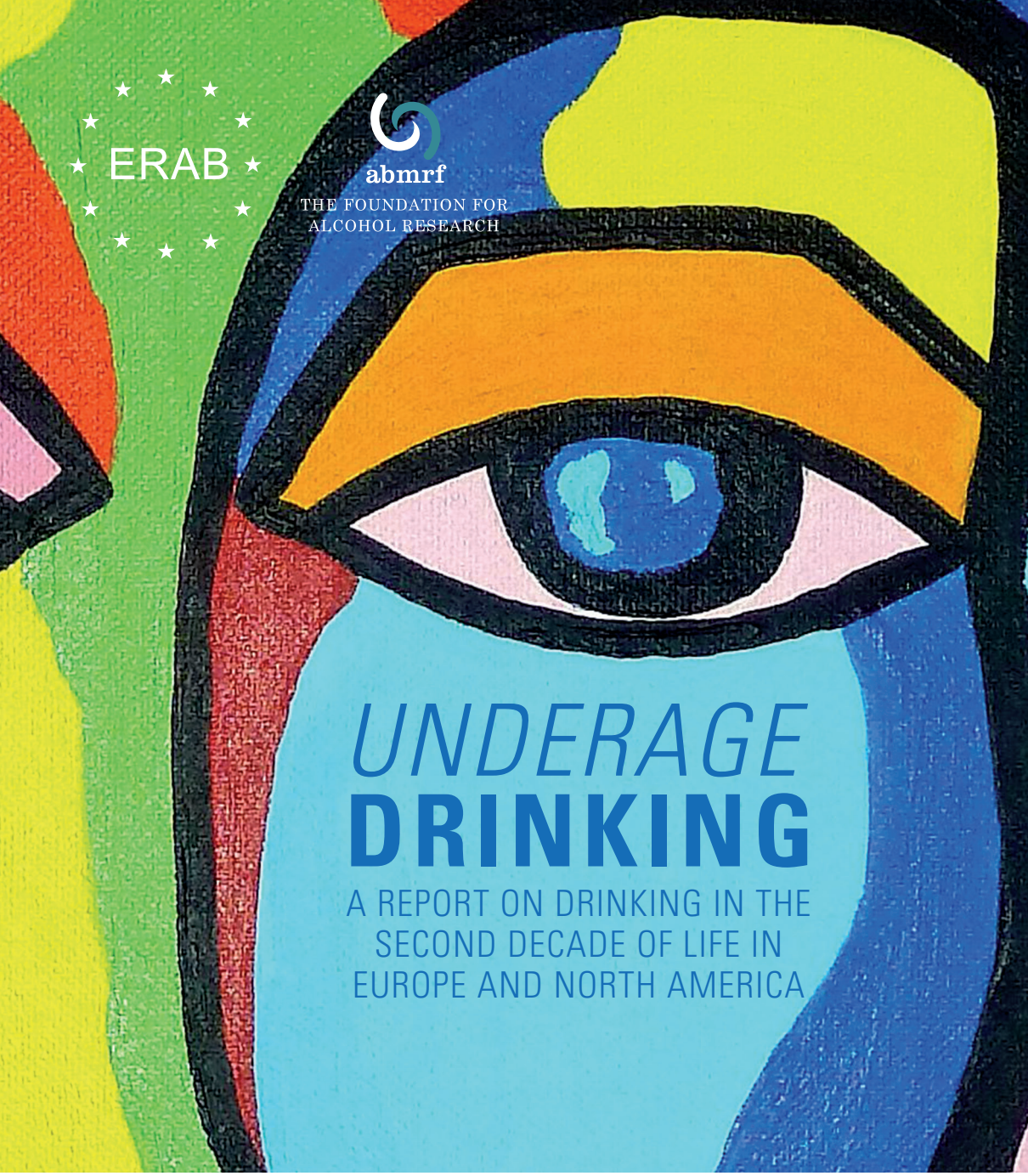

UNDERAGE **DRINKING**

A REPORT ON DRINKING IN THE SECOND DECADE OF LIFE IN EUROPE AND NORTH AMERICA

Edited by **Philippe De Witte**
and **Mack C. Mitchell Jr.**

UCL PRESSES UNIVERSITAIRES DE LOUVAIN

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The European Foundation
for Alcohol Research

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- Disclaimer: The information and views set out in this report are those of the authors and do not necessarily reflect the official opinion of ERAB or ABMRF.

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Preface

Philippe De Witte

In 2010, ERAB: The European Foundation for Alcohol Research (ERAB)[1] in partnership with ABMRF/The Foundation for Alcohol Research (in North America) (ABMRF)[2] answered a call for applications from DG (Directorate General) RELEX (External Relations[3]) to coordinate a review of underage drinking in Europe and North America. This application was unsuccessful but after careful consideration, the view was that ERAB and ABMRF were ideally placed to deliver such a project. A modified version of the original application was proposed and started in 2011. ERAB and ABMRF were keen to undertake this project to have the opportunity to generate strategy options in order to assist authorities in Europe and North America address this important public health issue

The project marked a new direction for ERAB which, prior to this, had only funded applications for scientific grants with the awards being based on the quality of the science as judged by peer review. This special project on underage drinking is no less independent than its usual work, but constitutes a review of the evidence-base in a particular area rather than initiating new research. It has been undertaken by experts in the field, for an honorarium, and has been subjected to peer review. Funding

[1] ERAB was established as an independent Charity in Brussels in 2003 to fund European biomedical and psychosocial research into the effects of beer and alcohol. It is funded by the brewing sector in Europe and its independence is guaranteed by a Board of Directors made up of a majority of public members along the lines of the ABMRF/ The Foundation for Alcohol Research - see below. In the past 9 years it has funded 55 European research projects from 12 countries.

[2] ABMRF is a private non-profit foundation that was established in 1982 to fund alcohol research in North America. ABMRF is supported at arms-length by contributions from the brewing industry and private individuals in the United States and Canada.

[3] DG RELEX, now the European External Action Service (EEAS), the European Union's Diplomatic arm, was the Unit within the European Commission with responsibility for External Relations with other countries of the world including the US and Canada.

for ERAB and ABMRF[4] is provided at arms-length by the brewing sector. It must be stressed that the providers of the funding have NO influence over any aspect of this project, nor any of the research funded by either organisation.

The project has involved a group of experts in the EU and North America who have produced a review of the research on underage drinking, drawn comparisons between both Continents and made recommendations on effective interventions in different situations based on the evidence reviewed.

[4] Both foundations have developed a unique partnership between academia and the brewing industry that, whilst maintaining a clear separation and the independence of the two parties, grew out of a shared concern over the importance of improving the understanding of the effects of alcohol consumption on health and behaviour. Scientists in Europe, Canada and the U.S. submit investigator-initiated proposals to each foundation for review by independent scientists in social and behavioural as well as biomedical research to determine which applications to fund. Decisions are made independently of any direction from industry. Grantees publish their results in peer-reviewed journals without prior review by the foundations. In total, more than 500 investigators have been funded by ERAB or ABMRF. Both foundations meet regularly at an annual conference, the International Medical Advisory Group Conference (IMAG). These scientific conferences provide a forum for scientists in all areas of alcohol research to exchange information on the very latest research on the biomedical and psychosocial aspects of alcohol, and to discuss future research projects.

Introduction

Philippe De Witte
and Mack C. Mitchell Jr.

This report is based on a collaborative project on underage drinking in Europe and North America sponsored by ERAB: The European Foundation for Alcohol Research (ERAB) in partnership with the ABMRF/The Foundation for Alcohol Research (ABMRF).

Underage drinking is a serious public health problem through many parts of the world. While there is a decline in drinking among youth both in North America and Europe, a significant percentage of youth engages in risky behaviour by repeated episodic heavy drinking on both sides of the Atlantic.

Substantial evidence indicates that the initiation of risky drinking is higher during adolescence than at other times in life (Zeigler et al., 2005). Risky drinking is often part of an overall profile of high-risk behaviours in adolescents, but the availability and role of alcohol consumption in society demands a thorough understanding of underage drinking.

Underage drinking could have different definitions across cultures and countries that have different minimum age of legal purchase, so this report focuses on the second decade of life; between the ages of 10 and 20, with an emphasis on drinking by adolescents through age 16. The second decade is a time of physical maturation and continuing development of the brain. Recognizing that different regions develop at different times may help to understand some of the impact of alcohol consumption during the second decade of life.

Emotions and motivation are thought to originate in the midbrain, whereas the frontal region of the brain exerts executive function and

limitation of impulsive behaviour. Understanding that the midbrain regions develop earlier and faster than the frontal regions helps explain why adolescents may experience more dramatic emotional responses following ingestion of alcohol yet not have sufficient ability to limit impulsivity. As a consequence of having inadequately developed executive functions adolescents are very vulnerable to the feeling of invincibility when drinking alcoholic beverages. This combination represents a dangerous mixture.

The potential harm to brain development is one of the greatest concerns about underage drinking. Both animal and human studies have shown that heavy drinking can cause cognitive deficits, which further impair decision making, problem solving, planning, attention, and learning (Crews, He, & Hodge, 2007). Thus, early heavy drinking can interfere with school performance and create other behavioural difficulties for youth.

Repeated episodes of binge drinking damage areas of the midbrain (e.g., the hippocampus) that encode memory processes (Guerri & Pascual, 2010; Medina & Tapert, 2012). Moreover, specific cell types within the brain, such as the microglia, can be activated by repeated heavy drinking, producing pro-inflammatory cytokines that persist for long periods of time after repeated consumption (Crews, Zou, & Qin, 2011). In other words, chronic heavy drinking during the second decade of life can induce immunological disturbances that first appear later in adulthood.

Heavy drinking by youth can result in a wide range of costly health and social consequences, including fatal and nonfatal accidents, all types of interpersonal violence, risky sexual behaviour, academic problems, and alcohol poisoning (U.S. Department of Health and Human Services, 2011).

In 2007, the U.S. Surgeon General's Call to Action to Prevent and Reduce Underage Drinking (U.S. Department of Health and Human Services, 2007), heralded the start of a more focused examination of the relationship between alcohol use and adolescence describing strategies to reduce and to prevent harmful drinking. Considerable work since then provides a deeper understanding of the problem. The complexity and

importance of underage drinking prompted ERAB and ABMRF to initiate a review of the extent of underage drinking across Europe and North America and our current understanding of factors that increase the risk of this behaviour. This review compares similarities and differences in underage drinking between the two continents, including the prevalence and patterns of underage drinking and the risk and protective factors. The focus is primarily on modifiable risk factors since these factors represent potential targets for prevention. The report also examines effective evidence-based psychosocial approaches to prevent underage drinking and the harm that is often associated with the behaviour.

Unfortunately, the problem is complex and a single solution or policy to prevent underage drinking does not exist. Nevertheless, a number of strategies are effective in some circumstances and warrant further study in different populations. Preventing risky drinking requires understanding of the important influence of family and peers. As young people develop independence and freedom from their parents, they learn behaviours related to drinking and other aspects of life from both family and peers (see Chapter 2). Genetic traits like impulsivity, anxiety, sensation seeking and emotional dysregulation can also influence harmful drinking (see Chapter 2). The expression of genetic traits and early learning is further influenced by the cultural and environmental milieu.

Social networking and digital media have developed rapidly over the last 5 years. However, they remain a largely unexplored domain both for exacerbating and alleviating problems related to alcohol use in underage youth. The lack of publications in this area limits the extent of evaluation of both the benefits and risks for underage drinking. The recommendations take into account the need to expand the knowledge base in this key area as well as identifying other gaps in the research and avenues that need to be explored.

Although public policies have the potential to modify adolescent drinking behaviours, consideration of most of those efforts is beyond the scope of this review. Much of the previous work regarding effectiveness of public policies on harm associated with alcohol consumption has examined the impact on the population as a whole (for

example see Anderson, Braddick, Reynolds, & Gual, 2012; Babor et al., 2010). An exception is the growing body of knowledge regarding the vulnerability of the developing brain in adolescents to harmful effects of alcohol. This issue may have relevance for public policy regarding the age of purchase or consumption of alcoholic beverages. Future work in this area should examine the impact of public policies on adolescents, who may be "at-risk" for harm associated with heavy drinking.

The first chapter, written by Franca Beccaria and Helene White, reviews epidemiological data on underage drinking in European countries and the United States and Canada. This chapter takes into account data from the 2011 European School Survey Project on Alcohol and Other Drugs (ESPAD; Hibell et al., 2012), Health Behaviour Survey of Children (HBSC; Currie et al., 2012), Monitoring the Future Survey (MTF; Johnston, O'Malley, Bachman, & Schulenberg, 2012) and Cross Canada Report on Student Alcohol and Drugs Use (Young et al., 2011). It is clear that underage drinking is widespread throughout Europe and North America. Not only do many adolescents drink, but when they drink they consume large quantities in a short period of time, a pattern of drinking that can cause serious problems.

The second chapter, written by Reinout Wiers, Kim Fromme, Antti Latvala and Sherry Stewart, analyzes risk and protective factors for underage drinking. Some risk and protective factors are common to all cultures. These include biological and temperamental traits that predispose an individual to drink or not to drink and to experience greater reinforcement from drinking. On the other hand, other risk and protective factors are culturally-determined, such as expectancies about alcohol and parental influence. It is expected that the former types are consistent across countries, whereas the latter may differ.

The third chapter, written by Sherry Stewart, Patricia Conrod, Antti Latvala, Reinout Wiers and Helene White, explores the reported evidence on preventive interventions in North America and Europe and explores what initiatives are effective in discouraging underage drinking and reducing related harms in different circumstances / cultures.

The overall goal of this project was to develop a set of recommendations that could be used to address the problem of underage drinking in Europe, the United States and Canada. The final chapter presents a set of recommendations, recognizing that a single solution to this problem cannot be identified, given the different cultural backgrounds. However, the potential benefits of the exchange of knowledge and the examination of effective practices is enormous. Gaps in the literature and suggestions for future research are included. These recommendations share two common goals:

- To delay the age of onset of drinking;
- To prevent heavy episodic drinking and intoxication in underage drinkers.

Accomplishing these goals will likely reduce the harm associated with underage drinking. Combining several interventions may improve overall effectiveness in comparison to using single interventions in isolation.

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Chapter 1

Underage Drinking in Europe and North America

Franca Beccaria and Helene R. White

This chapter presents epidemiological data on underage drinking in European countries, the United States (U.S.), and Canada with an emphasis on ages 11-16 years. It is not meant to be a comprehensive report of all the existing epidemiological data. Rather, we provide a summary of key findings regarding drinking patterns from a few major European and North American reports. First, we summarize data from students in two European surveys. Next we present data collected in one annual, national survey of students in the U.S. and provincial data collected from students in Canada, which were recently summarized in a national report. Finally, we compare certain aspects of drinking patterns across Europe and North America. Because of differences in legal ages for drinking across countries and within Canada, underage drinking has different meanings. Further, there are many differences across the surveys in study design, questionnaire administration, and measures included, which makes accurate comparisons difficult. Nevertheless, we attempt to paint a picture of how many youth drink, how much and how often they drink, and what they drink.

KEY FINDINGS

- Although rates of underage drinking have decreased in Europe recently and in the United States for more than a decade, underage

drinking is still quite prevalent in Europe and North America. Prevalence rates are generally higher in Europe than in Canada and even more so than in the United States.

- Average rates for Europe mask large differences across individual countries in terms of frequency, quantity, and intoxication, with countries showing varied patterns of consumption. Young drinkers who consume large quantities of alcohol per drinking day can be found both in countries with high as well as low frequencies of consumption and vice versa.

- For the most part, the prevalence of drinking is relatively similar for adolescent boys and girls in both Europe and North America, even if significant differences still remain in many countries in the extent of frequent and heavy drinking. High rates of heavy episodic drinking among younger girls in Europe and North America warrant greater attention.

- Patterns of drinking of youth across European countries are relatively consistent with the patterns of adult drinking within the same country, although for some countries they match better than for others.

UNDERAGE DRINKING IN EUROPE

The best way to create a detailed representation of the current situation of young people drinking in Europe is to examine findings from two large-scale, cross-national surveys. These two surveys are the European School Survey Project on Alcohol and Other Drugs (ESPAD; Hibell, Guttormsson, Ahlström, Balakireva, Bjarnason, Kokkevi, & Kraus, 2012) and the Health Behaviour in School-Aged Children (HBSC; Currie, Zanotti, Morgan, Currie, de Looze, Roberts, Samdal, Smith, & Barnekow, 2012) studies, which include almost all the European countries. The ESPAD was initiated in the mid-1980s by a group of researchers working with the Pompidou Group, along with the Swedish Council for Information on Alcohol and Other Drugs, as the first European investigation on alcohol, drugs, and risk behaviours among young people. In the same period, the most comprehensive research on

health among school-aged young people was launched as a World Health Organization collaborative cross-national study, the HBSC survey. Although the two studies have used, in many regards, different methodologies, they offer a comprehensive picture of risky behaviour among European young people. The differences in the questionnaires, including wording differences, the slightly different sampling methods, the dissimilarity of participating countries, and the not completely overlapping age of the samples make results not always comparable (Charrier & Cavallo, 2010). Keeping in mind these limitations, the main findings emerging from these two international resources will be summarized and where possible compared.

The Surveys' Aims, Methods, and Samples

ESPAD. The aim of the ESPAD is to collect comparable data on substance use among 15- to 16-year-old European students in order to monitor national trends and to compare tendencies among European countries (Hibell et al., 2012). The investigation has been planned to be repeated every four years so as to observe the changes that have taken place within each country and any variations in drug and alcohol consumption and abuse on a European scale. Thus far, five investigations have been carried out in the following years: 1995, 1999, 2003, 2007, and 2011. The same questionnaire has been used in all the participating countries in order to collect comparable data. In the last wave, more than 100,000 students, born in 1995 (mean age 15.8 years), completed self-administered questionnaires, which were administered in the classroom by teachers or research assistants. Whereas only 26 countries participated in the first wave, 36 countries[5] participated in 2011. In each country, with a few exceptions, the final sampling unit in the multi-stage stratified sampling process was the classroom, defined using random samples including schools and classes, with a sample size of at least 2,400. Only the smallest European countries (e.g., Cyprus,

[5]Albania, Belgium (Flanders), Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, the Faroe Islands, Finland, France, Germany (5 out of 16 federal states), Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Malta, Monaco, Moldova, Montenegro, Norway, Poland, Portugal, Romania, the Russian Federation (Moscow), Serbia, Slovakia, Slovenia, Sweden, Ukraine and the United Kingdom.

Iceland) used a total sample. Researchers in most countries drew a nationally representative sample, but not in Germany where the study was done in 5 out of 16 federal states, nor Belgium where data collection was limited to Flanders, the Dutch speaking part, and nor in the Russian Federation where data was limited to Moscow. Besides these countries, the report includes also some selected results from two non-ESPAD countries, Spain and U.S. For the United Kingdom (U.K.), the net sample was too small and cannot be considered representative, so those data are not fully comparable to the data from the other countries.

HBSC. The initial aim of the HBSC was to provide a wide picture of health-related behaviours and the social context of young people's health in industrialized countries. In later studies, these behaviours also included smoking, alcohol consumption, and cannabis use (Currie et al., 2012). The HBSC used self-administered, structured questionnaires. The number of countries involved in the HBSC cross-national study grew from the five European Nordic countries in 1983-84 to 41 countries[6] from Europe and North America in the last survey in 2009-10. The HBSC study focuses on children and adolescents aged 11, 13, and 15 years old, with achieved mean ages of 11.6, 13.5, and 15.5, respectively. This is an age period that represents early to middle adolescence and the challenge of physical and emotional changes. The nationally representative samples were stratified by region or school type, in accordance with the structure of the national school system, but the primary sampling unit was the school class. With the exception of the smallest countries, where a census survey was more appropriate, the sample size in each country was approximately 1,500 students for each age group. It was decided that a number of regions would be covered in Germany and the Russian Federation, instead of the national territories.

[6]Armenia, Austria, Belgium (Flemish and French), Canada, Croatia, the Czech Republic, Denmark, England, Estonia, Finland, France, Germany, Greece, Greenland, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Scotland, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the former Yugoslav Republic of Macedonia (MKD), Ukraine, United States and Wales.

Prevalence of Drinking

Lifetime and last 12 months use of alcohol. An average of about 90% of the 15-16 year-old students across all the ESPAD countries has drunk any alcohol at least once in their lifetime. The rate is quite varied among countries, with the highest percentages in the Czech Republic, Estonia, and Latvia (95% or more), and the lowest ones in Iceland, Montenegro, Norway, Portugal, Romania, and Sweden (below 80%). Annual prevalence data for boys and girls in each country are shown in Figure 1. Most of the students have used alcohol during the last 12 months. In fact, about 90% of the students in the Czech Republic, Denmark, Germany, Greece, and Monaco consumed alcohol in the past year, whereas the lowest rates of yearly consumption are reported in Iceland (43%). Thus, alcohol consumption is a common behaviour among European 15- to 16-year-old students. For those countries that participated in all five waves, at the aggregate level the percentages of students reporting lifetime and last 12 months alcohol use has remained relatively unchanged from 1995 to 2011 (not shown).

Last month use of alcohol. Figure 2 shows past month prevalence data from the ESPAD. There is great variability across countries in the percentage of students reporting alcohol use in the last month. The ESPAD average across countries is 57%, but in some countries such as Cyprus, the Czech Republic, Denmark, Germany, and Greece the vast majority of students (70% or more) report use in the last month. In contrast, in Nordic countries – the Faroe Islands (44%), Iceland (17%), Finland (48%), Norway (35%), and Sweden (38%) – and in Balkan countries - Albania (32%), Bosnia-Herzegovina (47%), and Montenegro (38%), less than half of the students report alcohol use in the last month. Low monthly prevalence is also found in Romania (49%) and the Russian Federation (37%). The patterns for lifetime and monthly drinking are consistent across countries; in those countries where a greater number of students have tried alcohol in their life, there is also a higher percentage that have drunk in the last month. Comparing the different waves from 1995 (not shown), there has been an increase at the aggregate level of alcohol use during the last month between 1995 and 2003, followed by a slight decrease in the last two surveys, so that the average of students who have drunk any alcoholic beverage in 2011 in

the last month is the same as 1995 (57%). The most prominent recent decrease has been found in Iceland and Ireland, among both boys and girls.

