This chapter addresses state-of-the-art approaches to substance use prevention in youth.

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Substance use: Determinants and opportunities for prevention in the family and school context

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During adolescence, teenagers try a range of risk behaviors including smoking, drinking, and the use of soft drugs. Because substance use contributes to an unhealthy lifestyle of teenagers on the short term and can lead to serious health problems on the longer term, prevention in this target group is important. We provide here an overview of the determinants of substance use on the one hand, and primary and secondary prevention opportunities on the other, especially in the school context. At the end, we will discuss future directions and recommendations for school, youth, and family.

Consequences of substance use

Substance use at a young age is not without risks. Alcohol use can lead to aggression and violence, alcohol intoxication, and it increases the risk of traffic accidents. In addition, heavy drinking during adolescence increases the risk of alcohol dependency in adulthood. Teenagers seem to be more vulnerable to experience negative consequences from drinking than adults, for which several factors are responsible. First of all, teenage bodies are usually smaller and have a different composition than adult bodies. Moreover, because teenagers are still in development, long-term heavy alcohol use might particularly damage the brain development. The detrimental consequences of smoking are very serious as well, but usually take longer to emerge. Smoking-related diseases, such as lung cancer, are seldom or not at all prevalent among adolescent smokers. However, smoking certainly has short-term negative health effects including mouth and teeth problems, more asthmatic symptoms, and the experience of negative consequences during intensive physical exercise. In addition, smoking is quickly and strongly addictive. Research suggests that even adolescents who smoke infrequently and sporadically can already experience symptoms of nicotine dependence, and the adolescent brain is sensitive to the development of nicotine dependence as well. Smoking in adolescence increases the risk to continue smoking into adulthood, and the permanent changes in the brain cause strong sensations of “craving” (strong urges to smoke) during periods of abstinence. Studies show that nicotine dependence poses a barrier to successful smoking cessation among teenage smokers as well. The younger the age of onset, the greater the likelihood of nicotine dependency later in life.

Determinants of substance use

There are various individual and environmental characteristics that can function as risk factors in the onset and development of substance use among adolescents. These individual and
environmental characteristics include, for example, personality characteristics, educational level, and genetic factors. Examples of environmental characteristics that can influence adolescents’ substance use are among others parental substance use, the availability of substances, and family dysfunctioning.

**Individual or person-related factors**

At the level of the individual factors, we first of all refer to the knowledge that youths have of the possible risks of substance use and their personal ability to comprehend the impact of these risks. The attitude teenagers have toward themselves and others toward substance use is relevant as well. An important predictor of substance use is the intention to use.\(^9\) This intention is determined by motivational factors. Youths smoke or drink because they have positive ideas or expectations about smoking and drinking and because they do not possess sufficient self-efficacy or skills to abstain from these behaviors. Several studies have associated positive attitudes, outcome expectations and motives regarding smoking and drinking with both the onset and continuation of use.\(^10\) The quality of coping and social skills (being able to say “no”) are important considering that teenagers who set boundaries to their substance use, and who dispose of the skills to not let themselves be persuaded by peers to use, are less likely to develop problematic substance use.\(^11\) Furthermore, other problems, such as psychological problems, can coincide with substance use. At this point, it is not yet clear why substance use often coincides with the onset and prevention of psychological problems.\(^12\) On the one hand, substance use can serve as self-medication for psychological symptoms. On the other hand, substance use can exacerbate existing psychological problems or accelerate the development thereof.

