortcomings, overcome obstacles, and bounce back from challenges. Being a good model also means getting help when needed to safeguard one's own mental and physical health and normalizing the act of seeking help when it is needed.

COMMUNICATE OPENLY AND HONESTLY.

Having open and honest conversations with children creates a dynamic where they will feel safe to ask questions or seek help for problems from trustworthy, credible adults rather than less reliable sources.

SHARE EXPECTATIONS.

Children do well when clear boundaries and limits are set and when adults consistently and fairly follow through on previously discussed consequences. Clear expectations and rules and a shared understanding of consequences for violating them provide children with a sense of stability, consistency, and security both within their home life and in their interactions and experiences outside of the home.

MONITOR BEHAVIOR.

A key responsibility of all adults is to protect children from harm and help them develop into healthy and fulfilled adults.[305] Knowing where children are, what they're doing, and who they're doing it with, and speaking up if children are in an unhealthy or unsafe situation constitute effective monitoring if done in an age-appropriate way with an eye toward promoting health rather than punishment. Today, monitoring also requires keeping an eye on children's social media use, as too much time spent on social media has been associated with poor mental and physical health, weakened family bonds, and reduced connection to school and community.

TAKE A HEALTH, NOT A PUNITIVE, APPROACH.

A focus on supporting children's health rather than imposing punishments for unhealthy or unsafe behaviors yields better outcomes and lets children know that of primary concern is their well-being.

ENCOURAGE HEALTHY RISK-TAKING AND EMOTION EXPRESSION.

Taking risks and expressing a broad range of emotions is an important part of development, and if children can be helped to do so in safe and healthy ways, they will be less likely to engage in and develop dangerous habits. Children should be encouraged to face challenges and go beyond their comfort zone so that they can learn how to adapt to new and complex situations, manage setbacks in a healthy way, and develop new skills.

USE POSITIVE REINFORCEMENT.

Giving positive feedback to children when they demonstrate effort or engage in desired attitudes and behaviors, rather than reprimanding them when they don't meet expectations, is an important part of promoting resilience and healthy attitudes and behaviors.

KNOW CHILDREN'S RISK LEVEL AND RESPOND ACCORDINGLY.

It is important for parents and other caregivers to know whether a child is susceptible to mental or physical health problems or substance use, be vigilant for and responsive to signs of risk, and know when and how to seek help if needed.

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EDUCATORS

Adopting an earlier and broader approach to prevention that promotes child health, wellness, and resilience and addresses shared risk factors across a range of health issues inherently reduces the burden on resource-limited schools and the need for multiple, resource-intensive initiatives targeted to discrete negative outcomes. With adequate funding, schools can provide effective social-emotional learning, substance use prevention programming, routine screening for risk, and counseling services and other interventions for children who need them. Specific actions for educators to promote healthy child development and prevent substance use include:

- Conducting screening and intervention to identify and address ACEs, child mental health problems, and other early risk factors for substance use within child care, pre-K, primary, and secondary school settings;

- Implementing social-emotional learning programs in schools (from pre-K through high school);

- Identifying low school readiness and deficits in self-regulation and develop interventions to increase social-emotional competence;

- Reducing stigma and achieving a broader reach by implementing universal programming – aimed at all students, regardless of risk level, starting in pre-K and extending through high school – that emphasizes positive development, health promotion, and resilience; and

- Incorporating families in substance use prevention efforts (including early care and early education programs) by helping them address and moderate the negative effects of ACEs and other risk factors for child mental health and substance use problems and providing referrals for support services when needed.

HEALTH CARE PROVIDERS

The principal responsibility of health professionals with regard to preventing substance use and addiction plays out within the confines of individual clinical practices via patient education, screening, early intervention services, and referrals to treatment when necessary. Yet, the health profession can transcend the clinical walls and become involved in broader initiatives to promote healthy child development and prevent the risks associated with substance use.

Health professionals can work with parents, community organizations, educators, social service agencies, and policymakers to help ensure that prevention messaging and initiatives are based in the evidence. They can become more involved in the education, training, and support of those working in nonmedical settings to identify and appropriately manage substance-related risk factors in the populations they serve. And they can be involved in promoting and advocating for legislative and regulatory measures that control the availability and accessibility of addictive substances, especially to youth.[306] Specific actions for health professionals to promote healthy child development and prevent substance use include:

- Routinely educating parents about the risk factors for substance use at various stages of child development and how best to address them, even before signs of risk emerge;[307]

- Screening young patients for all forms of substance use risk – including ACEs, low school readiness, and deficits in self-regulation – as a routine part of clinical visits;[308]

- Providing counseling to parents whose children are diagnosed with certain medical, mental health, or behavioral problems that present a higher risk of developing substance use in adolescence (attention-deficit/hyperactivity disorder, conduct disorder, headache, injury/poisoning, oppositional defiant disorder, and trauma- or stress-related disorders);[309] and

- Providing parenting support to parents receiving substance use or mental health disorder treatment (e.g., linkage to home visiting programs).[310]

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KEY RESEARCH PRIORITIES

Deliberately measuring and tracking changes in the prevalence of known risk factors for youth substance use can help establish an evidence base for expanding traditional prevention efforts to include interventions not typically considered within their direct scope, such as those that reduce financial stress on families and support child and parental mental health. By demonstrating that intervening earlier and more broadly can better prevent substance use in adolescence and put children on a healthy path to adulthood, we can ultimately steer more youth and adults away from developing addiction.

With the value of investing in families and communities laid bare by recent national crises, including COVID-19 and the opioid epidemic, it is important to measure the impact of such investments on future youth substance use and addiction.[311] Specific actions for researchers to promote healthy child development and prevent substance use include:

- Expanding collaboration between prevention researchers and practitioners (e.g., schools, health professionals) and between researchers in the fields of substance use prevention and childhood development to ensure that relevant early childhood factors are being included in studies;

- Conducting research on interventions targeting early social determinants of risk and health;[312]

- Conducting more longitudinal (long-term) studies to determine the impact of preventing childhood risk factors on later youth substance use and better identify the most influential targets and ideal timelines for interventions; and

- Developing and adhering to standards or guidelines to reduce bias in prevention research such that new or ongoing programs are evaluated for effectiveness by researchers independent of the development of those programs.

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CONCLUSION

Now is the time for policymakers, health care providers, educators, and researchers to explore and implement policies and strategies to address the broader pressing needs of children by supporting families along each stage of a child's development. Admittedly, the changes that are needed to transform how our nation prevents addiction are many and can feel daunting. Implementing these changes will require substantial shifts in how we think about addiction and prevention, how we allocate funds, and how our education, health, child welfare, and criminal justice systems operate.

Fortunately, we are in an historical moment of government attention to the importance of investing in many of the early social determinants of health, including allocating more resources toward improving child mental health and education, reducing child poverty, and securing families' income, food, and housing stability. This moment allows us an unprecedented opportunity to improve prevention efforts and their outcomes through initiatives that traditionally have seemed to be beyond the scope of substance use and addiction.

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