Sex differences in prevalence. For lifetime and past year alcohol use, the sex differences are quite small, and where there are any, they seem to be culturally specific. Regarding last month alcohol use, on average more boys than girls report drinking (59% vs. 54%), with large differences among countries. In the Balkan countries, Albania, Bosnia-Herzegovina, Montenegro, and Serbia, as well Cyprus and Italy, the gap between boys and girls is quite high, while in the Nordic and Baltic countries of Estonia, Finland, Iceland, Latvia, Lithuania, Norway, and Sweden, a higher percentage of girls than boys have drunk in the last month (see Figures 1 and 2).

Weekly drinking. In the HBSC study, students were asked how often they drink any alcoholic beverage. Figure 3 shows the rates of weekly drinking across European countries for boys and girls at ages 11 (Figure 3a), 13 (Figure 3b), and 15 (Figure 3c). While there are large variations among countries in weekly consumption, the number of consumers increases greatly from ages 11 to 15 years, especially between 13 and 15 years old. At age 11 the average prevalence of weekly drinking across countries is 4%, with a wide range from less than 1% in Portugal, Germany, Iceland, and Norway to more than 15% in Romania and Armenia. Higher rates among boys are found in Ukraine, the Czech Republic, Italy, and Croatia. At age 13, on average 8% of the students report weekly drinking. Iceland and Portugal maintain the lowest rates and the Czech Republic and Ukraine the highest, but at the two extreme positions we can also find Finland, Sweden, and Macedonia on the bottom, and Romania, Croatia, Wales, Armenia, and Greece on the top level. At age 15 the average is 21% but the rank ordering among countries is more or less the same as at age 13, with remarkable differences between countries.

Types of Beverages Consumed

The HBSC study provides information on consumption of different alcoholic beverages (not shown). It is interesting to note that at age 11

years there are no differences among types of beverages, whereas at age 13 years and even more so at age 15 years, students prefer beer, followed by alcopops and spirits at about the same level, and then wine. Almost the same preferences emerge from the ESPAD study (not shown). There is clearly a preference for beer among 15- to 16-year-olds in the ESPAD, which is consumed by 47% of the students in the last month, followed by spirits and wine (37%-38%), alcopops (32%), and cider (27%). Higher beer preference is reported in Belgium, Bulgaria, the Czech Republic, and Germany compared to other countries, whereas a higher amount of cider is consumed in Denmark, Estonia, Latvia, and Lithuania, compared to the other countries. Alcopops are most common in Cyprus, Denmark, Germany, and Italy. Wine drinking is not particularly high among 15- to 16-year-olds, even if some countries show a figure of 50% or more in the last month (i.e., Croatia, France, Greece, Hungary, Malta, Moldova, and Monaco). As expected, wine drinking is relatively rare among students in the Nordic countries (6-19%). There are also considerable differences in the rates of spirit use, ranging from 50% or more in the last month in Croatia, the Czech Republic, Denmark, France, Greece, Malta, Monaco, and the Slovak Republic to 20% or less in Albania, Iceland, Moldova, and Norway.

Quantity

In the ESPAD study, the quantity of consumption can be estimated by responses to a question asking youth about the quantity of alcoholic beverages consumed on their most recent alcohol-drinking day. Within the whole sample, students drink on average 2-3 drinks of spirits, 40 centiliters of wine, or one litre of beer, but there is great variation among countries (not shown). The quantity of alcohol consumed is almost twice the average in Denmark and three other Nordic countries show a high level of consumption (Finland, Norway, and Sweden), followed by Croatia, Ireland, and the U.K. The lowest quantity levels are reported by students in Albania, Moldova, and Romania, although the amount of alcohol consumed is also quite low in Bosnia-Herzegovina, Montenegro, and the Russian Federation. The results clearly show that students with lower alcohol consumption on their last drinking day live in the Balkan area, in Eastern Europe, and in the Mediterranean region rather than in the other parts of Europe.

The patterns of consumption do not show any statistical correlation between frequency of consumption and the amount of alcohol consumed across countries. This means that those students who consume a large quantity of alcohol per drinking day can be found both in countries with high as well as low frequencies of consumption and vice versa. For example, in Albania, the Russian Federation, and Montenegro students report both low frequency of alcohol consumption and low amounts consumed, unlike Norway and Sweden where prevalence of drinking during the last month is low but the average consumption during the latest drinking day is one of the highest. The same complex picture occurs if we compare those countries with highest drinking frequencies in the last month, such as Denmark, Greece, and Cyprus. Danish students report the highest quantity of consumption on their most recent drinking day, whereas students in Greece and Cyprus have drunk small quantities on their most recent drinking day (not shown).

Alcohol Intoxication

Students in the ESPAD were asked how drunk they got on their most recent drinking day using a 10-point scale ranging from "not drunk at all" to "heavily intoxicated." Students from Denmark, the Faroe Islands, and the U.K. report the highest average intoxication scores (4-4.6), while the lowest scores (2-2.4) are reported by students living in Albania, Bosnia-Herzegovina, Cyprus, Greece, Moldova, Montenegro, and Portugal (not shown). The data show a strong association at the country level between the amount of alcohol consumed on the most recent drinking day and the perceived level of intoxication.

In the ESPAD questionnaire students were also asked to indicate the number of times that they had been intoxicated due to alcohol during their lifetime, in the past year, and in the past month. As intoxication is a subjective perception, the researchers gave the students some examples of what being "intoxicated" means, such as staggering when walking, slurred speech, or vomiting. Drunkenness is a quite common experience among ESPAD students, as on average almost half of them (47%) has already been intoxicated at least once in their life, 37% in the last year,

and 17% in the last month. Past year data for each country are presented in Figure 4 (lifetime and past month data are not shown).

Great differences occur among countries in drunkenness. Lifetime intoxication is highest in Denmark (71%), followed by the Czech Republic, Hungary, Latvia, Lithuania, and Slovakia (more than 60%), whereas the lowest percentages are reported in Albania, Cyprus, Greece, Iceland, Italy, Montenegro, Norway, Portugal, Romania, Serbia, and Sweden (below 40%). In terms of sex differences, more boys than girls report drunkenness experiences in a vast majority of countries, even though these differences are not that large.

Moving to data on being drunk during the last year (see Figure 4), the figure shows little variation from the lifetime figures. Even though more boys than girls report past year drunkenness in most countries, in some countries, such as Estonia, Finland, Iceland, Ireland, Norway, Sweden, and the U.K., the percentage for girls is higher than that for boys; in particular, in Monaco the difference is more than 10 percentage points higher for girls than boys. Last month intoxication is strongly correlated with lifetime and last year intoxication on the aggregate country level, so that the order of the countries is more or less the same across all three measures and the patterns across countries remain almost the same, which also holds for students who have been drunk more than twice in the last month.

In the HBSC study students were asked whether and how often they have ever been "really drunk". The reported experience of drunkenness at least twice increases significantly with age, from an average of 2% among 11-year-olds, to 9% among 13-year-olds, and 32% among 15-year-olds (see Figure 5). The value for 15-year-olds is similar to that found among 15- to 16-years-olds in the ESPAD study for last year drunkenness (37%). Generally boys report higher rates than girls. Perhaps the greater sex differences found in the HBSC, compared to the ESPAD, can be attributed to the former's question which focuses on "really" drunk.

As expected, at age 11 years (Figure 5a), having been drunk on two or more occasions is very rare in most countries. However, rates are

alarming in Armenia, Latvia, Romania, the Russian Federation, and Ukraine. Data at age 13 years (Figure 5b) show great variation ranging from the lowest percent in Iceland (1% of girls and 4% of boys) to the highest in Latvia (12% of girls and 25% of boys). High levels of drunkenness are also found in Estonia, Greenland, Lithuania, and Wales. Similarly, at age 15 years (Figure 5c), the differences among countries are large, with the lowest rates in Macedonia (8% of girls and 19% of boys) and Italy (14% of girls and 19% of boys), and the highest in Denmark (56% of girls and 55% of boys).

Heavy Episodic (or Binge) Drinking

As perception of drunkenness is a relatively subjective measure, in the ESPAD study a more objective question was introduced, which asked students about the number of times during the last month they had consumed five or more drinks on one occasion. This measure is often used to operationalize "heavy episodic drinking" (HED), although some studies of youth refer to this behaviour as "binge drinking" (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). It should be noted, however, that adolescent girls, compared to boys, are generally smaller and weigh less. Therefore, at the same number of drinks, girls will achieve much higher blood alcohol concentration (BAC) levels than boys. Even at equal weight, females achieve higher BACs than males (Lieber, 1997). Thus, some studies (although not included in this report) differentiate this measure for boys (5+ drinks per occasion) and girls (4+ drinks per occasion) (e.g., Wechsler et al., 2002). This sex-based measure (5+/4+) results in more sex parity for estimates of HED, compared to the sex non-specific measure (5+).

Figure 6 shows rates of HED in the last month by sex from the ESPAD study. On average, 39% of the ESPAD students have had five or more drinks on one occasion during the last month, and for 14% this has happened at least three times during this period (not shown). Nevertheless, it is worth highlighting that the range between the highest countries and lowest countries is smaller than the comparison reported above for intoxication. Denmark and Malta (56%) are at the top followed by Croatia, the Czech Republic, Estonia, Slovenia, the U.K., and Slovakia (50-54%). The lowest levels of HED are reported by

students in Iceland (13%), Albania (21%), and Portugal (22%). The aggregate country correlation between "having been intoxicated during the last 30 days" and "having engaged in heavy episodic drinking" in the same period is high and statistically significant.

Nevertheless, the minor difference among countries in rates of HED, compared to rates of drunkenness, raises a question that could be related to methodological issues, as the first measure can be considered as more objective than the second one. On the other hand, according to Room (2010), it may reflect cultural differences in the quantity of alcohol consumed. That is, there is a large possible range beyond five drinks. It may be that southern European teenagers may stop at only five drinks, whereas those young people in the rest of Europe who drink five or more units on one occasion may actually drink a lot more than five drinks. Alternatively, Room suggests that the greater expectancies of disinhibition for a given amount of drinking in the north of Europe may push youth to act in accordance with them, and thus report higher rates of drunkenness. A third plausible explanation he offers is that for southern European teenagers the definition of drunkenness could be more extreme and/or deviant than for their contemporaries in other parts of Europe. None of these hypotheses has been adequately tested and results are inconclusive (Room & Bullock, 2002; Room, 2007).

At the aggregate level, the percentage of boys who report HED during the last month is higher than of girls (43% vs. 35%). Nevertheless, as discussed above, by using the same level (5+) for boys and girls, the results might be biased against girls. At the aggregate level, HED during the last month increased from 1995 to 1999 and from 2003 to 2007 but it is slightly lower in 2011 (see Figure 20). Whereas the increase between 2003 and 2007 is due to an increase for girls, the decrease between 2007 and 2011 occurs for both sexes. Bulgaria, Croatia, the Czech Republic, Greece, Hungary, Malta, and Slovakia are the countries that have shown a constant upward trend in HED across all five data collections (not shown).

Age of Onset of Alcohol Consumption and Drunkenness

Age of onset of consumption. In the ESPAD study, students were asked the age at which they had their first glass of each type of alcoholic beverage (not shown). In the majority of the countries, almost half of all students (including non-drinkers) report having their first drink at age 13 years or younger. Beer is the most common alcoholic beverage consumed by age 13 years (44%), followed by wine (38%), cider (34%), alcopops (27%), and spirits (20%). Age of onset is quite spread out across European youth.

A similar trend in terms of age of onset by age 13 years emerges from HBSC data. In fact, among 15-year-olds, 39% report first drinking by age 13 years or younger with great variation among countries: from 11% in Iceland to 62% in Estonia. Both countries were in similar positions in the ESPAD scale. HBSC students in Finland, Italy, Norway, Romania, the Russian Federation, and Sweden also report low rates of early-onset drinking (less than 30% first consume alcohol by age 13 years), whereas in Croatia, the Czech Republic, Latvia, and Lithuania at least 50% of 15-year-olds report first drinking by age 13 (not shown).

Age of onset of drunkenness. In the ESPAD survey about one fifth of students in Estonia, Latvia, the Russian Federation, and Slovakia report having experienced their first intoxication by age 13 years or younger (not shown). In other countries, the percentage is substantially lower with an overall average of 12%. At the bottom of the scale are Iceland and Italy with about 5% reporting first being drunk by age 13 years.

The HBSC study shows almost the same average with 14% of the 15-year-olds reporting having been drunk by age 13 years. As seen in Figure 7, young people from southern European countries (Italy, Greece, and Portugal) generally have a lower prevalence of early drunkenness compared to northern European countries (Estonia, Latvia, and Lithuania). On the other hand, some Nordic countries, such as Iceland and Norway also have low rates.

Availability of Alcoholic Beverages

In the ESPAD study students were asked to report on whether they had bought any alcoholic beverages in a store over the last month for their own consumption (not shown). On average, 25% of students (ages 15-16 years) report that they bought beer, the most common type of alcoholic beverage in the majority of the countries. The variation among countries is wide, although in almost every country in Europe the minimum legal age for off-premise purchase (i.e., buying alcohol to take out and drink some place else) is 16 or 18 years (see Table 1). Whereas about six in ten students have bought alcohol to take out in Bulgaria, Malta, and Ukraine, only 4% have done so in Iceland and 11-17% in Finland, Norway, and Sweden (not shown).

According to national regulations, on-premise alcohol consumption should be even more difficult than off-premise purchase. Nevertheless, on average, one in three 15- to 16-year-olds reports having consumed beer in a public establishment during the last month (not shown). Further, in the past month, one fourth has drunk spirits and one fifth has consumed alcopops in a public establishment. Again the variation across countries is large, considering that high proportions of on-premise alcohol consumption are found in Greece, Cyprus, and Malta, while in Iceland, Finland, Norway, and Sweden rates are relatively low (about 10%). (see Hibell et al., 2012 for greater detail).

Students in the ESPAD survey were also asked how easy it would be to get beer, wine, and spirits if they wanted to (not shown). Nearly three-fourths (73%; range 44-92%) report that it would be "fairly easy" or "very easy" to get beer. Rates were slightly lower for wine (66%; range 42-83%) and much lower for spirits (53%; range 24-74%). Overall, 81% (range 55-96%) report that it would be fairly or very easy to get an alcoholic beverage.

Summary

The ESPAD and HBSC surveys have used similar but, in many regards, importantly different methodologies to study adolescent alcohol use

behaviours in Europe. Thus, they can be thought to provide complementary information on student drinking across European countries. Besides differences in the actual questionnaire items gathering information on alcohol use, these two surveys differ in their sampling methods, participating countries, sample sizes, and the age groups that were targeted. Comparisons between the two surveys are possible only with regards to the oldest age group in the HBSC study (age 15 years), which has a similar mean age as students in the ESPAD study. While acknowledging the important differences and the resulting difficulties in forming a coherent synthesis of the findings, some similar patterns emerge suggesting a strong overlap in findings (Hibell et al., 2012).

In both surveys, teenagers in the Nordic countries report the least frequent drinking, although Denmark is clearly an exception, having a high proportion of students reporting recent alcohol use in the ESPAD survey. In contrast, adolescents living in some central European countries report frequent drinking; examples include the Czech Republic and Germany. In addition, southern European countries, such as Greece, score high in frequent drinking in both surveys.

There is better consistency between the two surveys vis-à-vis drunkenness. In both surveys, Danish adolescents report the highest prevalence of drunkenness. The Czech Republic, the U.K., Hungary, Finland, and the Baltic countries are also consistently high in drunkenness. In contrast, southern European countries, such as Italy, Portugal, and Greece, are in the lower position of drunkenness prevalence in both surveys. The Balkan countries also show low rates of drunkenness in the ESPAD survey; but only two Balkan countries participated in the HBSC study making comparisons more difficult. The prevalence of drinking and drunkenness reported by adolescents in a certain country in the two surveys are often quite similar, although relatively large differences between surveys are also evident for some countries.

In examining the ESPAD and HBSC surveys, two main themes related to underage drinking in Europe seem to emerge. The first point is that alcohol use behaviour is common among European adolescents, and this situation has remained relatively stable at least since the mid-1990s. Over

the entire 16-year period of the ESPAD study, the lifetime prevalence of alcohol use has remained unchanged in most of the countries, and on average is only slightly lower in the latest, compared to the first, survey (89% in 1995 vs. 87% in 2011). Last year alcohol consumption shows the same trend, and last month prevalence has not changed at all. Furthermore, heavy episodic drinking reached its peak between 2003 and 2007, but it is slightly lower in 2011.

Secondly, there are great variations among European countries in underage drinking behaviours, and although some general patterns can explain this variation, these differences are not easily classifiable into clear-cut and obvious categories. Overall, the data indicate that:

- most European adolescents find it easy to get various alcoholic beverages;
- close to 90% of 15- to 16-year-olds have drunk alcohol at least once;
- beer is the dominant alcoholic beverage among European adolescents; and
- drunkenness is a common experience among European adolescents, with almost half of the 15- to 16-year-old students having been intoxicated at least once during their lifetime.

Some of the differences across countries can potentially be explained by the traditional drinking cultures that characterize European countries. Previous surveys generally indicated that in those countries where students drank more frequently, the total amount of alcohol consumed during the last drinking day was usually lower than in those countries in which drinking was less frequent. In the last wave of these surveys, however, it is possible to find large quantity consumption in countries both with low and high frequencies of consumption, and vice versa. For example, among those countries with high drinking frequencies in the last month, such as Denmark, Greece, and Cyprus, students from Greece and Cyprus have drunk small quantities on their most recent drinking day, whereas the Danish drink frequently and consume large quantities. Nevertheless, some patterns seem to remain constant across time, such as in Norway and Sweden, where the prevalence of drinking during the last month is low, but the quantity of last day consumption is high.

In summary, it seems that across Europe, even among teenagers, some countries show drinking patterns more oriented towards intoxication, while youth in other countries are more oriented towards moderate drinking patterns. Similar to adults, young people living in Nordic and north-western European countries and some central European countries drink heavily more frequently, compared to those living in southern Europe and in the Balkan region. These geographical differences are particularly strong among girls.

Nevertheless, the traditional classification into "dry" and "wet" drinking cultures (Allamani et al., 2011; Room & Mäkelä, 2000; Room & Mitchel, 1972) does not fit well for contemporary young people (Beccaria, 2011; Järvinen & Room, 2007; Room, 2010). Nordic countries have always been considered the best representation of "dry" cultures, characterized by a low level of per-capita consumption and a high prevalence and level of intoxication. These dry countries also typically have a high level of formal regulation on alcohol consumption and distribution, and high prevalence of public health problems due to acute intoxication. On the contrary, in "wet" cultures, drinking occurs mainly during meals and in social gatherings; alcohol per capita consumption is high, but with a low level of intoxication; the main control on alcohol consumption and distribution is informal; and chronic health problems are more important than problems occurring from acute intoxication. The two cultures also differ with regard to the type of alcoholic beverage consumed, where spirits and beer are more prevalent in dry cultures and wine more prevalent in wet cultures.

However, nowadays it has become increasingly problematic to apply this classification to young people's drinking cultures because of many factors, one of them being the converging alcohol consumption levels in Europe with per-capita consumption among the general population, falling in southern and rising in northern Europe (Allamani & Beccaria, 2007; Beccaria, 2010; Järvinen & Room, 2007; Room, 2010; WHO, 2011). According to Room (2011, p. 235), the two European surveys of adolescents summarized in this chapter show that "the clearer distinction to be made between European youth drinking cultures may be in terms of how intoxication is defined and the extent to which it is valued or disvalued." Thus, youthful drinking cultures can be divided into

"intoxication cultures" and "non-intoxication cultures" (Järvinen & Room, 2007). The measure that distinguishes these cultures the most is self-reported drunkenness, which is "also the variable that best predicts the level of alcohol-related problems in a country" (Jarvinen & Room, 2007, p. 162). Prime examples of youth non-intoxication cultures have for several years been Italy, Portugal, France, and Greece. Youth intoxication cultures, on the other hand, have been best represented by Denmark, the Czech Republic, the U.K., and the Baltic countries with Finland and Sweden following closely behind. Based on the most recent European surveys summarized above, some central European countries seem to have joined the group of youth intoxication cultures, whereas most of the Balkan countries should be added to the youth non-intoxication cultures. These patterns of adolescent drinking seem to correspond well with both historical and more recent statistics on alcohol use behaviours in the general population in different parts of Europe. These statistics have generally shown that frequent but moderate drinking is common in southern European cultures, whereas drinking less frequently but in larger amounts often resulting in intoxication is more typical of northern, northwestern, Baltic, and central-eastern European countries (European Commission, 2010; Kuntsche, Rehm & Gmel, 2004; Leifman, 2002; Nazareth et al., 2011; Simpura & Karlsson, 2001; WHO, 2011). This correspondence implies that adolescent drinking has to be viewed in the context of the more general drinking culture. This perspective has important implications for policies aimed at reducing the risks linked to underage drinking. Below we examine drinking in North America and how it relates to these various European drinking cultures.

UNDERAGE DRINKING IN NORTH AMERICA

This section describes underage drinking in the United States (U.S.) and Canada focusing primarily on approximate ages 12 through 18 years. The data for the U.S. come from the Monitoring the Future (MTF) study (Johnston, O'Malley, Bachman, & Schulenberg, 2012), which involves annual data collection throughout the U.S. (except Alaska and Hawaii) from 8th, 10th, and 12th graders. The MTF began in 1975 as annual cross-sectional studies of 12th graders. In 1991, it was expanded to include 8th

and 10th graders. The study uses a multistage random sampling procedure each year, first selecting particular geographic areas and then selecting public and private schools within those areas. Finally, students are randomly chosen from within the selected schools. The sampling plan is designed to create a representative sample of all U.S. students. A passive consent procedure is used. Each year, approximately 17,000 8th graders (from approximately 150 schools), 15,000 10th graders (from approximately 130 schools), and 15,000-18,000 12th graders (from 120-146 schools) are surveyed. Data are weighted to account for differential probabilities of selection. The MTF excludes high school dropouts (about 12-15% of students nationally) and students who are absent from school on the day of data collection. Thus, estimates may be somewhat lower than those for all youth because dropouts and absent students are more likely to be alcohol and drug users than youth who remain in/attend school. (For greater detail on sampling and response rates, see Johnston et al., 2012.)