In addition, smoking, drinking, and cannabis use are more prevalent among youths from lower educational backgrounds compared to youths with higher educational attainment.\(^13\) The lower the educational level, the more students smoke (daily). Educational level does not play a role in the prevalence of lifetime and current drinking.\(^14\) However, drinking large quantities of alcohol and
“binge drinking” are more common among youths at a lower educational level. Teenagers who receive mental health care score higher on smoking and most indicators of drinking compared to peers who receive regular education.\textsuperscript{15} Lastly, there are biological factors, such as innate character traits and genetic predisposition. Several studies indicate that the risk of dependence on and misuse of smoking and drinking is heritable. Twin studies have revealed that a large part of the variance can be explained by genetic factors.\textsuperscript{16} Nowadays, there are increasingly more studies that aim to examine which specific genes form the basis of innate vulnerability to substance use and dependence. Popular candidate genes are genes that are related to reward and regulatory neural systems. In several studies into smoking and drinking it has been examined whether specific polymorphisms are more prevalent among (heavy) substance users.\textsuperscript{17} However, these studies do not provide consistent results. One of the explanations for these inconsistent findings might lie in the notion that it does not suffice to solely look at the unique effects of genes alone and that one rather has to investigate the interaction between genes and environmental factors.\textsuperscript{18} Negative environmental factors, such as inadequate child rearing or the availability of substances, can increase adolescents’ risk of substance abuse and dependency, especially if the adolescent has a genetic predisposition for substance use as well. Thus, the environment can contribute to protecting teenagers from their genetic vulnerability. This is valuable information for substance use prevention policy.

\textit{Environmental factors}

Parents play an important role in their children’s substance use. There is a relation between parental substance use and that of their children. Parents can influence their children’s substance use by setting a norm, by shaping behaviors that their children are likely to imitate, or by restricting the availability of substances.\textsuperscript{19} It further also appears that if parents forbid their children to drink and if they communicate this well at home, children start drinking at a later age.\textsuperscript{20}
As adolescents grow older, friends are starting to play an increasingly important role in their lives. Until approximately the age of fourteen, youth alcohol use is influenced by parental alcohol use, and the child-rearing climate.\textsuperscript{21} As soon as adolescents’ drinking behavior starts to exceed the level of incidental experimentation, the role of friends becomes more prominent.\textsuperscript{22} No full consensus about the role of friends has been established yet. Several scholars posit that the role of friends in the development of substance use might be smaller than is often assumed, in part because friendships can be formed on the common ground of joint alcohol use (selection effect).\textsuperscript{23} In a longitudinal study by Jaccard and colleagues, it was found that the influence of friends on substance use was limited when controlling for selection effects.\textsuperscript{24}

Examples of environmental factors on a larger scale are physical environmental factors, such as the availability of alcoholic beverages and tobacco including the regulations for selling them to minors. If the availability is restricted and the age limits for selling alcohol and tobacco are well maintained, alcohol and tobacco will be sold to a lesser extent overall.\textsuperscript{25} However, it is good to realize that next to a direct and indirect influence of environmental factors and regulations on substance use, substance use itself, in turn, influences the environmental factors and regulations. When the negative consequences of substance use are made more visible, the tolerance toward substance use will decrease and more precautions will be taken by the environment to prevent and discourage use.

\section*{Prevention}

To prevent and discourage experimentation and escalation of substance use among teenagers, a lot of attention is being paid to the development and implementation of various prevention activities, especially in the school context.

\subsection*{Universal prevention}

Universal prevention is being implemented in several domains. First of all there are policy measures, mainly taken by the
government. These measures aim to directly reduce substance use among teenagers. Raising taxes and prices, prohibition or restriction of marketing, age limits, restriction of number of selling points, and the smoking ban in public places are among these measures. Next to policy measures, public education about substance use is an important pillar of prevention efforts.

**Governmental policy measures.** Several measures have been legally established by including them in the law. These involve measures that are aimed at the production, promotion, accessibility, and sale of alcohol and tobacco in order to discourage their use. Most of the studies on the effects of governmental measures have been carried out in countries outside the Netherlands. A very promising measure to lower the prevalence of smoking and drinking among youth is raising the price or excise. For alcoholic beverages counts that the selling price is mainly of influence when adolescents are younger, as this impact lessens as they grow older. It has also been calculated that a 20 percent raise in the selling price of tobacco can reduce the number of young smokers in the Netherlands by almost 20,000 on the short term.