The data on underage drinking in Canada come from the first Cross-Canada Report on Student Alcohol and Drug Use (Young et al., 2011). These data were compiled from provincial school surveys and include data from: British Columbia, Alberta, Manitoba, Ontario, Québec, New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland. The Canadian provincial studies differed in a number of design characteristics that could affect estimates, including: sample selection procedures and exclusion criteria, stratification procedures, use of clustering, response rates, weighting and post-stratification adjustments applied to the data, missing data imputation, the type of questionnaire administration (e.g., anonymous, paper and pencil), how questionnaires were administered and by whom, when the data were collected, and use of passive versus active parental consent (for greater detail see Young et al., 2011).

Data were presented separately by province in the Cross-Canada Report. Due to the differential number of students surveyed in each study and the differential distribution of adolescents across provinces, it would be inaccurate to average across provinces to determine a national average. We, therefore, weighted the data, taking into account the percentages of youth in each province. Specifically, using data from the Statistics Canada (2007), we derived the percentage of the total population of

Canada for 10- to 14-year-olds and 15- to 19-year-olds for each province. We then multiplied that percentage by the estimates for each province, summed those figures, and divided by 100%. Because Québec was not included in the 12th grade estimates (they included 11th graders in the estimates for sex) and Québec made up 23% of the 10- to 19-year-olds in Canada, when we computed estimates for 12th graders we summed across the eight other provinces and divided by 77. For the 7th and 9th grade calculations we used the percentage of 10- to 14-year-olds; for the 10th and 12th graders we used the percentage of 15- to19-year-olds; and for the sex estimates we took the average percentage for the two age groups. Readers should evaluate these data as very rough estimates given the weighting procedure and the other issues described above regarding survey differences.

Below we will first present data on patterns of underage drinking in the U.S. from the most recent MTF. Then we discuss patterns in Canada. We will then make comparisons across both countries by using data from the MTF in 2007, the same year in which most of the Canadian data were collected. At the end of the chapter we tie these results to those presented earlier in this chapter on drinking patterns among European adolescents.

Underage Drinking in the U.S.

Patterns. In Figure 8 we present data on lifetime, last year, and last month prevalence by grade for the total sample. In the U.S., 8th graders are approximately 13-14 years old, 10th graders are approximately 15-16 years old, and 12th graders are approximately 17-18 years old. Therefore, the 10th graders in the U.S. are relatively the same age as the 15- to 16-year-olds in the ESPAD study described above. As shown here, all three indicators increase with grade level. About one-third of the 8th graders have ever tried alcohol, which increases to 56% of the 10th graders and 70% of the 12th graders. Rates of annual prevalence (use in the last year) are slightly less but show the same pattern. Prevalence rates for use in the last month are 13% for the 8th graders, 27% for the 10th graders, and 40% for the 12th graders.

Figure 9 shows indicators of heavy and frequent drinking by grade, including the prevalence of daily drinking, getting drunk in the last year, and heavy episodic drinking (HED, also referred to as binge drinking), which is defined in the MTF as drinking five or more drinks in a row in the last 2 weeks. As shown here, very few youths report daily drinking ranging from 0.4% of the 8th graders to about 2% of the 12th graders. In contrast, 11% of the 8th graders, 29% of the 10th graders, and 42% of the 12th graders report having been drunk in the past year. Furthermore, 6% of the 8th graders, 15% of the 10th graders, and 22% of the 12th graders report at least one occasion of HED in the past 2 weeks.

Subgroup differences. In terms of annual prevalence, rates are remarkably similar for boys and girls, although at grade 8, females are slightly higher than males and at grade 12, females are slightly lower than males (not shown). Figure 10 presents sex differences in daily drinking and prevalence of HED in the last 2 weeks. Note that nondrinkers are included in these calculations; however, as described above, sex differences in prevalence of drinking in the last year are relatively small. As shown here, although prevalence rates are relatively similar for both sexes, boys drink more frequently than girls, especially with advancing age. More than twice as many 12th grade boys (2.9%) than girls (1.2%) report daily alcohol use. Boys, compared to girls, are less likely to report HED in the last 2 weeks in grade 8, slightly more likely in grade 10, and much more likely by grade 12. As pointed out earlier in this chapter, the use of a sex-nonspecific measure of HED biases the results against females.

We also examined the prevalence of last year drinking and past 2 week HED separately for Whites, Blacks, and Hispanics in the 8th, 10th, and 12th, grades (Figure 11). Blacks consistently report the lowest prevalence of last year drinking. In the 8th grade Hispanics, compared to Whites, report a higher prevalence of last year drinking. In the 10th grade the former report a slightly higher rate than the latter. However, by the 12th grade, Whites report a slightly higher annual prevalence rate than Hispanics. Race/ethnic differences in rates of HED follow a similar pattern.

In addition, there are differences in drinking patterns among adolescents in the U.S. depending on where they live in the country, especially with advancing age. Figure 12 shows regional differences in the prevalence of last year drinking and HED in the past 2 weeks. In the 8th grade, Southern youth are most likely to drink followed by youth living in the West. In the 10th grade youths living in the West and Midwest are less likely to drink than youth living in the other two regions, whereas in the 12th grade, youth living in the Northeast and Midwest report higher prevalence rates than those living in the South and West. A relatively similar pattern is seen for HED in the past 2 weeks. Thus, these data indicate that there are subcultural differences in patterns of underage drinking within the U.S. depending on race/ethnicity and region of the country analogous to the cultural differences reported above across Europe, but the nature of these differences varies depending on the age of the youth. Data from the MTF also indicate that there are differences in underage drinking patterns by parent education levels and college plans. In general, higher parental education levels are associated with lower prevalence of drinking, especially in the younger grades. In addition, those students who plan to go to college, compared to those who do not, are less likely to drink while in high school (see Johnston et al., 2012 for greater detail).

Trends in underage drinking, beverage preference, and perceived availability over time. A major advantage of the MTF is that it has been following high school seniors for the past 36 years and 8th and 10th graders for the past 20 years. Therefore, it is possible to examine historical trends in underage drinking over a long period of time.

Figure 13 shows trends in annual prevalence of alcohol use for 8th graders and 10th graders from 1991 through 2011 and for 12th graders from 1975 through 2011. These data show a large decline from 1991 to 2011, especially among 8th graders. As shown in Figure 14, HED also decreased from 1991 to 2011 for both boys and girls with the percentage decline increasing from the 8th to 12th grade. Looking back to the 1970s, there has been a general decline in drinking and HED among U.S. 12th graders since the peak drinking years in the late 70s, although there have been cyclical changes. These cyclical changes in drinking patterns among

12th graders have been in concert with trends in student perceptions of harmfulness of and disapproval of drinking (Johnston, 2003).
In addition, as drinking has decreased over time, so has perceived availability. For example, in 1999, 72% of 8th graders, 88% of 10th graders, and 95% of 12th graders reported that it would be fairly easy or very easy to get alcohol if they wanted it. In contrast, in 2011 the rates are 59%, 78%, and 89%, respectively (not shown).

Trends in alcoholic beverage preference are shown in Figure 15, which presents 30-day prevalence rates separately for beer, spirits, wine, and alcopops (designated as flavored alcoholic beverages in the questionnaire) among 12th graders. Although beer was by far the most used beverage from the 1970s through the 1990s, in recent years, use of spirits has caught up. Beer remains the most used beverage by boys, but more girls currently drink spirits than beer (not shown). Alcopops were quite popular, especially for girls, in the late 80s but their popularity has diminished (for more details on sex differences in use of various beverages see Johnston et al., 2012).

Underage Drinking Patterns in Canada

Figure 16 presents weighted data on drinking from the Cross-Canada Report for grades 7, 9, 10, and 12. Seventh graders are generally ages 12-13 years old, 9th graders 14-15 years old, 10th graders 15-16 years old, and 12th graders 17-18 years old. Therefore, youth in each grade in Canada are comparable in age to youth in same grade in the U.S. and 10th graders in Canada are similar in age to the 15- to 16-year-olds in the ESPAD study. We show rates of lifetime alcohol use prevalence, last year prevalence, and binge drinking. Lifetime prevalence increases from 28% of 7th graders to 81% of 12th graders. The biggest jump occurs between the 7th and 9th grades. A similar pattern is observed for annual prevalence, which is slightly lower than lifetime prevalence. For the Cross-Canada Report, HED was defined as drinking five or more drinks on one occasion within the last month. There is a large increase in HED from the 10th to the 12th grade; almost half (45%) of the 12th graders report HED, compared to 29% of 10th graders. Although 18% of the 9th graders also report HED, only 3% of the 7th graders do.

Figure 17 shows sex differences in these same three indicators of drinking. There are virtually no differences between males and females in lifetime prevalence, past year prevalence, or HED. The findings for HED are particularly noteworthy given that the same number of drinks (5+) was used to define HED for both boys and girls.

As stated earlier, data were presented in the Cross-Canada Report separately by province. The highest rates of annual prevalence by Canadian students are in Ontario (62%) and Québec (60%), whereas the lowest rates are in Prince Edward Island (46%) and Alberta (49%) (not shown). Although there is variation across provinces, there is only a 16 percentage point difference from the lowest to the highest province. Furthermore, it is unclear whether these differences reflect real differences among students in the different provinces or whether they reflect differences in the survey methods (Young et al., 2011). In addition, we examined differences by province in the rate of HED in the last month. For seven of the eight provinces for which the data were reported, rates were between 24% and 28% indicating very little variation across provinces except for Alberta (19%). For the most part, differences between boys and girls within provinces were negligible (not shown).

Comparisons of the U.S. and Canada

For this section, we compare U.S. and Canadian youth by examining 10th graders (approximately 15-16 years old) and 12th graders (approximately 17-18 years old) in both countries. We use data from the MTF survey in 2007 to make them more comparable to the data from Canada, which were mostly collected in 2007, although some provinces were surveyed in 2008 (and one collected some data in the last two months of 2006). The Canadian data are weighted as above.

Figure 18 shows last year prevalence and HED for the two countries. Annual prevalence rates are about 10 percentage points higher in Canada than in the U.S. for both grades. In fact, last year prevalence rates for Canadian 10th graders are comparable to U.S. 12th graders. When comparing HED, it should be kept in mind that Canadian youth reported on the prevalence of drinking five or more drinks on one occasion in the last month, whereas American youth reported on

drinking five or more drinks in a row in the past 2 weeks. These differences in time frame could account for the substantially higher rates in Canada compared to the U.S., especially in the 12th grade. Nevertheless, it appears that youth in Canada are more likely to drink than youth in the U.S. at the same grade level. Whether differences in legal drinking age (ages 18 or 19 in Canada and 21 in the U.S.) account for these differences remains to be studied. We next compare some of the data on patterns of drinking for the U.S. and Canada with those reported for Europe.

COMPARISONS BETWEEN EUROPE AND NORTH AMERICA

The 2009/2010 HBSC study also collected data from students in the U.S. and Canada (Currie at al., 2012). Thus, it is possible to compare drinking patterns among countries in Europe and these two North American countries using the same questions. In terms of prevalence and frequency, the U.S. and Canada fall toward the low end of rankings compared with the European countries. For example, among 13-year-olds in the U.S., 4% of girls and 5% of boys drink weekly and for Canada these rates are also 4% and 5%, respectively. These rates are lower than the HBSC average of 6% for girls and 10% for boys. Among 15-year-olds, rates are 9% and 11%, respectively, for the U.S. and 13% and 17%, respectively, for Canada, again lower, especially for boys, than the HBSC average of 17% and 25%, respectively (see Figure 3 for rates in specific European countries to compare the U.S. and Canadian rates presented here). In terms of early drunkenness, 7% of the 15-year-old girls and 10% of the 15-year-old boys in the U.S. report having been drunk by age 13. In Canada 16% of 15-year-old boys and girls report early drunkenness. The U.S. rates are lower than the HBSC survey average for early drunkenness, which is 12% for girls and 16% for boys, while the rate for Canadian girls is higher than the HBSC average for girls (not shown).

An examination of youth who have been drunk at least twice from the HBSC study shows that the U.S. is clearly towards the bottom for all three age groups, generally even lower than France and close to Italy (not

shown). For example, 4% of U.S. 13-year-old girls report having been drunk two or more times in their lives compared to 4% of French 13-year-old girls and 2% of Italian 13-year-old girls. For 13-year-old boys, the rate is 4% in the U.S., 5% in France, and 4% in Italy. Similarly, for 15-year-olds the rates in the U.S. are 13% for girls and 15% for boys, compared to 14% and 19% for girls and boys, respectively, in Italy, and 17% and 26%, respectively, in France. In contrast, Canadian students are relatively high in the rankings for frequent drunkenness; 10% of the 13-year-old girls and 8% of the 13-year-old boys report being drunk at least twice in their lives, which is about in the middle of all HBSC countries (average: 8% for girls and 11% for boys). Rates for 15-year-olds in Canada are 35% for girls and 33% for boys, which are again near the middle of the survey (HBSC average: 29% for girls and 34% for boys). Thus, these data seem to suggest that drinking patterns among U.S. youth are comparable to those of European youth in non-intoxication cultures, whereas patterns for Canadian youth are more closely aligned with intoxication cultures. However, it should be noted that frequency of drinking is relatively low among U.S. adolescents. Therefore, these youth do not neatly fit the European typology, which defines non-intoxication cultures as those with high frequency and less drunkenness (Järvinen & Room, 2007). The latest surveys in Europe also show that this distinction is not always clear. That is, low levels of intoxication are related to both high and low frequency of drinking across European countries.

Findings from the ESPAD, which assesses on average 15- to 16-year-old students, can be compared to those for American and Canadian 10th graders, who generally average 15-16 years of age. Figure 19 compares lifetime, last year, and last month prevalence of drinking for the European average from the 2007 ESPAD (Hibell et al., 2009), the MTF in 2007 (Johnston et al., 2012), and the Cross-Canada Report, which collected data in 2007/2008 (Young et al., 2011). As seen here, average prevalence rates are highest in Europe and lowest in the U.S. with Canada in the middle.

Figure 20 shows rates of last year drinking for European students and U.S. students at the five time periods at which the ESPAD survey was conducted (1995, 1999, 2003, 2007, and 2011). As seen here and

discussed above, annual prevalence rates are higher in Europe than the U.S. Furthermore, in the U.S. there has been a decline in annual prevalence since 1999, whereas rates in Europe have remained relatively steady, although the latest survey shows a slight decline since 2003. Whether differences in legal regulations, prevention efforts, or social norms account for these variations in rates and trends across the U.S. and Europe should be investigated.
Figure 20 also shows rates of HED in Europe and the U.S. during these same time periods. When comparing these rates, it should be kept in mind that the U.S. measure of HED is based on the past 2 weeks and the European measure is based on the past month. Therefore, since rates were relatively comparable for Europe and the U.S. in 1995, probably suggests greater heavy drinking in the U.S. at that time. However, rates have declined in the U.S. over this 16-year period, whereas rates have increased in Europe through 2007 and show a slight decline in the latest survey. Whether these declines will continue remains to be seen. The finding that almost four in ten European 15- or 16-year-olds have consumed five or more drinks at least once in the last month still indicates a potentially serious problem in Europe.

It does not appear that these differences in drinking in the U.S. and Europe can be accounted for by easier availability of alcohol in Europe than in the U.S. In 2011, 81% of the European 15- to 16-year-olds, on average, reported that it would be very easy or fairly easy to get an alcoholic beverage if they wanted it. In that same year 78% of the 10th graders in the U.S. said that it would be fairly easy or very easy to get alcohol too. Note, however, that perceptions of availability vary greatly across Europe ranging from 55-96% of the 15- to 16-year olds reporting that it would be easy or fairly easy to get an alcoholic beverage. Obviously, more cross-national research is needed to examine the associations between drinking regulations and drinking patterns among youth.

There are large cultural differences in beverage preference; however, the most frequently used beverages among students in Europe and the U.S. are beer and spirits. In both Europe and the U.S., boys generally prefer beer and girls generally prefer spirits, although drink preferences of European girls are spread out across the various beverages depending on

their country of residence. The recent upward trend in preference for spirits could signal more problems in the future given the generally higher peak BACs achieved from one standard drink of spirits compared to one standard-sized beer (Mitchell, personal communication, July 12, 2012). Although the amount of absolute alcohol is the same in one standard drink of both beverages, beer is absorbed more slowly, which results in a lower peak BAC.

SUMMARY AND CONCLUSIONS

The findings clearly show that underage drinking is a normative behaviour in Europe and North America. Lifetime and annual prevalence rates, however, are on average much higher in Europe than in the U.S. and Canada. In 2007, nearly 90% of European 15- or 16-year-olds had tried alcohol at least once in their lives, compared to 62% of U.S. 10^{th} graders and 70% of Canadian 10^{th} graders. In addition, prevalence rates for drunkenness are somewhat lower in the U.S. compared to Europe. In 2011, 47% of the European 15- or 16-year-olds report having been drunk at least once in their lives, 37% in the last year, and 17% in the last month, compared to 36%, 29%, and 14% respectively, of 10^{th} graders in the U.S.

Nevertheless, there are several factors that complicate these comparisons. First of all, examining average rates across Europe masks large differences across individual countries in terms of frequency, quantity, and intoxication levels. Some countries show a drinking culture which is geared more toward intoxication, while the drinking culture of other countries is characterized by drinking more frequently but also more moderately (Järvinen & Room, 2007). Until a few years ago, these patterns appeared to be related to the European geography: on average, young people in northern and northwestern Europe had relatively high rates of drunkenness, including early initiation of drunkenness, and those in southern Europe had relatively low rates. In recent years, regional distinctions have become somewhat blurred. Nevertheless, even though there are exceptions and the picture is complex, higher- risk drinking patterns can be found among youth in Baltic, northwestern, and central

European countries and lower-risk drinking patterns among youth in Balkan and southern European countries. Nordic countries, which traditionally have been considered as characterized by high levels of intoxication, show a complex drinking pattern; Danish youth are towards the top in most of the comparisons and Icelandic youth are in the bottom, while youth living in Finland, Norway, and Sweden are somewhere in between. These geographic differences seem to be stronger for girls than boys.

Patterns of HED and drunkenness in the U.S. are more consistent with those in non-intoxication cultures like Mediterranean and Balkan countries. On the other hand, patterns of HED in Canada more closely match those of intoxication cultures like Central European countries. However, there are clearly some signs of cultural and gender convergence in adolescent drunkenness within European and North American countries (Kuntsche et al., 2011). For example, although HED is higher in some European countries, such as Denmark, Croatia, the Czech Republic, Estonia, Slovenia, and the U.K. than in others, such as Iceland, Albania, and Portugal, in recent years HED has been converging and slightly lowering. Thus, it will be necessary to keep an eye on trends in HED and drunkenness across European countries and to conduct more studies focused on understanding the motives that in some countries orient young people to getting drunk, while in other countries protect against frequent drunkenness. To complicate matters even further, one must consider within-country heterogeneity in drinking norms and behaviours. For example, it is clear from the MTF data that there are subcultural differences in the U.S. based on race/ethnicity, with greater proportions of White adolescents drinking and drinking heavily than Black adolescents. The European studies discussed above did not present data separately within countries based on ethnic background. However, there is some evidence to suggest that minority ethnic groups generally have lower prevalence rates of drinking compared to the White population (Hurcombe, Bayley, & Goodman, 2010).

Just as there are regional differences in adolescent drinking patterns in Europe, there are also differences in drinking patterns in the U.S. depending on the region of the country. In general, Southern and Western youth exhibit the highest rates of annual prevalence and HED

in early adolescence and Northeastern youth exhibit the highest rates in late adolescence. In contrast, there is little provincial variation in drinking prevalence and HED among adolescents living in Canada.

For the most part, prevalence of drinking is relatively similar for boys and girls in both Europe and North America. The narrowing of the gender gap and even higher rates of drunkenness among females than males in several European countries is a recent phenomenon, which is probably occurring in concert within the convergence between the sexes with respect to other lifestyle factors. This gender parity seems to be especially apparent at younger ages and could reflect a generation change. For example, in the U.S. 8th grade girls, compared to boys, are more likely to drink and drink heavily. This difference could simply reflect the fact that these girls have acquired drinking styles typical of an older age as they often have older male friends with whom they drink. Nonetheless, by the 12th grade, boys in the U.S. drink more often and engage more often in HED than girls, suggesting that traditional sex differences may emerge with advancing age. Similarly, data from European adults also suggests that, for the most part, adult men drink more often and in greater quantities than adult women (Eurobarometer, 2010; WHO, 2010). It is clear, however, that the relatively high rates of HED among younger girls in Europe and North America require greater attention. Furthermore, a recent study found that there has been an increase in risk for alcohol-related traffic accidents among underage (ages 16-20 years) females in the U.S. (Voas, Torres, Romano, & Lacey, 2012) adding greater concern about increases in drinking by female adolescents.

In conclusion, the studies reviewed above have shown relatively high rates of drinking, drunkenness, and HED among adolescents in Europe and North America. Although rates may be higher for the most part in Europe than North America, this does not mean that problems experienced by youth are different. More research is needed to determine if lower prevalence rates of drinking in the U.S. and Canada, compared to Europe, result in less damage, and what other factors determine which youth experience negative consequences from use. In the next chapter we examine risk and protective factors that influence drinking among adolescents and whether these factors may contribute to our

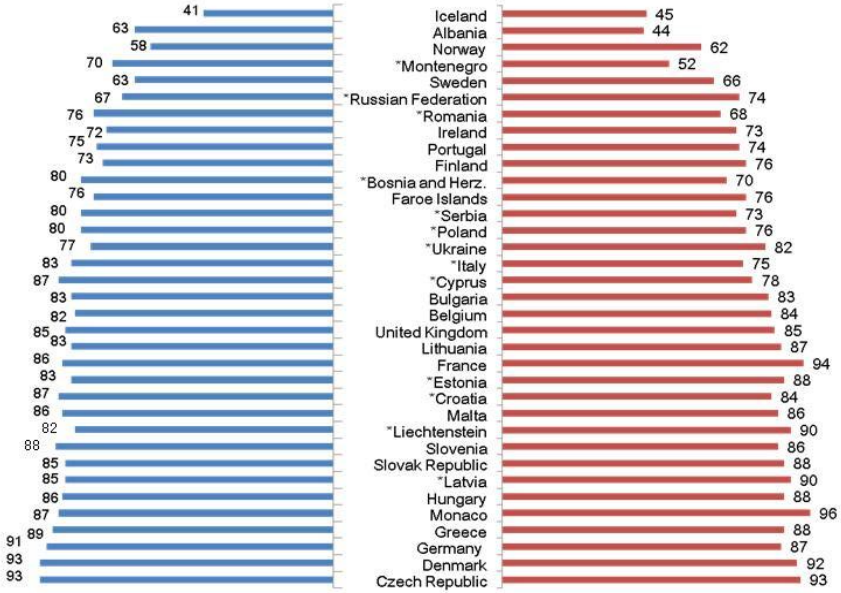
understanding of cross-cultural differences in drinking patterns and related problems.

Table 1. Age limits for purchasing alcoholic beverages, on- and off-premise, by country in Europe (European Union, Norway and Switzerland) and North America. Sources: http://www.ccsa.ca/eng/topics/legislation/LegalDrinkingAge/Pages/default.aspx; U.S. Department of Health & Human Services (2011); WHO (2012).

** New limits introduced in October 2012*

	On-premise		**Off-premise**	
Country	Beer & wine	Spirits	Beer & wine	Spirits
Austria	16	16	16	16
Belgium	16	18	16	18
Bulgaria	18	18	18	18
Canada	18 / 19	18 / 19	18 / 19	18 / 19
Cyprus	18	18	18	18
Czech Republic	18	18	18	18
Denmark	18	18	16	18
Estonia	18	18	18	18
Finland	18	18	18	20
France	18	18	18	18
Germany	16	18	16	18
Greece	18	18	18	18
Hungary	18	18	18	18
Ireland	18	18	18	18
Italy *	16	16	18	18
Latvia	18	18	18	18
Lithuania	18	18	18	18
Luxembourg	16	16	16	16
Malta	17	17	17	17
Netherlands	16	18	16	18
Norway	18	20	18	20
Poland	18	18	18	18
Portugal	16	16	16	16
Romania	18	18	18	18
Slovakia	18	18	18	18
Slovenia	18	18	18	18
Spain	18	18	18	18
Sweden	18	18	20	20
Switzerland	16	18	16	18
United Kingdom	16	18	18	18
United States	21	21	21	21

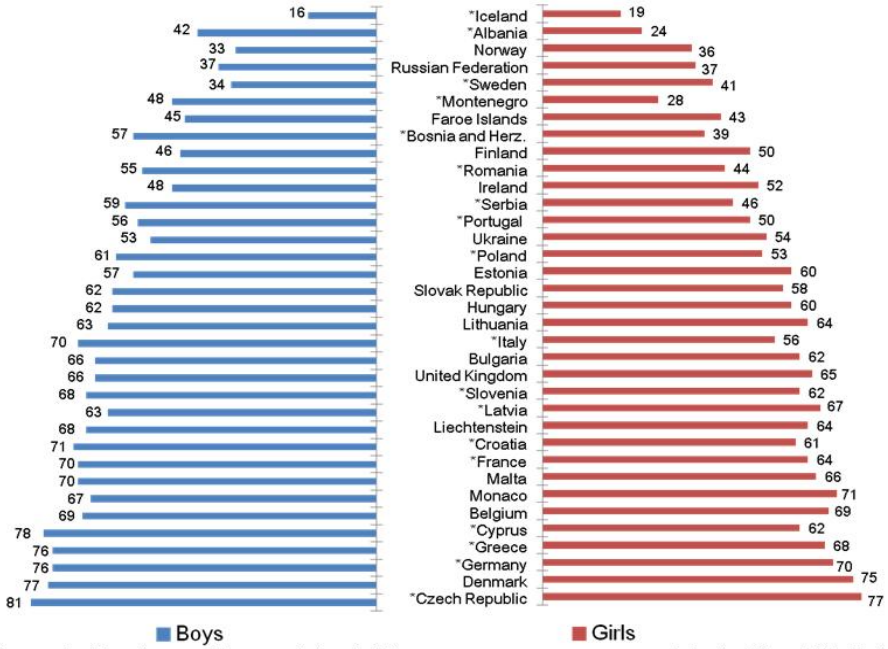
Figure 1. Last year prevalence of drinking by sex in the ESPAD 2011 study (percentages).



*indicates a significant sex difference (at p<0.05)

Adapted from Hibell et al., 2012

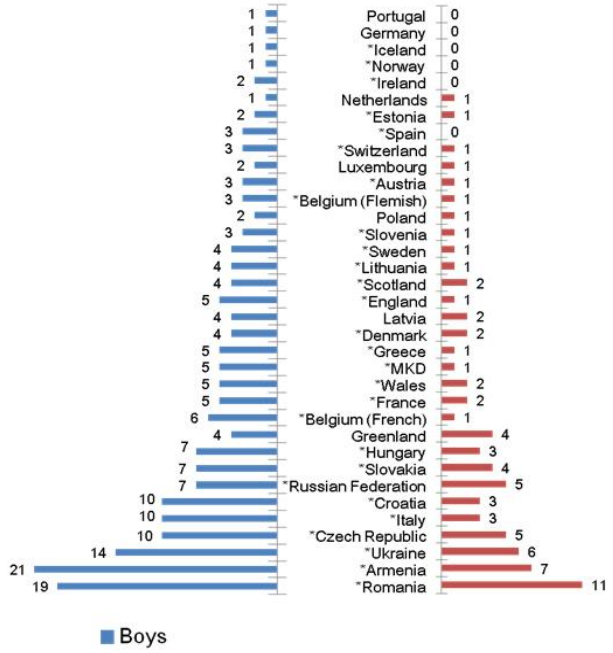
Figure 2. Last month prevalence of drinking in the ESPAD 2011 study (percentages)



*indicates a significant sex difference (at p<0.05)

Adapted from Hibell et al., 2012

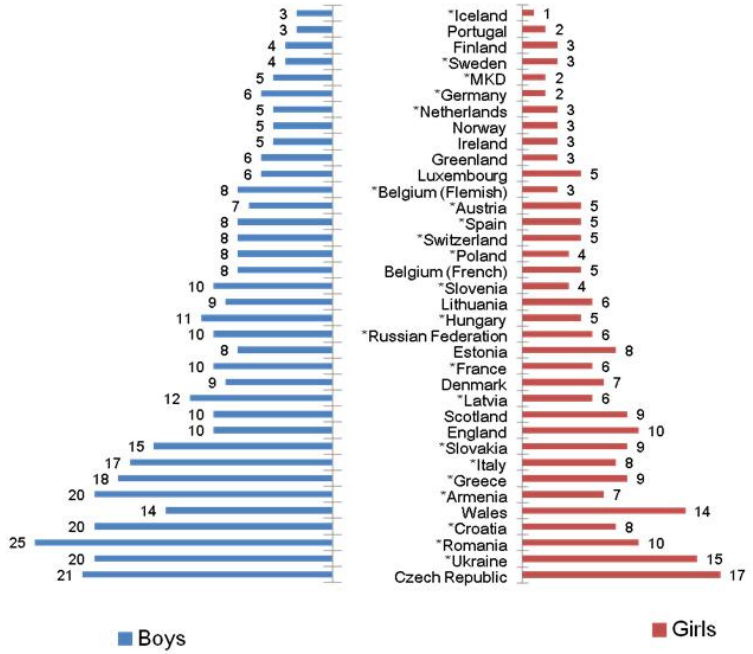
Figure 3a. Weekly drinking at age 11 by sex in the HBSC 2009/10 study (percentages)



*indicates a significant sex difference (at p<0.05)

Adapted from Currie et al., 2012

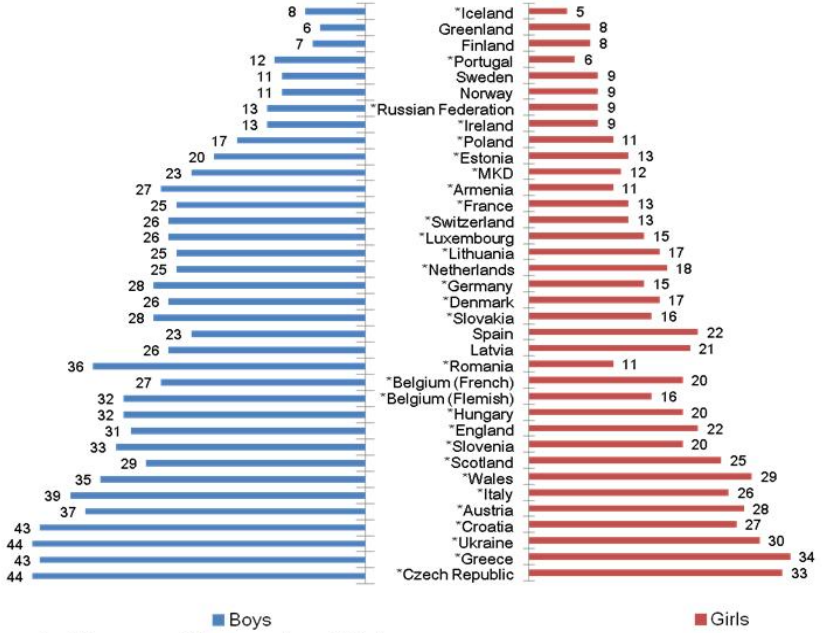
Figure 3b. Weekly drinking at age 13 by sex in the HBSC 2009/10 study (percentages)



*indicates a significant sex difference (at p<0.05)

Adapted from Currie et al., 2012

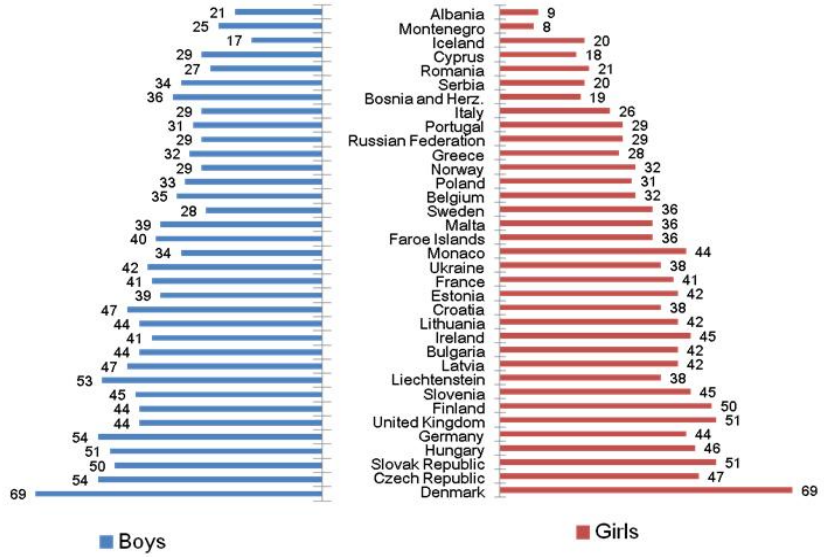
Figure 3c. Weekly drinking at age 15 by sex in the HBSC 2009/10 study (percentages)



*indicates a significant sex difference (at p<0.05)

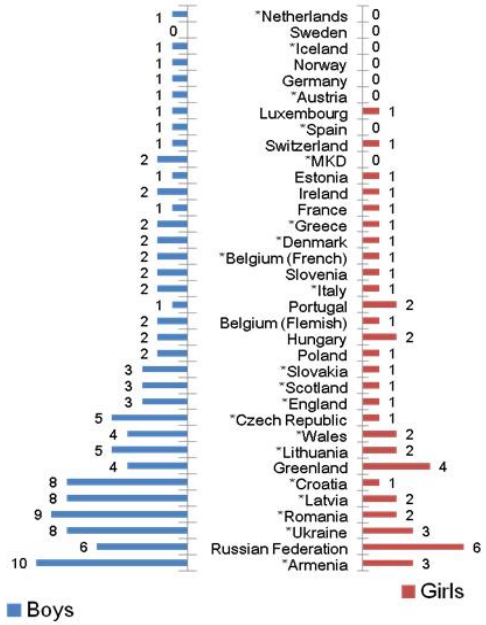
Adapted from Currie et al., 2012

Figure 4. Having been drunk during the last year by sex in the ESPAD 2011 study (percentages)



Adapted from Hibell et al., 2012

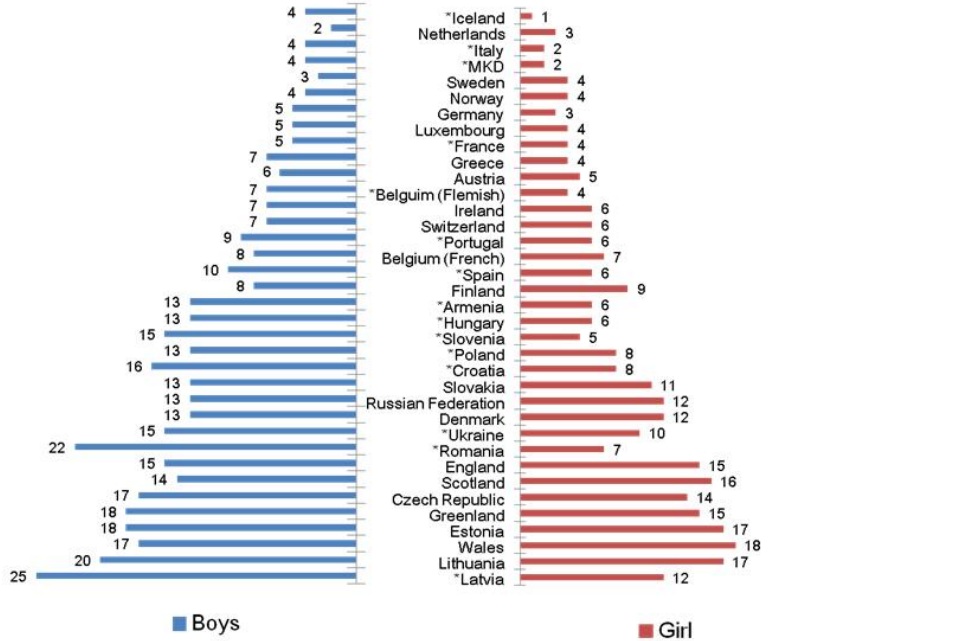
Figure 5a. Proportion of 11-year-olds who report having been drunk on two or more occasions, by sex, in the HBSC 2009/10 study (percentages).



* indicates a significant sex difference (at p<0.05)

Adapted from Currie et al., 2012

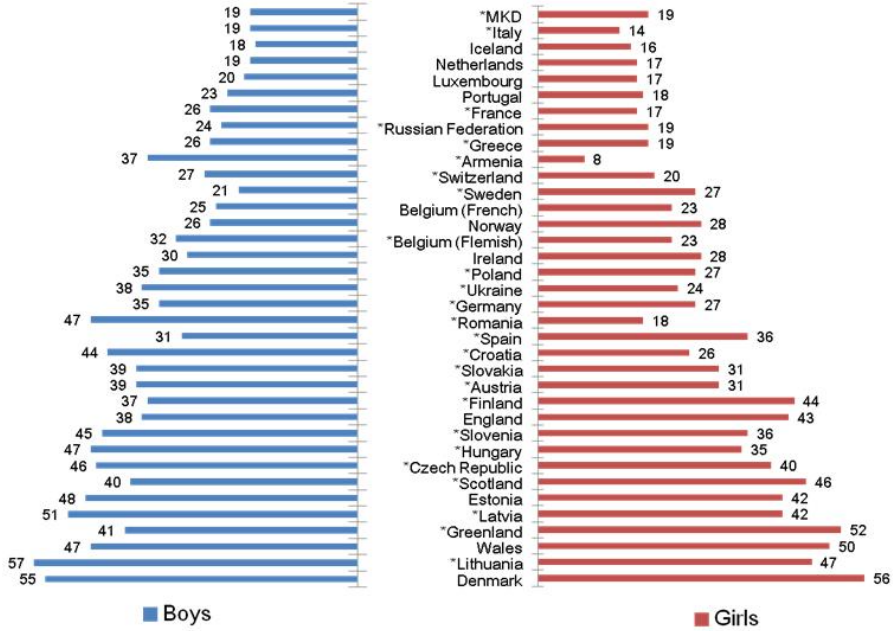
Figure 5b. Proportion of 13-year-olds who report having been drunk on two or more occasions, by sex, in the HBSC 2009/10 study (percentages)



* indicates a significant sex difference (at p<0.05)

Adapted from Currie et al., 2012

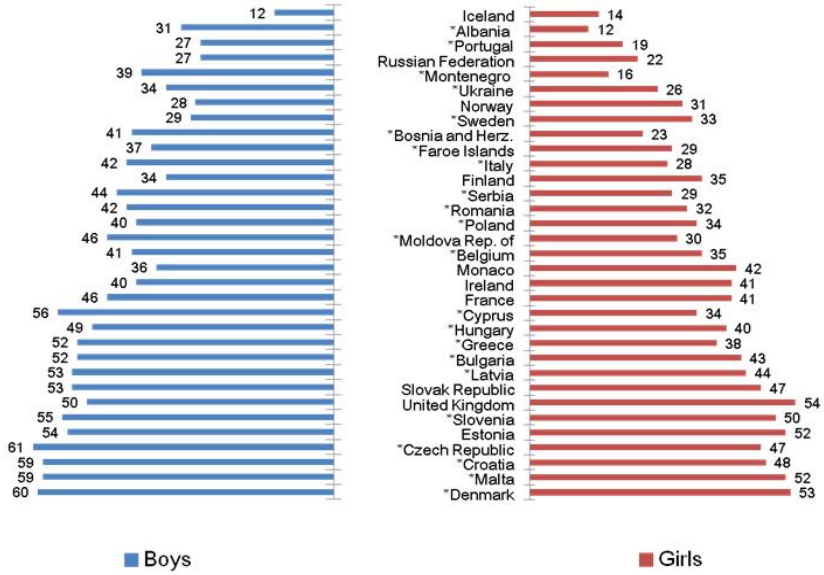
Figure 5c. Proportion of 15-year-olds who report having been drunk on two or more occasions, by sex, in the HBSC 2009/10 study (percentages)



* indicates a significant sex difference (at p<0.05)

Adapted from Currie et al., 2012

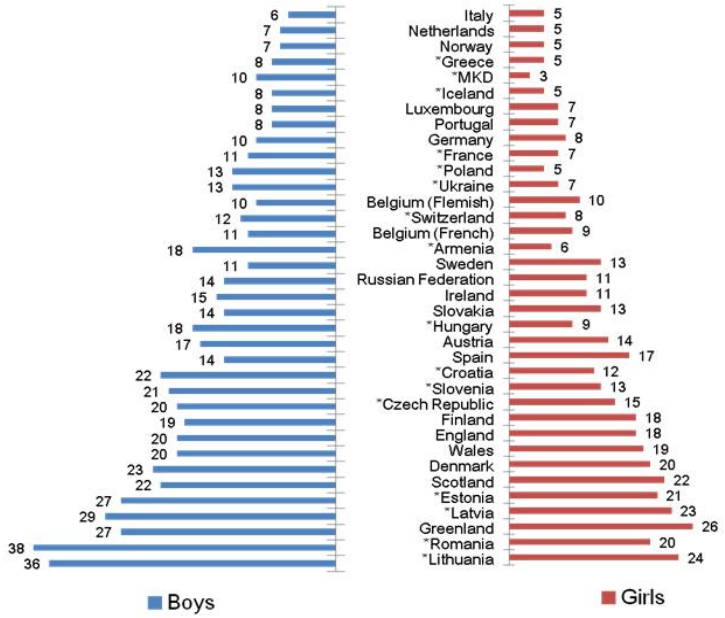
Figure 6. Drinking 5+ drinks on at least one occasion during the last month, by sex, in the ESPAD 2011 study (percentages)



* indicates a significant sex difference (at p<0.05)

Adapted from Hibell et al., 2012

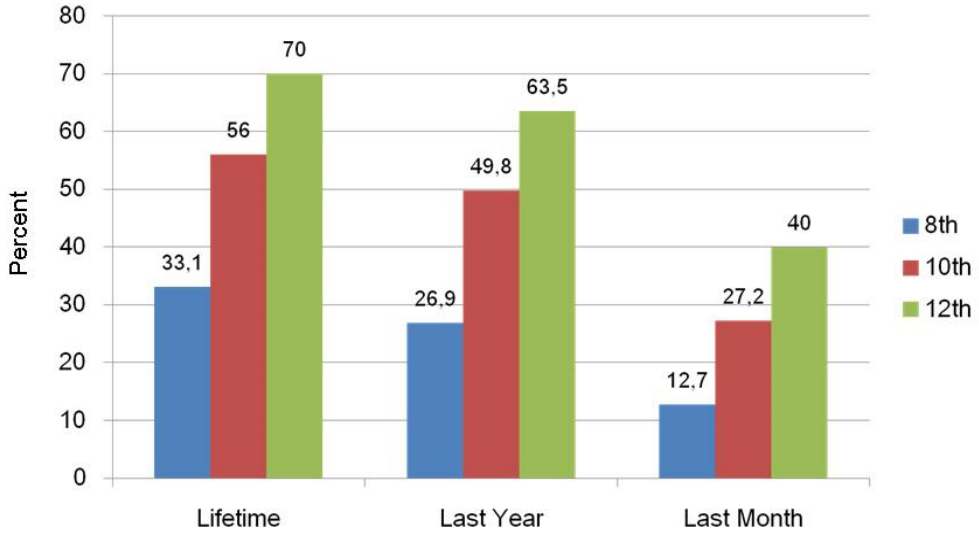
Figure 7. Proportion of 15-year-olds who report first drunkenness at age 13 or younger by sex in the HBSC 2009/10 study (percentages)



* indicates a significant sex difference (at p<0.05)