There is also evidence from international research on raising the legal age threshold for drinking. Raising the minimum age for drinking has been associated with reduced alcohol use, and an adequate compliance with age limits is related to decreases in alcohol sales. However, in the Netherlands, the age limits for selling alcohol are hardly complied with in stores, restaurants, bars, and nightspots. The compliance with age limits is problematic in the case of tobacco sales as well. A stricter maintenance and more intensive monitoring of compliance with the age limits by the government therefore seems indispensable to increase the effectiveness of age limits in the Netherlands.

Finally, commercial restrictions seem to have an effect on alcohol and tobacco consumption as well, albeit only modestly. A comparison among twenty-two countries revealed that commercial bans can reduce tobacco consumption, provided that the ban is pervasive and overarching. A limited ban on commercials was found to be hardly effective, if at all.
**Education and creating awareness.** Governmental measures are often combined with the provision of information and education to create extra foundation and to stimulate compliance with regulations. There are mass media campaigns around substance use on a regular basis using TV commercials, radio, printed materials, or combinations thereof. Regarding alcohol use, it seems that mass media education particularly has an effect on adolescents’ knowledge of and attitudes toward alcohol use. However, there hardly seem to be effects of these campaigns on actually reducing use or delaying the age of onset.\(^{33}\) There are some indications that mass media campaigns can be effective in the area of smoking when it comes to delaying the age of onset.\(^{34}\) However, on the longer term, no effects have been found on attitude, knowledge, or intention to start smoking. Thus, mass media campaigns mainly seem to contribute to creating awareness, increasing knowledge, and changing the public’s attitude, but barely contribute to actual behavioral change.

Schools are suitable mediums to reach youths for education about substance use. Interventions at schools among others comprise lessons in which information is being provided that is aimed at increasing knowledge among youths, influencing their attitude toward substance use, resilience training, and at influencing norms regarding substance use. Good intervention programs will delay the onset of use, or, if youths do start to use, good intervention programs will at least help to limit the use. In general, programs that are solely aimed at providing information and education do not seem to be very effective.\(^{35}\) More and more programs are being developed in which several forms of interventions are being combined. The program “Prevention of Alcohol use of Students (PAS),” for example, is targeted at both teenagers and their parents. A study on the effectiveness of this program showed that an e-learning module for adolescents was effective in delaying alcohol use but only if the parents were addressed as well.\(^{36}\) The “Healthy School and Substance Use” of the Trimbos-institute is an example of a program with multiple components aimed at creating awareness about substance use among students and teachers and at
creating a healthy (school) environment. Parents are involved in this program as well. Currently, a large-scale longitudinal randomized controlled study into its effectiveness is currently running in the Netherlands. However, with the exception of a few broadly implemented projects, currently little is known about the effectiveness of preventive substance use interventions within the Dutch school context.37

Finally, the influence of parents can be used to prevent or reduce substance use among teenagers. A recent longitudinal study showed that setting strict rules regarding alcohol use has a preventive effect on both onset of drinking and on developing regular or excessive alcohol use.38 There are indications that parents setting rules can be effective against smoking as well.39 However, this concerns mainly international findings and Dutch studies do not seem to be able to confirm these results. Dutch studies have shown no effects or only very modest effects.40 Enforcing smoking-specific parenting does seem to contribute to reducing smoking among teenagers.41 A good quality of the communication between parent and child, for example, talking to one another about smoking in a respectful way, seems to be important.42 Also with regard to alcohol use, it was found in recent longitudinal research that a good parent–child communication is an important predictor of alcohol use. When both the parent and the child are interested in each other’s opinion, and when they feel understood and taken seriously, this has a protective effect.43 These results indicate that parents can function as intermediaries in the prevention of substance use among youths. Thus far, however, only international studies on parental interventions show promising effects, also on the longer term.44 The programs “Preparing for the Drug Free Years” and the “Iowa Strengthening Families” program seem to be particularly effective when it comes to the substance use of the children of the parents who participated in the program. The effects of “Preparing for the Drug Free Years” appeared to even last until as much as six years after the intervention.45 Despite the promising findings in other countries, it is not clear whether these prevention programs are suitable for implementation in other cultures.
and countries, nor it is clear whether they would be effective here too.