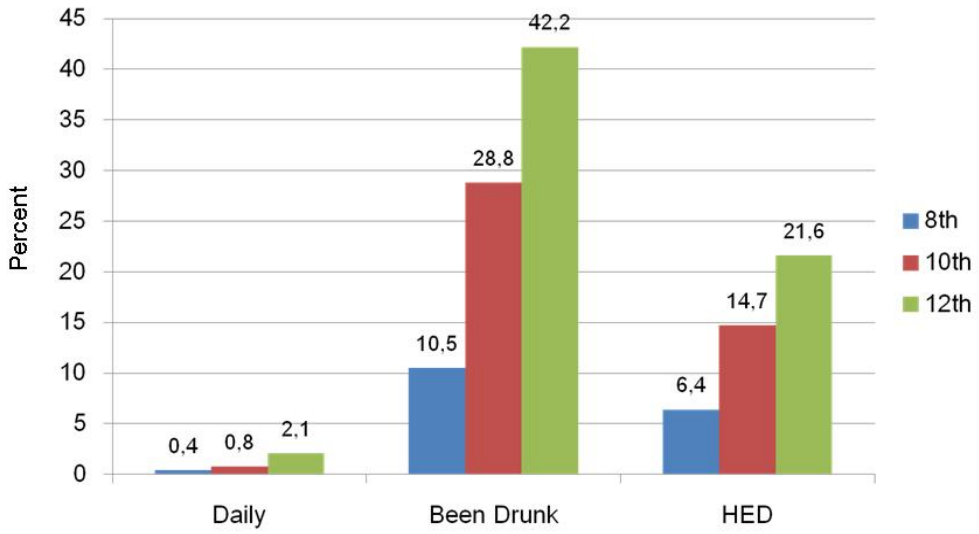
Adapted from Currie et al., 2012

Figure 8. Lifetime, last year, and last month prevalence of drinking in the U.S. 2011 by grade (percentages)



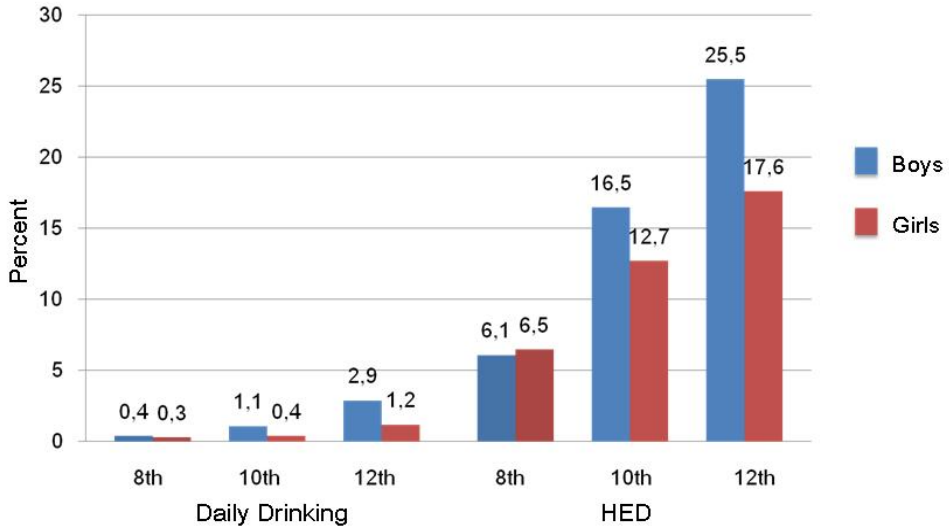
Adapted from Johnston et al., 2012

Figure 9. Daily drinking, drunk in the last year, and drinking 5+ drinks in a row (HED) in the last 2 weeks in the U.S. 2011 by grade (percentages)



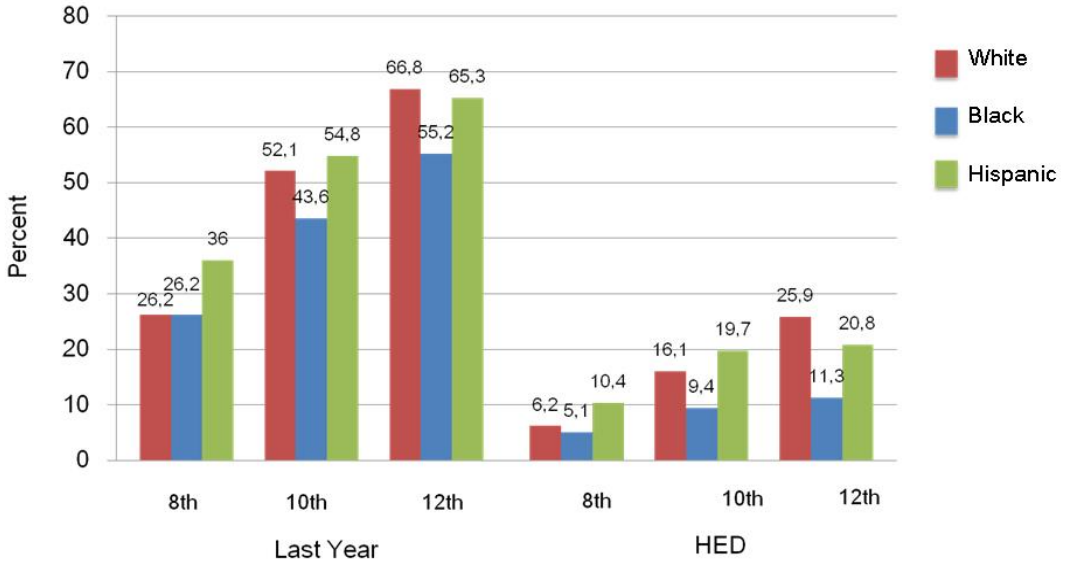
Adapted from Johnston et al., 2012

Figure 10. Last month prevalence of daily drinking and drinking 5+ drinks in a row (HED) in the last 2 weeks in the U.S. 2011 by grade and sex (percentages)



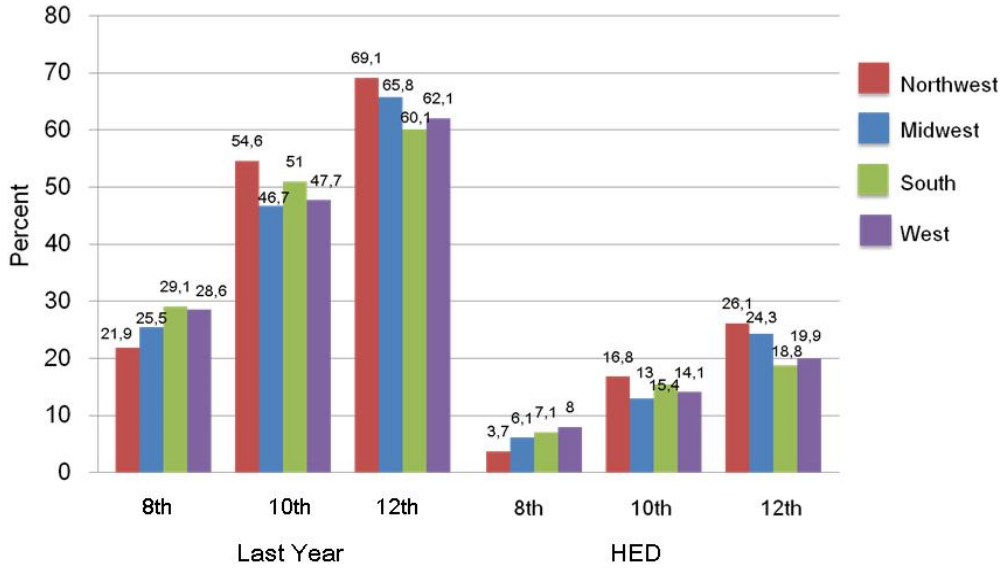
Adapted from Johnston et al., 2012

Figure 11: Last year prevalence of drinking and drinking 5+ drinks in a row (HED) in the last 2 weeks in the U.S. 2011 by grade and race/ethnicity (percentages)



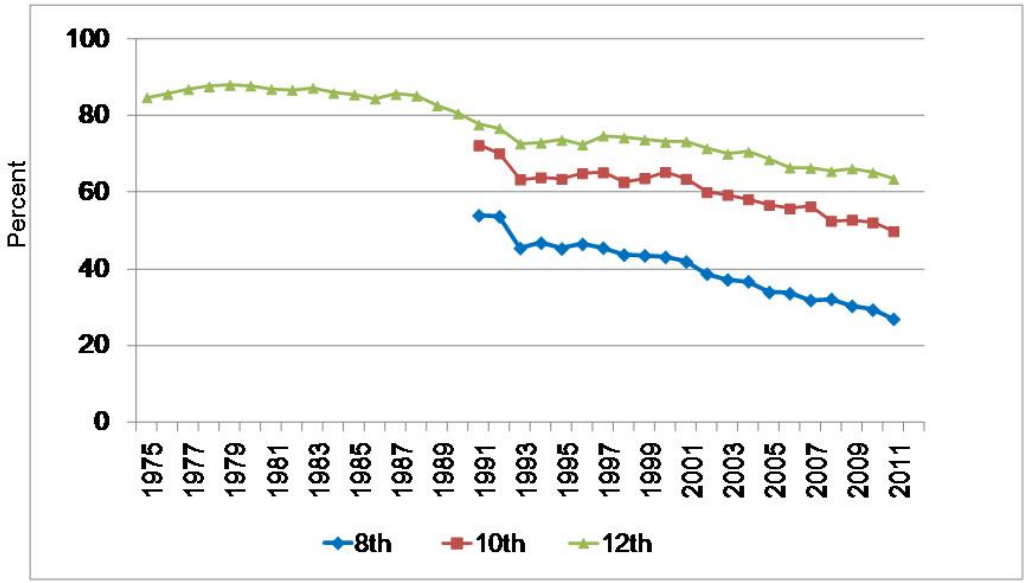
Adapted from Johnston et al., 2012

Figure 12: Last year prevalence of drinking and drinking 5+ drinks in a row (HED) in the last 2 weeks in the U.S. 2011 by grade and region of residence (percentages)



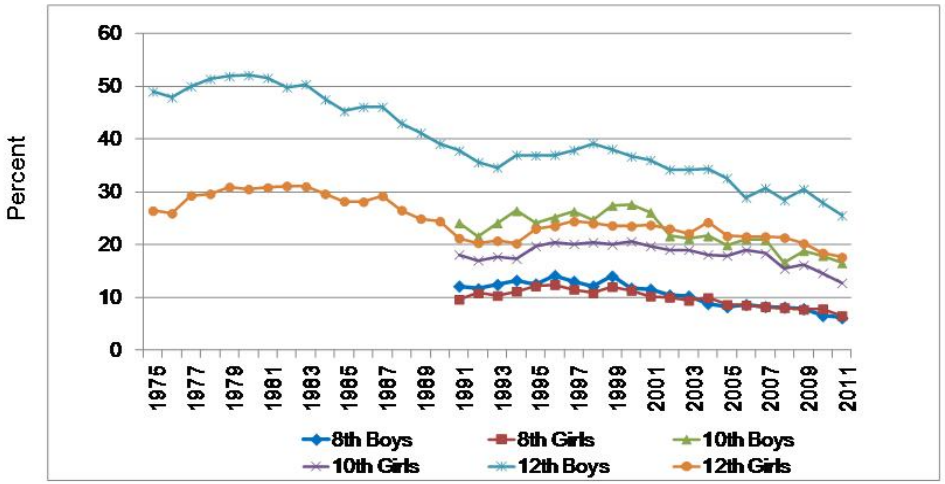
Adapted from Johnston et al., 2012

Figure 13. Trends in last year prevalence of drinking U.S. 1975-2011 by grade (percentages)



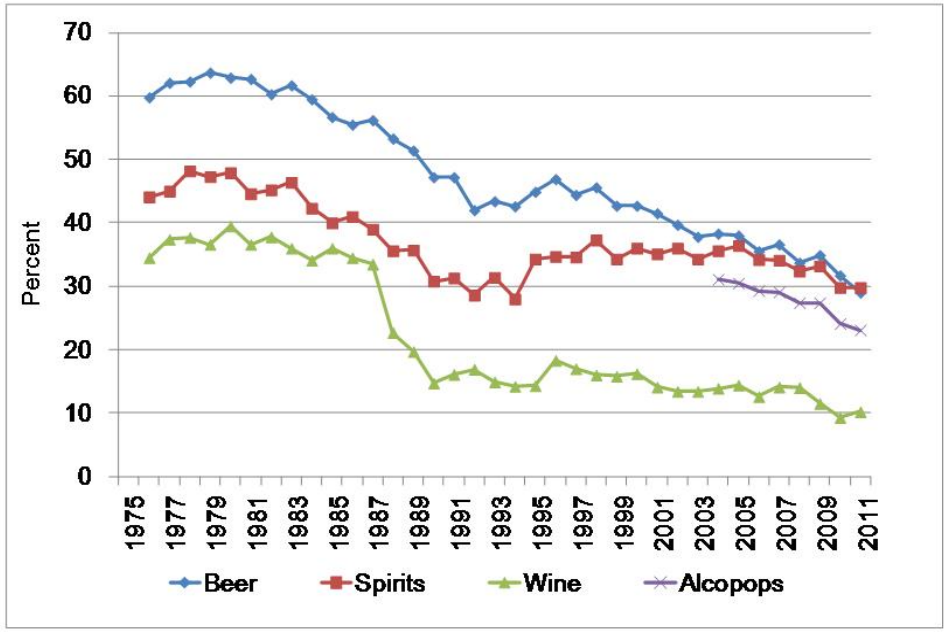
Adapted from Johnston et al., 2012

Figure 14. Trends in drinking 5+ drinks in a row in the last 2 weeks
U.S. 1975-2011 by grade and sex (percentages)



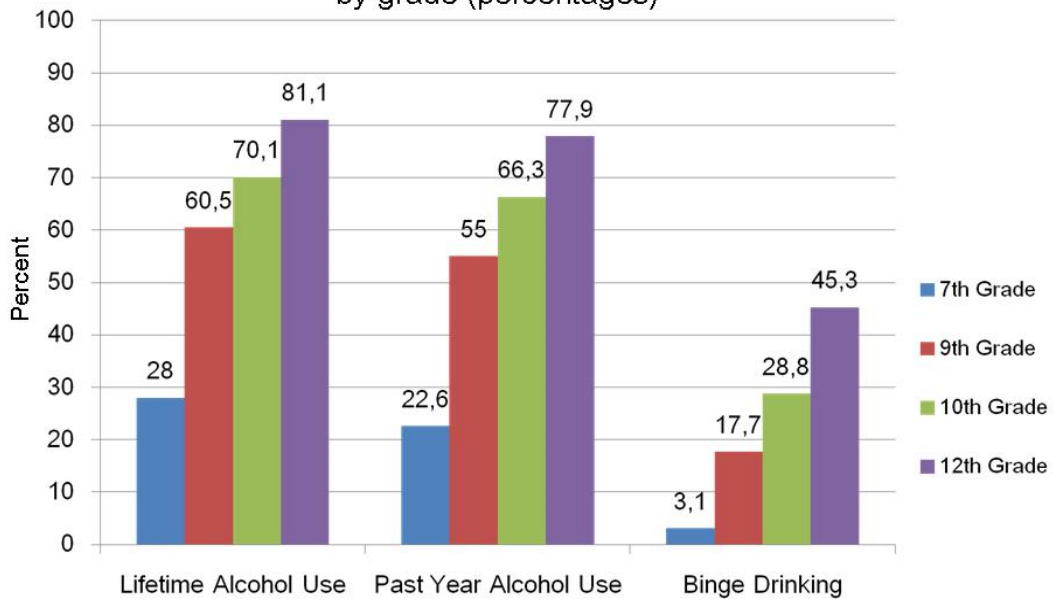
Adapted from Johnston et al., 2012

Figure 15. Trends in 30-day prevalence of different beverages among U.S. 12th graders 1975-2011 (percentages)



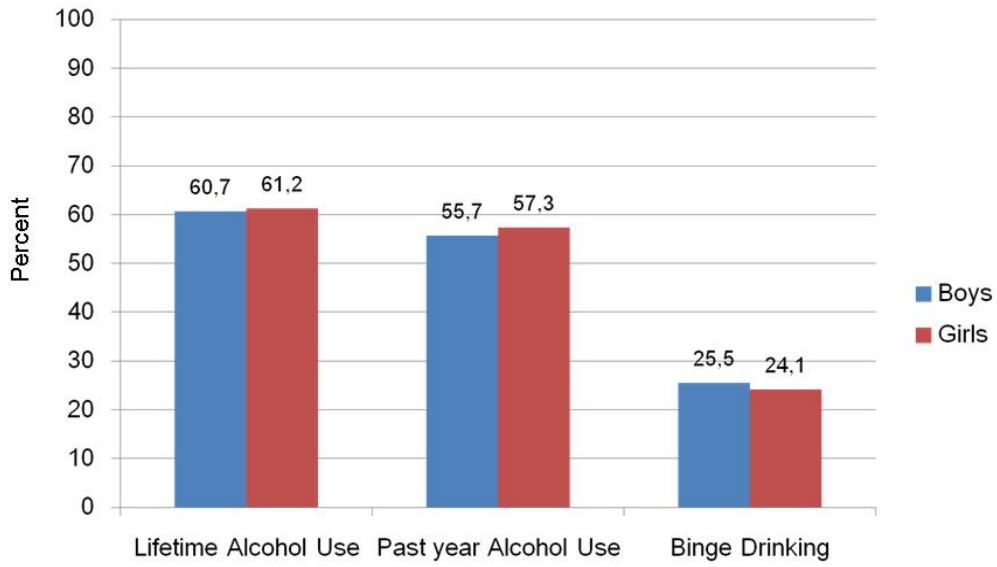
Adapted from Johnston et al., 2012

Figure 16. Prevalence of lifetime drinking, last year drinking, and drinking 5+ drinks on one occasion in the last month (HED) in Canada 2007-2008 by grade (percentages)



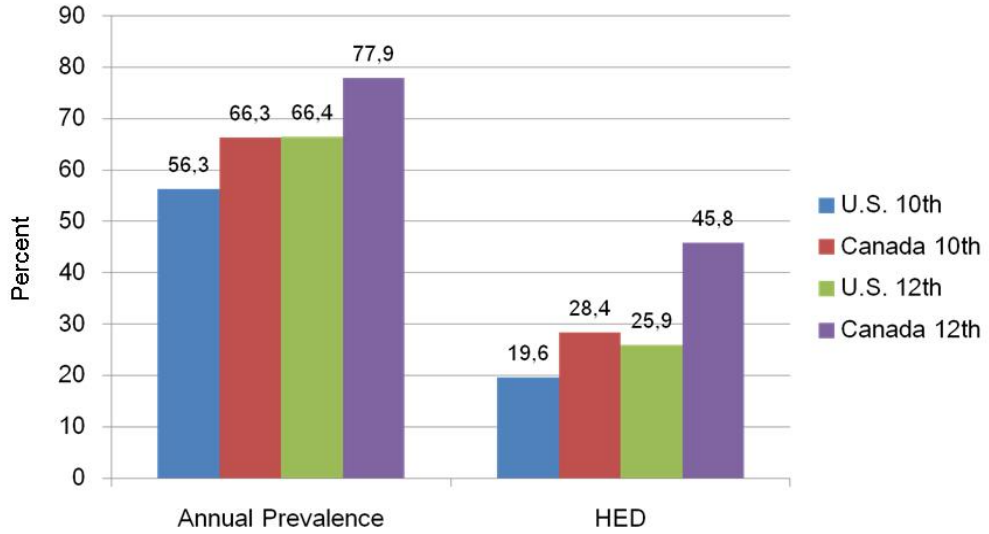
Adapted from Young et al., 2011

Figure 17. Prevalence of lifetime drinking, last year drinking, and drinking 5+ drinks on one occasion in the last month (HED) in Canada 2007-2008 by sex (percentages)



Adapted from Young et al., 2011

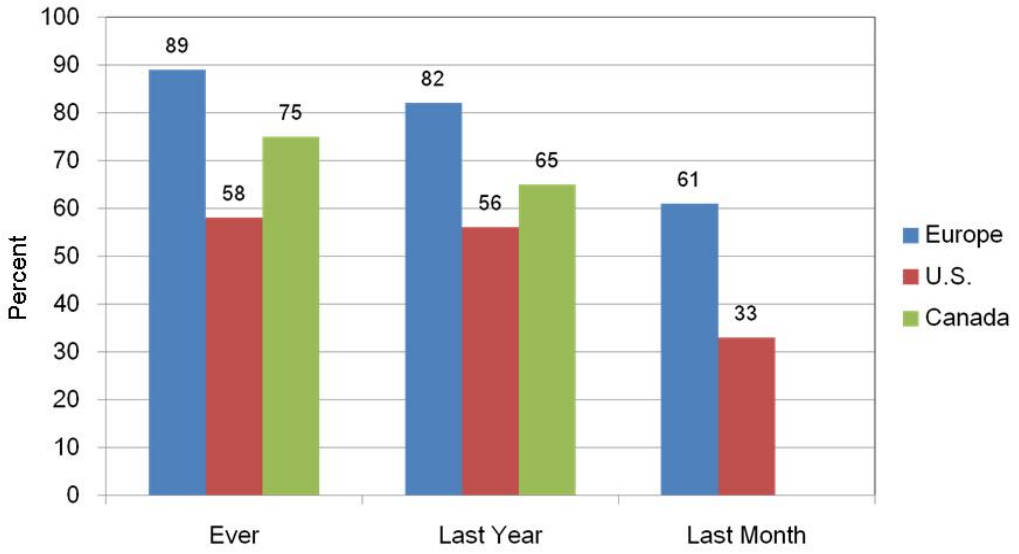
Figure 18. Comparison of annual prevalence and heavy episodic drinking between the U.S. (2007) and Canada (2007-2008) by grade (percentages)



*U.S. last 2 weeks and Canada last month

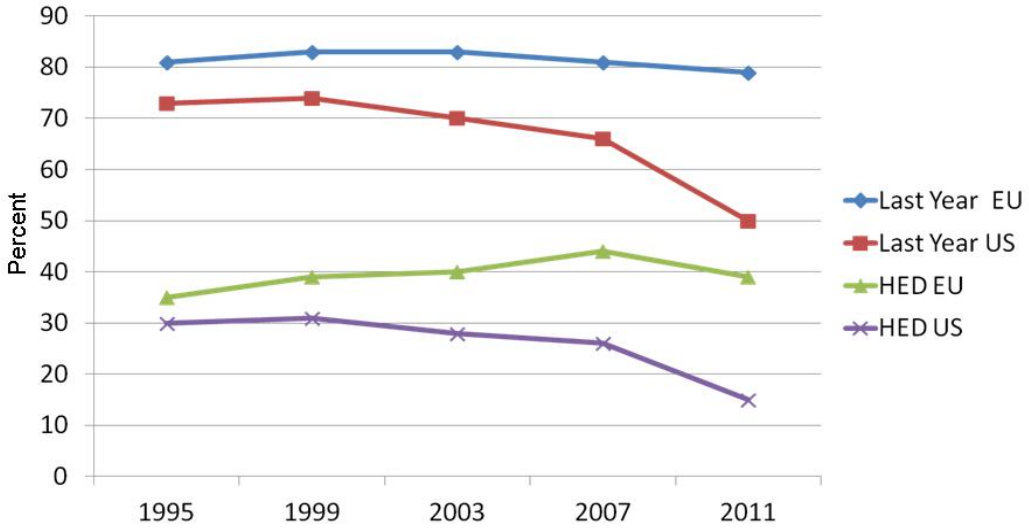
Adapted from Johnston et al., 2012 and Young et al., 2011

Figure 19: Prevalence of lifetime, last year, and last month drinking in European 15- to16-year-olds (2007), U.S. 10th graders (2007), and Canadian 10th graders (2007-2008) (percentages)



Adapted from Hibell et al., 2009, Johnston et al., 2012,Young et al., 2011

Figure 20. Trends in annual prevalence and heavy episodic drinking (HED)* among European (EU) 15- to 16-year-olds and the U.S. 10th graders 1995-2011 (percentages)



*Europe is 5+ drinks in the past month and U.S. is in the past 2 weeks

Adapted from Hibell et al., 2012 and Johnston et al., 2012

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Chapter 2

Risk and Protective Factors for Underage Drinking

Reinout W. Wiers, Kim Fromme, Antti Latvala and Sherry Stewart

A wide range of factors is known to influence adolescent alcohol use behaviours as reviewed by Hawkins, Catalano, and Miller (1992). Although somewhat outdated as a review, the categorization of the risk-factors is still useful. The authors distinguish between on the one hand individual and interpersonal factors and on the other hand contextual factors. Like almost all human behaviour, alcohol use - though fundamentally the behaviour of individuals - occurs in the context of societies with their legal and cultural norms and other factors restricting or enabling behaviour. We start with individual risk factors (genetics, cognitive processes, personality), followed by interpersonal risk-factors (e.g., influences of family and peers), and end with some environmental factors (e.g., neighbourhood influences). Factors at different levels of description can influence each other; for example, a stressful family environment has an impact on the development of the stress-reactivity of an individual and this is moderated by genetic factors, which can lead to "developmental cascades" (Masten & Cicchetti, 2010). We acknowledge that this is not a full systematic review in all of these wide domains, which was beyond the scope of this project. We illustrate current thinking about risk and protective factors across different levels of description and their interplay. We also note that many risk and

protective factors have not been studied across many different cultures, and in research on some risk factors there is a gender bias (e.g., acute alcohol effects, which has been primarily studied in men, mostly for pragmatic reasons such as risk of pregnancy, lower tolerance in women, etc.).

KEY FINDINGS

- Risk- and protective factors can be described at many different levels of description, ranging from genes and (sub-) cellular processes to societal characteristics. It is important to distinguish risk- and protective factors with respect to their causal status and with respect to their malleability. We focused on risk-factors with some evidence of causality and/or which may be malleable through interventions.

- Peers and parents are important factors across cultures in influencing underage drinking and related problems, with many indirect pathways (e.g., parental SES, neighbourhood-effects, etc.). Recent evidence has demonstrated a causal role for alcohol-specific rule setting on delaying age of onset both in North Europe and in the U.S.

- Personality is an important risk-factor, with different facets of personality influencing risk for underage drinking and related problems in different ways. Externalizing characteristics and related traits (impulsivity, sensation seeking, weak self-control) have been related to early onset and escalation. Internalizing problems appear to be less strongly related to age of onset, but do appear to play an important role in the escalation of teen drinking, with an important role for motivations to drink in order to cope with problems.

- Alcohol-related cognitive processes are important predictors of alcohol use and problems, with some operating more on explicit reasoning processes (e.g., motives to drink) and others operating more automatically (e.g., attention captured by alcohol-related stimuli).

- Some risk factors (parenting, personality, cognitive processes) can be targeted in interventions, as are discussed in Chapter 3.

Two important issues regarding risk and protective factors are their causal status, and whether or not they are amenable to intervention. Regarding causal status, there are two ways to investigate this: first, longitudinal studies can be done where the risk-factor is assessed and mediation of the risk factor regarding the outcome is tested (Baron & Kenny, 1986; MacKinnon & Fairchild, 2009; MacKinnon & Lockwood, 2003; Maric, Wiers, & Prins, 2012). The most convincing way to demonstrate causality, however, is to conduct an experiment and to manipulate the variable of interest in an experiment with random assignment and to demonstrate the effect on the outcome. In this context, that strategy is often a form of an intervention, although most prevention programmes are broad and rarely target a specific variable. As an example from underage drinking, it has been demonstrated that strict rule setting regarding alcohol use by parents is longitudinally related to a delayed age of onset of drinking in children (van der Vorst, Engels, Dekovic, Meeus, & Vermulst, 2007). From this observation it seems likely that lack of strict alcohol rules (no drinking allowed before the legal drinking age) is a causal factor in the prediction of underage drinking. However, there are other potential explanations: so called third-variables that could explain this relationship. For example, parents scoring high on intelligence or low on impulsivity could set more strict alcohol-specific rules than parents scoring low on intelligence or high on impulsivity. Given that these characteristics are influenced by heritability, offspring of highly intelligent (low impulsive) parents will score relatively high on intelligence (low on impulsivity), which could predict late age of onset. In that case the correlation between parental rule-setting and late age of onset would be a spurious one. The only way to rule out the possibility of third variables is to conduct an experiment, and that has been done for this example (Koning et al., 2009). Adolescents were randomly assigned to conditions combining universal prevention aimed at the adolescents themselves, with prevention aimed at the parents. Only adolescents receiving the universal prevention, and whose parents had also received the parent intervention, delayed their onset of drinking. In this case, third variables can be ruled out, and the interpretation of this effect was strengthened by the fact that changes in parental attitudes and perceived rules mediated the intervention effect (Koning, van den Eijnden, Engels, Verdurmen, & Vollebergh, 2011).

The second important feature of risk and protective factors is the extent to which they are malleable or not. Genes or low SES are not easily changed, but it is possible that some of the processes through which they exert their effects may be malleable. For that reason, psychological variables are particularly interesting, because there is evidence that some of the psychological risk factors (e.g., ideas adolescents have about the level of drinking of others, expected outcomes, coping strategies, and automatically triggered associative processes) can be changed by interventions. As was shown above so can parental rule-setting. Other important societal factors related to levels of alcohol use and problems in the population include policies and laws regulating the availability of alcohol, cultural norms (including religion), and various factors related to social cohesion and control, most of which are discussed in detail in this chapter (see, Babor et al., 2010; Galea, Nandi, & Vlahov, 2004; Mäkelä & Österberg, 2009; Sampson, Morenoff, & Gannon-Rowley, 2002 for greater details). Where possible, direct comparison studies between European and American research are highlighted.

GENETIC LIABILITY

The relative contributions of genetic and environmental influences to variation in a trait can be estimated in studies of monozygotic (MZ) and dizygotic (DZ) twins. This is based on the fact that members of a MZ twin pair are genetically identical, whereas DZ co-twins share, on average, 50% of their segregating genes (Boomsma, Busjahn, & Peltonen, 2002). A central concept of twin studies is heritability, meaning the proportion of total variance in a trait attributable to genetic variance. Alcohol use and disorders have been extensively studied by the twin study methodology. A robust finding of twin studies has been that genetic factors have a notable influence on the risk to develop alcohol use disorders. A review of community based twin studies of alcohol-related phenotypes from many different countries and more than 18,000 twin pairs found that the average heritability (weighted by sample size of the study) of alcohol dependence in adult populations was 55% (Dick, Prescott, & McGue, 2009).

The contribution of genetic and environmental variation to initiation and development of drinking has been investigated in studies of adolescent twins. In contrast to alcohol use disorders, drinking onset has been found to be strongly influenced by environmental factors, including those shared by members of a twin pair, such as factors related to growing up in the same family and sharing peers. Regarding initiation of drinking, the weighted average proportions of variation explained by genetic, shared environmental and non-shared environmental factors were 37%, 36% and 27%, respectively (Dick et al., 2009).

Environments shared by adolescent co-twins thus have an important influence on the early stages of alcohol use. However, based on both prospective and retrospective data, these factors seem to become less important in subsequent stages of alcohol use, whereas the relative contributions of genes and individual-specific environmental factors become more important (Fowler et al., 2007; Kendler, Schmitt, Aggen, & Prescott, 2008; Pagan et al., 2006; Rhee et al., 2003; Rose, Dick, Viken, Pulkkinen, & Kaprio, 2001). Importantly, the classic twin study methodology estimates proportions of variation which does not have a straight-forward relation to the mean level of the trait under study. Thus, the role of genetic factors underlying variation in adolescent drinking behaviours has been found to be independent of trends and cohort effects in adolescent drinking (Geels et al., 2012).

A recent study modeled genetic influences on a multitude of alcohol-related traits, ranging from use of alcohol to dependence. Based on two different data sets of twins, from the U.S. and Finland, Dick, Mayers, Rose, Kaprio and Kendler (2011) identified four independent genetic sources of variation. This means that the distribution of genetic and environmental influences on alcohol use, abuse and dependence, is highly phenotype (behaviour) specific. This would imply that intervening on different alcohol-related behaviours might require interventions that are behaviour-specific. While some specific genes acting on alcohol use and dependence have been identified, notably those involved in the metabolism of alcohol, findings relating specific genes to alcohol use have mostly been inconsistent and the findings have indicated, at most, weak associations. Thus, the genetic liability to alcohol use is probably composed of multiple genes, each with, at most, minor effects on the

liability to use. This hypothesis is exemplified by the recent genome-wide analysis of alcohol consumption in 20,000 subjects with genome-wide array data, from which only one finding of interest emerged (Schumann et al., 2011). Larger population studies of common genetic variants may reveal some more genes of relevance, but these are unlikely to account for a major fraction of the variance underlying alcohol use. For adolescent alcohol use, it is even less likely that specific genes play any major role.

Though traditional genetic models assume that genetic and environmental factors act independently of each other, accumulating evidence suggests that this is not the case. A recent review indicated that studies of inferred genotype, such as twin studies, provide fairly consistent evidence that specific environmental factors, such as parental and peer influences, region of residence, religious involvement and marital status modify the importance of genetic factors (Young-Wolff, Enoch, & Prescott, 2011). The same review indicated that studies of specific candidate genes, however, provide a more varied picture with less consistent findings. Partly, these are due to the weaker associations of individual genes with alcohol-related phenotypes, as well as lack of power, in mostly small to medium-sized samples. Overall, such studies indicate that variation in environmental conditions can minimize the impact of genetic liability. That is, genetic effects on alcohol use are very context-dependent.

PERSONALITY AND UNDERAGE DRINKING

Individual differences in temperamental and personality traits in childhood and adolescence have been found to be robust predictors of the development of alcohol use behaviours. For example, children whose behaviour was classified as under-controlled (i.e. impulsive, restless, or distractible) at age 3 were significantly more likely to be diagnosed with alcohol dependence at age 21 than children not exhibiting these behavioural tendencies (Caspi, Moffitt, Newman, & Silva, 1996). Similarly, the personality dimensions of high novelty-seeking and low harm-avoidance, assessed at age 11, were found to distinguish boys with

an increased risk for alcohol abuse at age 27 (Cloninger, Sigvardsson, & Bohman, 1988).

Externalizing characteristics. A large research literature has replicated and extended these findings (Barman, Pulkkinen, Kaprio, & Rose, 2004; de Wit, 2009; Dick et al., 2010; Iacono, Carlson, Taylor, Elkins, & McGue, 1999; Vanyukov et al., 2003; Verdejo-Garcia, Lawrence, & Clark, 2008; Weinberg & Glantz, 1999). It is thus currently generally accepted that a tendency for disinhibited, easily distractible, impulsive, or aggressive behaviour in childhood and adolescence significantly increases the risk to engage in alcohol use behaviours, ranging from initiation of drinking to alcohol dependence. Related to these behaviours are the psychiatric disorders: antisocial personality disorder, conduct disorder and attention-deficit/hyperactivity disorder (ADHD), which are strongly related to the risk of alcohol use disorders, in part due to shared genetic risk (Edwards & Kendler, 2012).

During the past decade, a hot topic of research has become the interplay between personality, brain development and substance use during adolescence (Casey & Jones, 2010; Gladwin, Figner, Crone, & Wiers, 2011; Steinberg, 2010; Steinberg et al., 2008; White et al., 2011; Wiers, Ames, Hofmann, Krank, & Stacy, 2010). For example, there is increasing evidence that two often confounded concepts, impulsivity and sensation seeking have a different developmental pathway, with sensation seeking peeking during adolescence, while impulsivity gradually decreases with age, which has been attributed to different developmental pathways of motivational brain circuits (fast development during adolescence) and brain systems underlying executive control (Casey & Jones, 2010; Gladwin et al., 2011; Steinberg, 2010; Steinberg et al., 2008; Wiers, Ames et al., 2010). Recent reviews have indicated that there is abundant evidence reporting correlations between impulsivity and abuse of alcohol and other substances, but that the causal pathways are less clear. The strongest evidence in humans points to impulsivity as a risk factor for the development of later problems with alcohol and other substances, and suggestive evidence for increased impulsivity due to early alcohol or substance abuse (de Wit, 2009; Verdejo-Garcia et al., 2008). Note that when impulsivity is defined as a lack of (executive) control over impulses, there is overlap with the concept of self-regulation.

Self-regulation capacity has a strong genetic component (Friedman, Miyake, Robinson, & Hewitt, 2011; Friedman et al., 2008); children who find it difficult to restrain their impulses (e.g., to not eat a cookie after an experimenter has left the room, which will yield two cookies upon the return of the experimenter), also show relatively weak executive control functions during adolescence (Friedman et al., 2011) and sub-optimal academic success and health outcomes in the long run (Mischel et al., 2011; Mischel, Shoda, & Peake, 1988). Lower self-control in childhood also leads to adolescent substance use, problems and dependence (Moffitt et al., 2011; Neal & Carey, 2007). Hence, sub-optimal development of control over impulses and self-regulation are risk factors for the development of addiction and other externalizing problem behaviours.

On the other hand, good self-control can be a buffering factor against adolescent problem behaviours (Wills, Ainette, Stoolmiller, Gibbons, & Shinar, 2008; Wills & Stoolmiller, 2002). Buffering factors reduce the effect of risk factors on behavioural outcomes, with good self control buffering the effects of negative life events and peer substance use. In a 4-year prospective study, adolescents (ages 14 to 15 years) who had higher self-control showed lower increases in substance use in response to life events and peers who used substances (Wills et al., 2008). Research also shows that the capacity for self-control could be stimulated successfully in children (Diamond, Barnett, Thomas, & Munro, 2007), and that this delayed the onset of substance use later as adolescents (van Lier, Huizink, & Crijnen, 2009).

In addition to impulsivity and related characteristics (suboptimal executive control or self-regulation) predicting later problems with alcohol and drugs, as discussed above, animal research increasingly suggests a detrimental role of abuse of alcohol and other substances on the normal developmental pathways during adolescence (Crews, He, & Hodge, 2007). The scarce prospective human research suggests that this may also be the case in human adolescents, with perhaps more possibilities for recovery to more normative developmental pathways with early cessation of alcohol abuse (White et al., 2011). This clearly constitutes an area for future research.

Internalizing characteristics. Internalizing characteristics such as neuroticism and negative affectivity have also been studied in adolescents in relation to risk for alcohol misuse. For example, neurotic personality traits have been shown to predict the progression from drinking in adolescence to alcohol problems in young adulthood (e.g., Jackson & Sher, 2003). Interestingly, both externalizing and internalizing personality characteristics appear to be linked to risk for problematic drinking through different mechanisms. Specifically, externalizing traits, like sensation seeking, appear to be linked to drinking to enhance positive affect, which in turn increases risk for alcohol problems via heavy drinking. In contrast, internalizing traits and symptoms, like neuroticism and negative affectivity, are linked to risk for alcohol problems through increased coping-motivated drinking, which is directly associated with drinking problems over and above drinking levels (Cooper, 1994; Cooper, Frone, Russel, & Mudar, 1995). In a longitudinal study, Marmorstein, White, Loeber, & Stouthamer-Loeber (2010) found that higher levels of both social anxiety and generalized anxiety predicted earlier age of onset among adolescent males. Generalized anxiety remained significant when delinquency was included in the model, but social anxiety did not.

In addition to the role of broad internalizing traits like neuroticism and anxiety disorders, researchers have explored the role of more specific internalizing personality characteristics such as anxiety sensitivity and introversion-hopelessness by examining the extent to which these more specific factors are associated with heavier drinking behaviour, alcohol-related problems, and/or risky drinking motives in adolescents and emerging adults. Anxiety sensitivity involves a fear of anxiety-related sensations, such as rapid heart beat, shaking or dizziness. Young people with high levels of anxiety sensitivity are theoretically at-risk of misusing alcohol because they are highly motivated to engage in behaviours that may reduce their unpleasant anxiety sensations, at least in the short term (Stewart & Kushner, 2001). Introversion-hopelessness is a personality profile characterized by introversion, neuroticism, and pessimism (Conrod, Pihl, Stewart, & Dongier, 2000). Studies have shown that anxiety sensitivity and introversion-hopelessness can both be reliably measured in young people, can be discriminated from one another both in factor analysis and in specific correlates, and can be well discriminated

from other personality risk factors for alcohol abuse, such as the externalizing factors of impulsivity and sensation seeking discussed above (Woicik, Conrod, Stewart, & Pihl, 2009). We first discuss the evidence for a role of anxiety sensitivity in risk for excessive drinking and/or alcohol problems in young drinkers, and then move on to a consideration of the role of introversion-hopelessness in this group.

Anxiety sensitivity appears to be reliably associated with elevated alcohol-related problems in young adulthood, although it is not reliably associated with increased alcohol use (Krank, Stewart, O'Connor, Woicik, Wall, & Conrod, 2011; Mackie, Castellanos-Ryan, & Conrod, 2011; Woicik et al., 2009). Moreover, anxiety sensitivity has been shown to moderate the association between anxiety symptoms and escalations in alcohol use over time (Mackie et al., 2011). Adolescents were tested at four separate times over an 18-month period. Adolescents with higher levels of both anxiety symptoms and anxiety sensitivity showed a faster rate of increase in alcohol use over time. Additionally, anxiety sensitivity has been uniquely associated with self-report reasons for alcohol use that reflected a desire to reduce negative emotional states and to reduce peer pressure (i.e., coping and conformity drinking motives, respectively; Woicik et al., 2009). Finally, targeting anxiety sensitivity in youth at-risk concurrently prevents onset of alcohol misuse, panic symptoms, and school avoidance in young adolescents (Castellanos & Conrod, 2006; O'Leary-Barrett, Mackie, Castellanos-Ryan, Al-Khudhairy, & Conrod, 2010), and reduces conformity drinking, relief alcohol outcome expectancies, and alcohol problems in emerging adults (Watt, Stewart, Birch, & Bernier, 2006). These prevention findings are consistent with the notion of anxiety sensitivity as a direct risk factor for alcohol problems or with the possibility that anxiety sensitivity predisposes to anxiety psychopathology which in turn increases risk for self-medication with alcohol (Stewart, Grant, Mackie, & Conrod, in press). Introversion-hopelessness is associated with elevated alcohol use and more problematic use in adolescents and emerging adults (Krank et al., 2011; Mackie et al., 2011; Woicik et al., 2009). Relative to other personality risk factors for alcohol misuse, introversion-hopelessness is uniquely associated with self-report motives for alcohol use that reflect a desire to reduce depressive symptoms and "numb pain" (Woicik et al., 2009), at least when using motives scales that allow for assessment of the extent to

which an individual uses alcohol to cope with depressive symptoms in particular (Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). Finally, targeting introversion-hopelessness in young adolescents at-risk concurrently prevents onset of both alcohol misuse and depression symptoms (Castellanos & Conrod, 2006; O'Leary-Barrett et al., 2010). Again, these prevention findings are consistent with the idea of introversion-hopelessness as a direct risk factor for alcohol misuse, or with the possibility that introversion-hopelessness increases the risk for depressive disorders, which in turn increases risk for self-medication with alcohol leading to eventual heavy drinking and alcohol problems (Stewart et al., in press). These prevention findings are discussed in more detail in the prevention chapter (see Chapter 3).

ALCOHOL-RELATED COGNITIONS

One of the most investigated and strongest correlates of alcohol use is alcohol-related cognitions. Traditionally, these include alcohol-related expectations or expectancies, drinking motives, and related social-cognitive constructs such as attitudes, beliefs and intentions. In the broader field of psychological science, researchers have begun to distinguish between implicit and explicit cognitive processes (Evans, 2003; Gawronski & Bodenhausen, 2006; Greenwald & Banaji, 1995; Kahneman, 2003; Smith & DeCoster, 2000; Strack & Deutsch, 2004). Implicit or impulsive cognitive processes are relatively automatic, associative processes that can lead to behaviour without conscious reflection, while explicit or reflective cognitive processes require (limited) cognitive resources and have unique properties related to propositional reasoning (Gawronski & Bodenhausen, 2006; Smith & DeCoster, 2000; Strack & Deutsch, 2004). According to dual process models, these two systems jointly predict behaviour, with boundary conditions determining the relative weight of the processes in the decision making process (Hofmann, Friese, & Wiers, 2008; Strack & Deutsch, 2004). For example, there are individual differences in the relative influence of reflective vs. impulsive processes on behaviour, related to individual differences in executive control functions. In people with relatively well-developed cognitive control functions, explicit cognitions better predict behaviour than implicit cognitions, and the reverse is found in

individuals with relatively poorly developed cognitive control functions (Hofmann, Friese et al., 2008; Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008). In addition, there are important factors within an individual that influence the relative influence of both processes; after exhaustion, fatigue, stress and alcohol and drug use, implicit cognitive processes gain in relative influence (for reviews see to: Hofmann, Friese et al., 2008; Wiers, Houben, Roefs, Hofmann, & Stacy, 2010).