Selective and indicated prevention

Given the modest effectiveness of universal prevention in reducing substance use among teenagers, there is a strong necessity to carry out interventions aimed at high-risk groups as well as teenagers who already excessively use substances but who do not yet meet the criteria for substance abuse or dependence (selective prevention). Schools are in particular interesting contexts to implement these prevention programs as they reach a high population of youth and have relatively low thresholds for adolescents (and their parents) to participate.

Selective prevention. Selective prevention is aimed at specific groups of youths who are at augmented risk to have problems with substance use, for example, children with precarious personality traits, children of parents with substance use problems, or children in special education.

First of all, there are teenagers who on the basis of their individual characteristics are at higher risk to develop problems with substance use. The prevention program Preventure targets youths who have one of the following precarious personality traits: sensitivity to anxiety, negative thinking, or sensation seeking. Preventure consists of two group sessions at school and comprises three elements: psychoeducation, cognitive coping skills, and behavioral coping skills. Research on the effectiveness of this program on alcohol use demonstrated that Preventure has an effect on abstinence, the quantity and frequency of drinking, and on binge drinking. At the moment, Preventure is being tested in the Netherlands. The program has been translated and adapted to the Dutch school situation.

In the area of family-related prevention for children of parents with substance use problems the “Focus on the Families” program is one of the few programs that has been studied experimentally. This program has been designed for children of parents in a methadone program and is targeted at the whole family. No
short-term effects were found on substance use (alcohol, tobacco, and cannabis) by the children. On the longer term, the researchers found that the intervention reduced the risk of addiction disorders among boys, but not among girls.\textsuperscript{48} We can conclude that only little research has been conducted on the effectiveness of selective prevention for children of parents with problematic substance use.\textsuperscript{49}

Finally, students in special and lower education form a high-risk group for developing problematic substance use.\textsuperscript{50} Several school-based prevention programs have been developed for this group. One example is \textit{Project No Drug Abuse}. In nine sessions, students receive information about dependency, ways to deal with substance use, and they are trained in decision-making skills. The intervention had an effect on alcohol use among teenagers who were (excessively) drinking before the intervention. However, no effect of the program was found on smoking or cannabis use, and on the longer term the effect on alcohol use did not last either.\textsuperscript{51} \textit{Project Success} also did not have a long-term effect on the use of alcohol, tobacco, or cannabis.\textsuperscript{52} Thus, there seems to be little evidence for the (long-term) effectiveness of school-based substance use interventions for youths in special education.

\textbf{Indicated prevention.} A large number of Dutch teenagers start drinking and smoking at an early age. Both for smoking and drinking count that a subgroup of teenagers shows a relatively fast progression to patterns of heavier use. These riskful patterns of use demand adequate interventions that encourage teenagers to change their patterns of use. Indicated prevention programs for teenagers are mainly focused on creating motivation for such changes.

One method to motivate teenagers toward behavioral change is to provide them with more awareness about their use by giving personal feedback. The website www.watdrinkjij.nl (Trimbos-institute) contains an online drinking test. With this test, teenagers can map their alcohol use. In addition, based on their answers to the test, they can obtain personal feedback on their alcohol use, their drinking motives, and their risk of developing problematic alcohol use. These websites try to make teenagers aware of their
smoking behavior and cannabis use and in addition offer several strategies to reduce use. Given that these interventions are provided online, and thus without interference by institutions or caretakers, they have the capacity to reach groups that otherwise would not seek professional help. There is some evidence for the effectiveness of giving youth’s personal feedback as an intervention.\textsuperscript{53} However, the preponderance of research on personal feedback is focused on (young) adults. Riper and colleagues recently carried out a meta-analysis of the effectiveness of personal feedback in reducing alcohol use among heavy drinking college students and adults.\textsuperscript{54} They found that providing personal feedback was effective in reducing alcohol use in this group on the short term. Future research will have to reveal whether these findings are applicable to teenagers as well and whether the effects are retained on the longer term.