These general models have been applied to the field of alcohol and drug use (Deutsch, Gawronski, & Strack, 2006; Gladwin et al., 2011; Stacy, Ames, & Knowlton, 2004; Wiers, Bartholow et al., 2007; Wiers & Stacy, 2006), with conceptually similar models in the neurocognitive literature, in which specific brain systems are associated with the impulsive versus reflective system (Bechara, 2005). The general notion is that in the course of the development of addiction, implicit cognitive processes gain relative weight over explicit cognitive processes, through two types of feedback loops (or neuro-adaptations); with repeated use, implicit cognitive processes become stronger (once triggered by the relevant alcohol-related stimulus), and explicit cognitive processes become weaker (Wiers et al., 2007). There is increasing evidence that both effects are stronger when alcohol and drugs are taken at a younger age (Casey & Jones, 2010; Gladwin et al., 2011).

Explicit Alcohol Cognitions

Two cognition constructs have received the most attention in the alcohol field: alcohol-related expectancies (from now on "expectancies") and drinking motives ("motives"). Hundreds of studies have demonstrated that expectancies are strongly related to alcohol use and problems in cross-sectional research, with most studies in young adults but some in underage drinkers (e.g., Christiansen & Goldman, 1983; Christiansen, Smith, Roehling, & Goldman, 1989; for reviews see: Goldman, Del Boca, & Darkes, 1999; Jones, Corbin, & Fromme, 2001; Wiers, Hoogeveen, Sergeant, & Boudewijn Gunning, 1997). Fewer studies have investigated prospective prediction, and there prediction is weaker (especially after controlling for earlier drinking levels), but still significant (Jones et al., 2001; Sher, Wood, Wood, & Raskin, 1996). While early research only investigated positive expectancies (Brown, Goldman, &

Christiansen, 1985), later research also assessed negative expectancies (Fromme, Stroot, & Kaplan, 1993) and demonstrated that negative expectancies account for unique variance in use (Jones et al., 2001). It appears that negative expectancies can serve as a protective factor for underage drinking, with beliefs about the potential negative consequences of drinking being inversely associated with both the frequency of drinking and amount consumed per drinking occasion for underage drinkers (Fromme et al., 1993; Fromme & D'Amico, 2000). Negative expectancies might also contribute to efforts to limit one's drinking (Lee, Greely, & Oei, 1999) as well as motivate problem drinkers and alcoholics to reduce or stop their alcohol use (Jones & McMahon, 1994). In the latter context, negative expectancies are related to motivation to change (Jones & McMahon, 1998), which is an important concept in the treatment literature (Miller, 1998). Finally, there are also some studies indicating that expectancies differ by dose and that in older adolescents and young adults, high-dose positive expectancies may be particularly relevant, both in Europe (Wiers et al., 1997) and in the U.S. (Read & O'Conner, 2006; Read, Lau-Barraco, Dunn & Borsani, 2009). Specifically, young binge-drinkers score especially highly on positive and arousal expectancies after many drinks.

Drinking Motives

Motives to drink have been studied extensively by Cooper (1994) and colleagues (1995). She developed a widely used scale: the Drinking Motives Questionnaire - Revised (DMQ-R), which has also been used often in studies of underage drinkers, both in North America and in Europe (Kuntsche, Stewart, & Cooper, 2008; Kuntsche, Wiers, Janssen, & Gmel, 2010). The scale combines two types of reinforcement (positive/negative) with an internal or external drive leading to four motives to drink: Enhancement (internal, positive reinforcement, for example drink for the kick); Social (external, positive reinforcement; drinking to affiliate); Coping (internal, negative reinforcement; drinking to manage negative emotional states); and Conformity (external, negative reinforcement; drinking to reduce or avoid social censure). The scales have been replicated across countries, and enhancement and coping drinking motives have been found to be primary predictors of excessive underage drinking and alcohol-related problems. For example, one study

by Kuntsche et al. (2008) compared motives across two North American (Canada and the U.S.) and one European country (Switzerland) among teenage drinkers. The structure of the scale was consistent across countries, meaning that the four types of motives are held by North American and European adolescents. Moreover, the same motives generally predicted heavy alcohol use and alcohol-related problems across the North American and European adolescents. Specifically, across countries, enhancement and coping motives were positively related to heavier alcohol use, and coping motives were additionally related to alcohol problems. Among all three countries, social motives were the most normative (in terms of being most strongly endorsed) and they were not strong predictors of either heavy drinking or alcohol problems. Interestingly, conformity motives were higher among the North American adolescents than the Swiss adolescents, and conformity motives only predicted alcohol-related problems in the two North American samples but not in the Swiss sample. This suggests that peer pressure to drink may be higher among North American than European adolescents (at least those in Switzerland), and that North American youth's conformity motivated drinking is associated with greater negative consequences from drinking.

A study of motives among adolescents across multiple North American and European countries is needed to expand this work and to determine, for example, how motives and their correlates might vary across adolescents from different drinking cultures within Europe (e.g., Northern vs. Southern European). For example, a recent study of Dutch adolescents showed that it was social, rather than coping or enhancement motives, that predicted heavier alcohol involvement one year later (Schelleman-Offermans, Kuntsche, & Knibbe, 2011). The authors suggested that in a wet drinking culture, such as the Dutch drinking culture, social motives might prove risky rather than protective given that the norms modeled for affiliative alcohol use would involve heavier drinking.

Studies of cultural differences within countries are also needed in the drinking motives area. One such study examined drinking motives in a sample of Canadian First Nations adolescents using both quantitative (administration of the DMQ-R) and qualitative (interview) methods.

Across both methods, an absence of social motives was observed in this cultural group. More specifically, a unique social motives factor did not emerge in factor analysis of DMQ-R items and a social motive also did not emerge in thematic analysis of responses to a qualitative interview on reasons for drinking. In contrast, the riskier drinking motives of enhancement, coping, and conformity were found to be present among adolescents in this cultural group. The authors suggested that the absence of a protective social motive for drinking may help explain the high prevalence of excessive and problematic alcohol use among Canadian First Nations adolescents (Mushquash, Stewart, Comeau, & McGrath, 2008).

An important question is the relationship between expectancies and motives (Patel & Fromme, 2010). First, it is noticeable that usually motives to abstain are not assessed (equivalent to negative expectancies). However, a recent study found that motives to not drink do indeed predict unique variance in an American sample of adolescents (Anderson, Grunwald, Bekman, Brown, & Grant, 2011). Second, according to motivational theory, motives are a more proximal predictor of drinking than expectancies. According to Cooper and colleagues (1995), drinking to cope is predicted by expectancies to reduce tension after drinking, combined with negative emotion, and drinking to enhance is predicted by expectancies of enhancement, combined with sensation seeking. In a recent study Kuntsche and colleagues (2010) tested whether the prediction of alcohol use by expectancies was indeed mediated by motives, while using the exact same wordings for both (e.g., Expectancy: How likely is it that you get high after drinking?; Motive: How often do you drink to get high?). It was largely confirmed that the prediction of drinking from expectancies was mediated by motives to drink. Motives may provide the drive for obtaining expected effects that are believed to result from alcohol. Importantly, the sources of inter-individual variation in drinking motives among adolescents are not very well understood. However, a recent study of more than 1,400 twins and siblings from the U.K. suggested that heritable genetic influences play an important role especially in predisposing adolescents to drink to cope with negative affects (Mackie, Conrod, Rijsdijk, & Eley, 2011).

Implicit Alcohol Cognitions

Implicit alcohol cognitions are assessed with tests that do not rely on introspection or explicit recall. Instead, different, largely behavioural techniques are used. For example, many studies have used varieties of a reaction time test, the Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998; first application to alcohol/addiction: Wiers, van Woerden, Smulders, & de Jong, 2002). This test assesses associations by comparing reaction times in two sorting conditions (e.g., alcohol/positive press left; soft-drink/negative press right vs. soft-drink/positive press left; alcohol/negative press right). Many studies have now found that varieties of this test predict unique variance in drinking, after controlling for explicit cognitions, both in adolescents and in young adults (Houben & Wiers, 2006; Thush & Wiers, 2007; Wiers et al., 2002; for meta-analyses Reich, Below, & Goldman, 2010; Rooke, Hine, & Thorsteinsson, 2008). In addition to reaction-time based tests, there are also paper and pencil tests assessing spontaneous first associations, for example with homographs (e.g., first thing that comes to mind for "draft"), and these tests also predict unique variance after controlling for explicit cognitions, in young adults (Stacy, 1997) and adolescents (Ames, Grenard, Thush, Sussman, & Wiers, 2007; Thush et al., 2007). Other tests used to assess implicit cognitive processes are tests of attentional bias for alcohol (review: Field & Cox, 2008; not much used in adolescents yet) and tests of automatic action tendencies for alcohol (Field, Kiernan, Eastwood, & Child, 2008; Wiers, Rinck, Dictus, & van den Wildenberg, 2009).

Individual Differences, Implicit Associations, and Expectancies

As noted above, there are important boundary conditions, regarding which type of cognitive processes predict better in whom and under what circumstances. A number of recent studies have demonstrated that in adolescents with relatively weakly-developed executive functions (i.e., a weak reflective system), implicit cognitive processes are a stronger predictor of alcohol use than in individuals with relatively well-developed executive functions (Grenard et al., 2008; Houben & Wiers, 2009; Thush

et al., 2008). There is also some evidence that in the latter group explicit cognitive processes are the stronger predictor (Thush et al., 2008).

While the studies above focused on individual differences between people (strength of executive control processes), other studies have investigated individual differences within the same people. After exhaustion (or "ego-depletion"), the influence of impulsive processes becomes stronger and the influence of reflective processes becomes weaker (Hofmann, Friese et al., 2008; Hofmann, Rauch, & Gawronski, 2007; Wiers, Houben et al., 2010). After alcohol, implicit appetitive processes leading to further alcohol use become stronger (Schoenmakers, Wiers, & Field, 2008), and reflective and executive processes become weaker (for reviews see: Field, Wiers, Christiansen, Fillmore, & Verster, 2010; Fillmore & Vogel-Sprott, 2006). When people are exhausted or after some alcohol, implicit cognitive processes become better predictors, not only of further alcohol use, but also of other behaviours such as (unhealthy) eating (Hofmann & Friese, 2008), and aggression after alcohol (Wiers, Beckers, Houben, & Hofmann, 2009; for a review see: Wiers, Houben et al., 2010).

Interactions with Other Predictors and Implications

It has been argued that cognitive processes could constitute a "final common pathway" for other risk-factors, including biological factors (e.g., temperament, genetics), as well as psychosocial factors (e.g., peer- and parental influences: Goldman & Darkes, 2004; Goldman et al., 1999). Although this claim is probably too strong (it would imply that all other factors would be mediated through cognitions), there is evidence that cognitive processes interact with many other risk-factors, such as genetics (explicit cognitions: Hendershot et al., 2009; McCarthy, Brown, Carr, & Wall, 2001; van der Zwaluw, Kuntsche, & Engels, 2011; and implicit cognitions: Hendershot, Lindgren, Liang, & Hutchison, 2012; Wiers, Rinck et al., 2009). Other factors that interact with cognitions are personality (Littlefield et al., 2011) and the effects of peers (partially mediated through expectancies). In addition, there is some evidence that effects of advertising on youth drinking is mediated by effects on cognitions (Stacy, Zogg, Unger, & Dent, 2004). A recent study also found that automatic approach tendencies predicted alcohol use in

adolescents with relatively weak working memory and weak parental control, suggesting that control over drinking should come either from inside (working memory) or from outside (parental rules) in adolescents at-risk to escalate their drinking (Pieters, Burk, van der Vorst, Wiers, & Engels, 2012). Because alcohol-related cognitions are a central construct in the predicting of underage drinking, they have become a prime target for prevention approaches, with promising findings both regarding modification of explicit cognitions (Darkes & Goldman, 1993; Darkes, Greenbaum, & Goldman, 1998; Marlatt et al., 1998; Wiers, van de Luitgaarden, van den Wildenberg, & Smulders, 2005) and regarding modification of implicit cognitive processes (e.g., Houben, Havermans, & Wiers, 2010; Houben, Nederkoorn, Wiers, & Jansen, 2011; Schoenmakers et al., 2010; Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011), although it should be noted that most of this work has been done in adults (see Chapter 3).

FAMILY INFLUENCES ON UNDERAGE DRINKING

Socio-demographic factors related to the family, such as low parental education and socio-economic status, are related to an increased risk for heavy drinking in adolescence (Caldwell et al., 2008; Hawkins et al., 1992), as are economic adversity of the family, and parental divorce or death (Clark, Lesnick, & Hegedus, 1997; Green et al., 2010; Huurre et al., 2010; Kestilä et al., 2008; van der Vegt et al., 2009). In contrast to alcohol problems, however, adolescent alcohol use as such does not seem to have a simple relationship with parental education and socio-economic status. Longitudinal studies of representative samples from different countries have yielded inconsistent results, with some studies finding a positive association, some studies a negative association, and most studies no association between parental socio-economic status and drinking among adolescents (Hanson & Chen, 2007; Melotti et al., 2011; Wiles et al., 2007).

It has been firmly established that children of parents with alcohol and other substance use disorders are at increased risk for substance-related disorders (Alati et al., 2005; Biederman, Faraone, Monuteaux, & Feighner, 2000; Bucholz, Heath, & Madden, 2000; Lieb et al., 2002;

Macleod et al., 2008; Walden, Iacono, & McGue, 2007). Consistent with a number of previous studies, Lieb et al. (2002) found that parental alcohol use disorders increased the risk of alcohol abuse and dependence in their children. In this community-based sample, both maternal and paternal alcoholism increased the risk for heavier alcohol consumption in their offspring. Parental substance use disorders have also been associated with increased use of alcohol and other substances during adolescence (Walden et al., 2007).

In addition to the genetic influences described earlier, parental alcohol use influences adolescent drinking through a variety of direct and indirect mechanisms (Andrews, Hops, Ary, & Tildesley, 1993; Chassin, Pillow, Curran, Molina, & Barrera, 1993). Perhaps the most direct effect of parental drinking is through the role modelling of drinking behaviour. Adolescents observe the drinking practices of their parents and may match their own drinking behaviour accordingly (White, Johnson, & Buyske, 2000). In a prospective study of 432 adolescents from ages 15 to 28, parental drinking behaviour was the most significant predictor of drinking in their offspring. In addition, living in a home with a heavy drinking parent may increase access to alcohol for adolescents (Johnson, Sher, & Rolf, 1991).

A uniquely powerful method to differentiate these possible direct influences of parental drinking from underlying genetic risk is to study families of children who have been adopted. Such studies have suggested that exposure to parental alcohol misuse is associated with increased likelihood of alcohol use in biologically unrelated adopted adolescents, indicating influences of the family environment, but that the risk related to parental alcohol dependence is mostly attributable to inherited genetic risk (King et al., 2009; McGue, Sharma & Benson, 1996).

An additional way in which parental heavy drinking may negatively impact the child is through an effect on parenting practices (Windle, 1996). A parent's alcohol abuse may contribute to inconsistent and unpredictable parental monitoring, including ineffective rule-setting or enforcement. Lower parental warmth or nurturance, combined with the potential for harsh punishment, can contribute to a generally less

positive family environment which increases the risk for adolescent drinking (Donovan & Molina, 2011; Windle, 1996).

The Influence of Parenting Practices on Underage Drinking

Whereas poor parenting practices can serve as a risk factor for underage drinking (Guo, Hawkins, Hill, & Abbott, 2001; Latendresse et al., 2008; Ryan, Jorm, & Lubman, 2010), good parenting can serve as a buffer against other risks for alcohol use. Four domains of parenting practice have been identified as potentially buffering the onset and level of adolescent drinking (Windle et al., 2009). Specifically, parental nurturance, parental monitoring, time spent together, and parent-adolescent communication, which reflect the degree of parental involvement with the adolescent and may affect the influence parents have on their children. High parental nurturance, as indicated by the parents' emotional warmth and support, is associated with delay in the initiation of alcohol use and lower consumption by adolescents who drink. Parental monitoring, which is reflected by setting and enforcing reasonable rules, is inversely associated with adolescent drinking. Consistent parental enforcement of clear rules, such as setting and maintaining curfews, is associated with later onset of drinking (van der Vorst, Engels, Meeus, & Dekovic, 2006), as well as lower levels of adolescent alcohol use (Windle et al., 2009). Prospective studies further indicate that parents' involvement in their adolescents' lives is significantly associated with later age of drinking initiation (Ryan et al., 2010). Further, students' perceptions of their parents' awareness and caring of their behaviour during high school predicted adolescents' alcohol use during their first year in college (Wetherill & Fromme, 2007). Some evidence suggests that the effects of parental monitoring may be mediated through encouragement of adolescent involvement in more conventional and pro-social activities, such as church and community (Kim & Neff, 2010). Overall, findings suggest that good parenting contributes to a later onset of drinking, and possibly lowers overall underage drinking, and that these effects may continue even after the child has left home.

There is also growing evidence that the time that parents and adolescents spend together is associated with lower levels of adolescent alcohol use (Windle et al., 2009). Data from the National Survey of American Attitudes on Substance Abuse: Teens and Parents (2001) indicated that adolescents who participated in frequent family dinners were less likely to use alcohol, less likely to have friends who drank regularly, and less able to obtain alcohol. Lastly, good parent-adolescent communication has been associated with lower levels of adolescent drinking (Windle et al., 2009). A recent review of prospective studies of parenting practices, and adolescent alcohol use, supported the positive effects of general communication, although not alcohol-specific communication, between parent and child on the age of drinking onset and levels of adolescent alcohol use (Ryan et al., 2010). Both delayed onset of drinking and reduced levels of underage drinking were also predicted by parental disapproval of adolescent drinking, general discipline, parental monitoring, and good parent-child relationship quality. Parental support was associated with delayed onset of drinking, but not with lower levels of later alcohol use, whereas parental involvement in the child's life predicted delayed onset of drinking but not later levels of alcohol use. It seems clear that parents exert a powerful effect on their adolescents' decisions to drink and levels of consumption once they have begun drinking alcohol.

Earlier drinking onset has clearly been related to the later development of alcohol-related problems (e.g., Warner & White, 2003). Yet, an important question relates to the possible effect of parental provision of alcohol on underage drinking. Studies from southern European countries have shown that parental provision of alcohol to adolescents and parentally supervised drinking may reduce the risk for adolescent drinking and alcohol-related problems (Bellis et al., 2007; Bonino, Cattelino, & Ciairano, 2005; Foley, Altman, Durant, & Wolfson, 2004; Strunin et al., 2010; Warner & White, 2003). Parental socialization of their children into appropriate use of alcohol is particularly evident when adolescents are allowed to drink alcohol with meals in a family setting (Strunin et al., 2010). Other studies in North America and Northern Europe, however, find that providing alcohol to adolescents and/or allowing them to drink in their parents' home predicts both earlier onset of alcohol use and higher levels of later drinking (Ryan et al., 2010; van

der Vorst et al., 2007). These differences could relate to whether parents provide alcohol for adolescents' parties, which is associated with increased risk of binge drinking, or whether adolescents are drinking with their parents, which has been found to be protective against binge drinking (Foley et al., 2004). Clearly the influence of parents should be considered from a broader cultural context. In cultures with a relatively high-risk of underage binge drinking strict parenting appears to be a protective factor, but this may not be the case in cultures with a relatively low risk of underage binge drinking (Southern Europe).

Perceived parental attitudes about drinking may be one mechanism through which provision of alcohol can serve as both a risk and protective factor in underage drinking. Provision of alcohol by parents in the home setting may convey the notion that alcohol is to be used moderately and only under certain situations. On the other hand, parental provision of alcohol for adolescent parties may convey the message that the parents condone or approve of adolescent binge drinking. Indeed parental disapproval of binge drinking can serve as a protective and buffering factor against heavy underage drinking. In a prospective study of 5,591 adolescents, annual surveys from ages 14 to 19 indicated that adolescents, of parents who consistently disapproved of substance use, were more likely to abstain from heavy drinking, even when they affiliated with peers who drank (Martino, Ellickson, & McCaffrey, 2009).

PEER INFLUENCES ON UNDERAGE DRINKING

Peers exert one of the strongest influences on adolescents' decisions to drink, and peer influence is among the most widely studied factors in underage drinking (Pandina, Johnson, & White, 2010). Adolescents who drink alcohol have consistently been found to also have alcohol-using peers, highlighting the social nature of adolescent drinking behaviours (Ary, Tidesley, Hops, & Andrews, 1993; Guo et al., 2001; Hawkins et al., 1992; Nation & Heflinger, 2006; Zhang, Welte, & Wieczorek, 1997). The number of heavy drinking peers in an individual's social network is strongly and positively associated with the individual's alcohol consumption. Likewise, membership in groups of abstainers or light

drinkers is associated with lower levels of alcohol use and problems (Wechsler & Nelson, 2008). Some research suggests that, even after controlling for social, family and individual factors, the strongest influence on adolescent drinking is having friends who drink (Fergusson, Horwood, & Lynskey, 1995; Reboussin, Song, Shrestha, Lohman, & Wolfson, 2006). Others, however, suggest that the influence of peers may be overestimated (Jaccard, Blanton, & Dodge, 2005), pointing to unexplained correlated events (e.g., changing schools) and shared method variance. In addition, the influence of peers' alcohol use seems to decrease over time and may not add much to the prediction of adolescents' later regular drinking patterns (Poelen, Scholte, Willemsen, Boomsma, & Engels, 2007; Poelen, Engels, Scholte, Boomsma, & Willemsen, 2009).

It is well known that the formation of peer groups is not random but an active process involving psychological and behavioural characteristics of the adolescents, which are also partly influenced by genetic predispositions (Kendler & Baker, 2007; Loehlin, 2010). Two processes that have been extensively examined in an effort to explain similarity in peer drinking are; selection into heavy drinking peer groups; and socialization to drinking within the peer group (Curran, Stice, & Chassin, 1997). The process of selection indicates that adolescents choose environments or people that have certain patterns of drinking. For example, heavy drinkers may seek out peers who also drink heavily, which leads them to join more deviant peer groups. Socialization, on the other hand, suggests that adolescents adapt to their environment and friends. In other words, adolescents alter their drinking to meet expectations of their peers and they match the drinking rates of their friends. There is general agreement that both processes occur and that there are reciprocal relations between selection and socialization processes in the development of adolescents' alcohol use patterns (Curran et al., 1997; Read, Wood, & Capone, 2005; White, Fleming, Kim, Catalano, & McMorris, 2008).