Next to independent (online) interventions based on personal feedback, there are also brief interventions for youths who come into mental health care through their parents, through school, or on their own accord. A frequently applied brief intervention is motivational interviewing.\textsuperscript{55} Motivational interviewing helps individuals to acknowledge their problematic behavior and to stimulate them toward behavioral change. It is especially a suitable method for individuals who show resistance and ambivalence toward behavioral change. For teenagers who have already experienced risky alcohol and drug use, motivational interviewing seems to be a useful intervention. The effectiveness of motivational interviewing as indicated prevention for teenagers has been investigated in several studies. To some extent there seems to be support for motivational interviewing as intervention method for youths.\textsuperscript{56}

\textit{Conclusions and future directions for school, youth, and family}

Teenage substance use is the result of a combination of individual and environmental risk factors. It is therefore important that prevention initiatives are aimed at the teenagers themselves (that is,
by influencing knowledge, cognition, and behavior) as well as their physical and social environment (that is, policy measures and educating parents about substance use). Thus, it is important to focus on a combination of risk factors. The current (Dutch) prevention programs independently from one another seem to have a modest influence on teenage substance use. However, there are indications that combined interventions (so-called integral approaches) have the capacity to have a larger impact. An example of this comes from a multifaceted school-based prevention RCT in which it was shown that the delay of alcohol use onset was only successful when both the parents and the child participated in the intervention.57

The same counts for tobacco use; the effectiveness of separate interventions will be augmented when delivered in conjunction with one another.58 A raise in selling price of tobacco, for instance, reduces the number of young smokers and generally reduces tobacco consumption. Yet, combined with other measures, such as selling restrictions and smoking-specific education, the impact of both measures can be expected to be even stronger. On a national level, government means include communicative means (for example, provision of information and education), economical means (for example, excise and fines), and legal means (for example, enforcing age restrictions and ensuring compliance with these restrictions). Provision of information and education is mainly important for creating a foundation for the other interventions and measures.59 By implementing a combination of measures, unhealthy behavior in the form of substance use can be corrected and reduced, and healthy behavior can be encouraged and facilitated. Teenagers, and where needed their parents included, should be informed and stimulated toward healthy behavior. Preferably, and conform a developmental approach, this is already started at an early age and involves several environments to which the child is connected (parents, school systems, sport clubs, etc.). This way the chances of children and teenagers developing healthy behaviors are optimized. One can think of interventions that run from elementary school to high school and that are directed at the children themselves as well as their (social) environment. These
interventions of course should be adapted to the developmental phase of children and adolescents as well as to the particular stage of substance use they individually find themselves in.

In response to the limited effectiveness of universal school-based prevention programs in preventing substance use among teenagers, several selective and indicated prevention programs have been developed. A recent meta-analysis showed that in the area of alcohol use, selective and indicated prevention programs are more effective in preventing and reducing alcohol use than universal prevention.\textsuperscript{60} Universal prevention, on the other hand, seems to be more effective against smoking. In addition, there are many prevention programs in use that have hardly undergone systematic empirical testing for effectiveness. It is important that the government stimulates research into the (long-term) effects of existing interventions and that the specific mechanisms behind change are being investigated more in depth (process research). It is also recommended that more research is devoted to answering the question which individual characteristics of the teenagers themselves affect the effectiveness of the interventions. This way we can obtain more insight into the working mechanisms of these programs for different (groups of) youths.

Notes


Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.


22. Van der Zwaluw et al. (2008).


38. Van der Vorst (2007).


58. Bouwens et al. (2007)


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