There is also some evidence that the relative importance of these processes may shift across adolescence. Developmental trends in selection and socialization were studied in three cohorts of adolescents in Sweden, who represented early adolescence (ages 9-11), middle

adolescence (ages12-14) and late adolescence (ages 15-18) (Burk, van der Vorst, Kerr, & Stattin, 2012). Peer selection was found to be more important than socialization among early adolescents, whereas both processes contributed to similarity in peer drinking in middle and late adolescence. Peer socialization was not evident until middle adolescence and remained an important influence on alcohol use through late adolescence. Nevertheless, the overwhelming evidence supports the importance of both selection and socialization in the observed similarity of adolescent peer drinking.

A special factor related to peer influence that has received considerable attention is the relationship between adolescent sports participation and alcohol use. Participation in team sports has especially been found to be associated with elevated levels of alcohol use and problems in several studies (e.g., Lorente, Souville, Griffet, & Grélot, 2004; Mays & Thompson, 2009; Wichstrom & Wichstrom, 2009). A recent review of 29 studies examining the relationship between sports participation and alcohol use in high school and college students found that in 22 of those studies individuals who participated in sports reported higher levels of drinking than those who did not participate, while seven studies did not find this relationship (Lisha & Sussman, 2010). However, another review, focusing on the methodology of the studies looking at this association, concluded that various definitions and measures of sports participation have been used, and that the failure to differentiate between relevant contextual factors may have confounded the relationship (Mays, Gatti, & Thompson, 2011). Indeed, several studies have reported mixed results and complex relationships between sports and alcohol use, depending on, for example, age, sex, type of sport, and participation in other activities than sports (Mays & Thompson, 2009; Mays et al., 2010a; Moore & Werch, 2005; Peck, Vida, & Eccles, 2008; Peretti-Watel, Beck, & Legleye, 2002). However, some studies finding a positive association have indicated that differences in perceptions of peer drinking and drinking-related risks may moderate the relationship between sports participation and alcohol use (Mays et al., 2010b; Wetherill & Fromme, 2007; Yusko, Buckman, White, & Pandina, 2008).

Direct and Indirect Peer Influences on Underage Drinking

There are a number of possible direct and indirect mechanisms through which peers exert their effects on adolescent drinking. Direct peer influences include buying and providing alcohol to one's friends, offering drinks, and encouragement to drink or to get drunk (Borsari & Carey, 2001). When alcohol is widely accepted and drinking is expected, there may be overt peer pressure to drink and, possibly, to drink faster and more than one anticipated. Drinking games, for example, have become a popular means by which peers encourage the rapid consumption of alcohol, often to high levels of intoxication (Nagoshi, Wood, Cote, & Abbit, 1994). Although the research literature on direct peer influences is modest, offers of drink have been associated with alcohol use and problems (Wood, Read, Palfai, & Stevenson, 2001). Personality factors and group context are likely to influence the ability of adolescents to refuse offers to drink. For example, those adolescents who are more socially confident, and those within an established peer group, are better able to refuse drinks, whereas those who are less secure may accept offers of drinks in an attempt to fit in with a new peer group (Borsari & Carey, 2001). Resistance to direct peer influence may, therefore, be influenced by individual differences in personality, motivations, and social skills.

Indirect peer influences on adolescent drinking include the role modelling of alcohol use by peers (Borsari & Carey, 2001). As with the observation of parental drinking, adolescents, who see their friends or peers drink, may learn to imitate that behaviour (White, Bates, & Johnson, 1991). Experimental studies, using confederates to model drinking behaviour, have shown that individuals will match or model the drinking rate and amount of the confederate (Borsari & Carey, 2001; Quigley & Collins, 1999). Individuals who are paired with heavy-drinking models consume more than those with a light-drinking model, and this effect is especially strong when the confederate behaves in a warm and friendly manner (Collins, Parks, & Marlatt, 1985). It is easy to see an extension of these laboratory findings to the actual peer drinking context, when being in the presence of friendly, heavy-drinking peers is likely to encourage drinking by the adolescent.

A second, and more recently studied, indirect influence of peers on underage drinking is perceived peer norms (e.g., Pandina et al., 2010; Perkins & Craig, 2003). Perceived drinking norms of peers are strongly associated with both adolescent and young adult drinking (e.g., Pandina et al., 2010; Perkins & Wechsler, 1996; Song, Smiler, Wagoner, & Wolfson, 2012). Alcohol-related norms have been differentiated into descriptive and injunctive drinking norms (Borsari & Carey, 2001). Descriptive norms are the person's beliefs about how much and how often their peers drink alcohol, whereas injunctive norms reflect the individuals' beliefs about their peers' approval of drinking.

An increasingly large body of research, primarily on U.S. college students, provides evidence that both descriptive (Baer, Stacy, & Larimer, 1991; Stappenbeck, Quinn, Wetherill, & Fromme, 2010) and injunctive norms (Neighbours, Lindgren, Knee, Fossos, & DiBello, 2011) are associated with underage drinking patterns (Borsari & Carey, 2003). In fact, social norms are among the best predictors of underage drinking (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Patel & Fromme, 2010) and may even influence the individuals' alcohol use when they are portrayed on Facebook (Litt & Stock, 2011). In fact teens ages 12-17 who see pictures of other teens getting drunk or having passed out on social networking sites are twice as likely to drink (National Center on Addiction and Substance Use, 2011). Adolescents' increased involvement with mass media has led some to suggest that social media may serve as a "super peer" (Windle et al., 2009, p. 33) by conveying alcohol-related messages.

Again, focusing primarily on college students, the influence of perceived norms appears to vary by the reference group (Neighbors et al., 2008; Larimer et al., 2011). Injunctive norms, or perceived approval of drinking, are positively associated with one's own drinking when they are about one's friends, but are negatively associated when they are about more distal referents, such as the "typical student" (Neighbors et al., 2008). Injunctive norms are also associated with the experience of drinking-related consequences, especially when close friends or parents are the source of the perceived norm (LaBrie, Hummer, Neighbors, & Larimer, 2010).

Descriptive norms, which are beliefs about how often and how much others drink, are consistently and positively associated with an individual's own drinking (e.g., Borsari & Carey, 2001; Neighbors et al., 2007). Yet there is compelling evidence to suggest that individuals tend to over-estimate the amount that their peers drink, perhaps leading to an increase in drinking in an effort to match the misperceived norms (Baer et al., 1991; Perkins, Meilman, Leichliter, Cashin, & Presley, 1999). Social norms-based interventions are designed to correct these misperceived norms in an effort to reduce underage drinking among both high school (e.g., Haines, Barker, & Rice, 2003) and college students (e.g., Agostinelli, Brown, & Miller, 1995; Perkins, Haines, & Rice, 2005; see Chapter 3 for details on prevention strategies targeting social norms).

The influence of peers increases during early adolescence when children are given more autonomy from parents (Windle et al., 2009). It peaks around ages 11 to 13 (Windle et al., 2008), and then appears to decline as the adolescent matures. For example, in a prospective study, same and opposite gender peer dyads were assessed from ages 19 to 27 years (Andrews, Tildesley, Hops, & Fuzhong, 2002). At the earlier ages, both same- and opposite-gender peer use predicted the target participant's binge drinking. However, at later years there was a concurrent, but not a prospective, association between both same and, opposite gender friend's alcohol use and that of the participant. Thus, the strong effect of peers on adolescent drinking had subsided by young adulthood. The authors further suggested that the findings support the selection and maintenance of friends with similar drinking patterns, and that peers might serve as either a risk or protective factor as the individual moves into young adulthood. Because selection of peers in adolescence is such an important and potentially long-lasting influence, prevention programmes might consider the inclusion of the friends and partners of adolescents.

CULTURAL, CONTEXTUAL, RELIGIOUS AND ACADEMIC INFLUENCES ON UNDERAGE DRINKING

Cultural Attitudes about Drinking and Drunkenness

Since the classic examination of alcohol intoxication as "time out" by MacAndrew and Edgerton (1969), it has been clear that different cultures' and subgroups within cultures' have distinct views about drinking and drunkenness. What is perfectly acceptable, and even expected, in one culture, for example, may be completely unacceptable in others. Cultural attitudes about drunkenness by underage youth include the view that it is a warning sign or symptom of problem drinking or alcoholism (Finn, 1979). Yet, adolescent intoxication is also viewed as a motivated behaviour that includes the desires to celebrate an occasion, escape responsibilities, relieve negative feelings, or justify sexual misconduct (Critchlow, 1983; Finn, 1979; Maggs, 1997).

The Healthy People 2010 report identified attitudes about alcohol as a strong contributing factor to underage drinking (USDHHS, 2010). The report indicated that the perception that alcohol use is socially acceptable is associated with the fact that 80% of American youth drink alcohol before their 21st birthday, whereas the lack of social acceptance was associated with lower rates of use. Consequently one of the objectives of the Healthy People 2010 report is to increase the proportion of youth who disapprove of people having one or two drinks a day (USDHHS, 2010). A generally permissive societal attitude toward drinking, through the media, parents, and peers, is partly attributable for the current substance use problems among adolescents (National Center on Addiction and Substance Use, June 2011). Whereas the report suggests that most parents do not explicitly condone substance use among adolescents, the messages they convey through their own use of alcohol can be interpreted as ambivalent, tolerant, or providing implied approval. In their report on American attitudes towards substance use, teens of parents who disagree about the messages they convey to their teens

about the use of alcohol are twice as likely to drink (31% versus 14%) (National Center on Addiction and Substance Use, August 2011).

In a recent cross-sectional survey-study involving five states in the U.S., perceived support for drinking, regardless of the source, was associated with greater alcohol involvement and alcohol-related behaviour (Song et al., 2012). Among both drinkers and non-drinkers, the belief that they would be punished for drinking (either by school officials or police) was associated with lower odds of all alcohol-related behaviours. However, community consequences were less important among adolescent drinkers, who believed that school officials and police were unlikely to punish them for drinking, than among non-drinkers. It seems clear that consistent messages about the unacceptability of drinking by youth, whether from parents, schools, or the media, is a necessary step toward reducing the prevalence of underage drinking.

Contextual Factors and Underage Drinking

Neighbourhood influences in the U.S. The role of neighbourhood effects on adolescent alcohol use is part of an area of burgeoning research, exploring the differential effects of area-level socio-economic factors on adolescent health and behavioural outcomes. Predicated on social disorganization theory (Shaw & McKay, 1969), research on neighbourhoods and crime in the U.S. has found that neighbourhood-level characteristics, such as low socio-economic status (SES), ethnic heterogeneity, and residential mobility, negatively affect social organization and result in an increased rate of crime and delinquency (Sampson, Morenoff, & Gannon-Rowley, 2002). As well, a substantial body of work seems to suggest that substance use patterns vary across neighbourhoods, although the findings are mixed as to whether neighbourhood social disadvantage is related to increased substance use, including alcohol use (Karriker-Jaffe, 2011; Sampson et al., 2002). The mixed findings are due, in part, to differences in the definition of a neighbourhood, the measurement of SES, study designs, and outcome measures. Whereas some studies have shown a positive association between neighbourhood disadvantage and adolescent alcohol use, others show that higher SES neighbourhoods can also lead to increased alcohol use. Additionally, some studies have either found no effects of SES on

alcohol, or revealed mixed results based on the measure of SES (Karriker-Jaffe, 2011). Taken together, the research suggests that both low and high SES neighbourhoods may be associated with risk factors for increased adolescent alcohol use. While lower SES neighbourhoods suffer from lack of proper infrastructure, various levels of economic disadvantage, and opportunities for youth, higher SES neighbourhoods are characterized by greater adolescent disposable income, lax parental monitoring, intense competitive pressure, and social norms that condone frequent alcohol use (Gardner, Barajas, & Brooks-Gunn, 2010). All these factors may potentially contribute to higher prevalence of alcohol use among adolescents.

Leventhal and Brooks-Gunn (2000) provide a framework for understanding how neighbourhood structure influences individual-level outcomes. They propose that structural factors, such as institutional resources, relationships, and collective efficacy, may mediate the relation between neighbourhood SES and adolescent substance use. The differential nature of these components in advantaged and disadvantaged neighbourhoods provides a way to understand the particular structural factors that drive alcohol use. For instance, whereas schools in low SES neighbourhoods might lead to alcohol use as a result of poor quality and risk of failure, high SES schools are characterized by intense scholastic and achievement pressure (Gardner et al., 2010). The literature, taken primarily from the U.S., clearly suggests that the school environment has a definite impact on adolescent alcohol use. Risk for alcohol use among students is lower in schools where less students drink and norms are less favourable to use and where the school climate promotes bonding and consistent enforcement of substance use policies (Ennett & Haws, 2010). Similarly, the quality and availability of neighbourhood group activities, such as youth groups, can be instrumental in providing adolescents with pro-social activities and keeping them away from substances. Generally there is a difference between the low and high SES neighbourhoods in terms of the quality and quantity of such organizations, where the former, compared to the latter, tend to have fewer organized youth activities.

Differences in family functioning across neighbourhoods might also account for neighbourhood effects on adolescent drinking (Gardner et

al., 2010). For example, parents in high SES neighbourhoods have been shown to practice lax monitoring because the environment is relatively safe. Lax parental monitoring in turn can increase the risk for adolescent drinking. Alternatively, higher rates of family stress and conflict that occur more often in disadvantaged than non-disadvantaged neighbourhoods tend to be positively related to alcohol and substance use.

Another key mechanism accounting for the association between neighbourhoods and adolescent deviant behaviours is collective efficacy, which is characterized by social ties and support among neighbours (Sampson et al., 2002). Higher collective efficacy has generally been found to be protective against deviant behaviours, including adolescent substance use. Nonetheless, studies have found low collective efficacy in both high and low SES neighbourhoods. Whereas neighbourhood disadvantage in low SES neighbourhood predicts lower collective efficacy, studies have also found low collective efficacy in some high SES neighbourhoods due to the high premium placed on privacy, which precludes social cohesion (Gardner et al., 2010).

Overall, the findings are equivocal on whether adolescent alcohol use is more prevalent and frequent in lower or higher SES neighbourhoods. Neighbourhood racial segregation patterns in the U.S. and racial differences in substance use (see Chapter 1) further complicate this picture (Cronley et al., 2012).

European and cross-cultural neighbourhood influences. The relationship between characteristics of the neighbourhood and adolescent alcohol use may well vary across countries and cultures. The recent systematic review of associations between area-level socio-economic status and substance use outcomes, by Karriker-Jaffe (2011), included studies from North America (U.S. and Canada), Europe (U.K., Finland, and the Netherlands), and New Zealand. As summarized above, the findings related to adolescent alcohol use outcomes were inconsistent. A formal analysis of study characteristics indicated that although fewer associations with SES were observed in non-U.S. studies, these differences among the total of 180 studied effects could have arisen by chance.

Two recent European studies, not included in the review by Karriker-Jaffe (2011), further illustrate the inconsistencies related to neighbourhood SES. Caria and colleagues (Caria, Faggiano, Bellocco, & Galanti, 2011) reported findings from the EU-Dap prevention programme (see Chapter 3). The study sample included 5,541 students 12-14 years of age from 143 schools in 7 European countries (Austria, Belgium, Germany, Greece, Italy, Spain and Sweden). Schools within each regional study center were classified as being of high, medium or low SES, based on indicators such as unemployment rate and average income in the school district. An analysis across these European countries found that at study baseline students from high SES schools were more likely than students from other schools to drink at least monthly, while students from low SES schools were more likely to report recent episodes of drunkenness and alcohol-related problem behaviours (Caria et al., 2011). However, the practical significance of these small differences (absolute differences were less than three percentage points) is questionable.

Contrasting these findings related to neighbourhood SES, another European study conducted longitudinal analyses in a representative sample of 863 Dutch adolescents and found no association between average neighbourhood income (based on official data from Statistics Netherlands) at an average age of 14.9 years and frequency or quantity of alcohol use four years later (Ayer et al., 2011). Further, neighbourhood characteristics had no moderating effect on the predictive associations between adolescent personality profiles and drinking outcomes, leading the authors to suggest that proximal risk factors such as personality may be more strongly related to drinking behaviour than variation among neighbourhoods (within cultures).

However, information on neighbourhood characteristics may still be useful when studying individual-level risk factors for alcohol outcomes. As an example, Lemstra and colleagues (2009) studied the association between Aboriginal cultural status and lifetime drunkenness in a school survey of 4,093 children and adolescents aged 9 to 15 years in the city of Saskatoon, Saskatchewan in Canada. The authors found that the increased risk for drunkenness among Aboriginal youth (crude odds ratio = 3.52) diminished to non-significance (adjusted OR = 0.80) when

individual-level and neighbourhood variables were included in the analysis. Low neighbourhood income was among the risk factors significantly associated with drunkenness in the final, fully adjusted model, as were age, skipping school, being bullied, low self-esteem, and having substance-using friends (Lemstra et al., 2009).

Urban vs. rural residence and adolescent alcohol use. In addition to socio-economic factors related to neighbourhoods, studies have compared adolescents' alcohol use in urbanized and rural areas of residence. Theoretically, both urban and rural residence could be related to increased risk for adolescent alcohol use, albeit for different reasons. In more urban areas, it may be easier for adolescents to access alcohol and other substances, and societal control over drinking may be weaker. On the other hand, the variety of leisure activities available for youth may be more restricted in rural areas, and the more homogenizing cultural influences may lead to drinking being more normative. Correspondingly, recent representative surveys in European countries have found both urban (Iceland: Heimisdottir, Vilhjalmsson, Kristjansdottir, & Meyrowitsch, 2010; Finland: Winter, Karvonen, & Rose, 2002) and rural (Germany: Donath et al., 2011; Denmark: Stock et al., 2011) residence to be associated with higher frequency of drinking and drunkenness among adolescents. Existing evidence also suggests that urban vs. rural residence is not associated with the prevalence of alcohol use disorders among European adult population (Rehm, Room, van den Brink, & Jacobi, 2005). Studies from North America have indicated that although prevalence of heavy and binge drinking in the adult population is somewhat higher in urban areas, the increase in prevalence between 1995 and 2003 was steeper in more rural areas (Jackson, Doescher, & Hart, 2006). Recent studies conducted in the U.S. and Canada have suggested that adolescents living in more rural areas tend to drink more frequently and increase their drinking more rapidly than do adolescents of urban residence (Jiang, Li, Boyce, & Pickett, 2008; Martino, Ellickson, & McCaffery, 2008). However, the dichotomy between urban and rural is often ambiguous, and Martino and colleagues, in fact, found that youth residing in the most rural areas had lower risk than youth from "micropolitan" areas (medium and large towns).

Taken together, the evidence regarding the role of urban vs. rural residence in relation to adolescent alcohol use behaviours is inconsistent. There may be genuine associations with adolescent drinking, and these associations may differ across countries, but it is crucial to differentiate the effects of place of residence from population characteristics that could explain the association. For example, the higher levels of abstinence and lower frequency of drinking among drinkers in rural as compared to urban Finnish adolescents were found to be partly explained by differences in religiosity between rural and urban families (Winter et al., 2002).

Religiosity and Adolescent Drinking

Children who are more religious and who attend religious services are less likely to begin drinking at an early age (e.g., Donovan & Molina, 2011). However, the mechanisms that explain this association are poorly understood. Religiosity is often thought to be comprised of two components, the importance or value placed on religion, and participation in religious practices, such as attending religious services (Walker, Ainette, Wills, & Mendoza, 2007). Whereas some studies find that both aspects of religiosity are inversely associated with adolescent drinking (e.g., Nonnemaker, McNeely, & Blum, 2003), others indicate that only personal values about religion makes a unique contribution to substance use (Walker et al., 2007). The extent to which religiosity affects adolescent alcohol use appears to depend upon the outcome measures (e.g., onset, frequency, or quantity consumed) and whether other influences (e.g., peer, family, school) are simultaneously considered (Mason & Windle, 2002). For example, the effects of religious importance and religious practices were examined in a one-year longitudinal study of 1,175 middle-adolescent boys and girls in the U.S.. Controlling for age and gender, religious salience was a prospective predictor of the prevalence of drinking, whereas religious attendance predicted the amount consumed per drinking occasion. When peer, family and school variables were added to the model, however, the effect of religious salience on frequency of drinking became non-significant, whereas the effect of religious attendance on quantity consumed remained significant.

These findings are consistent with the possibility that the association between religiosity and lower risk for underage drinking may be explained by environmental or genetic factors (Harden, 2010). In a study of twin and sibling pairs from the National Longitudinal Study of Adolescent Health, analyses indicated that environmental differences between families completely accounted for the association between religiosity and later age of first drink. Thus, religiosity may serve as a proxy for other important family, personal, or social influences on drinking (Harden, 2010). For example, religiosity is associated with more conventional values (Mason & Windle, 2002) and may reduce the effects of life stress (Chawla, Neighbors, Lewis, Lee, & Larimer, 2007; Wills, Yaeger, & Sandy, 2003), thereby decreasing adolescent drinking.

Academic Achievement and Motivations

School misbehaviour, such a skipping class, is widely recognized as a correlate of problematic drinking among underage youth (Wechsler, Dowdall, Davenport, & Castilo, 1995). Conversely, placing a high value on academic achievement can serve as a protective factor for alcohol use and related behaviours (Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003). For example, college-bound high school seniors who had stronger academic motivations did not intend to drink heavily in college (Rhoades & Maggs, 2006). Indeed, in a longitudinal study of 1,447 first-time college students, those who had higher academic motivations drank less across five years of surveys (Vaughan, Corbin, & Fromme, 2009). Nevertheless, social motivations had the strongest influence on alcohol use during the transition from high school to college, with academic motivations having a relatively weaker effect on drinking.

CROSS-NATIONAL AND CROSS-CULTURAL COMPARISONS OF RISK AND PROTECTIVE FACTORS

Comparisons within Europe

Risk and protective factors for underage drinking have been extensively investigated in separate studies in different parts of Europe. However, there are differences among European countries in the factors that modify an individual's likelihood of engaging in alcohol use behaviours have only rarely been formally assessed. As the previous chapter indicated, there is considerable variation between adolescents in different European countries in drinking frequency, quantity, and levels of intoxication. Against this background, it would be important to also compare risk and protective factors and their association with drinking outcomes across European countries.

Potential sources of cross-national information on risk factors are the ESPAD and HBSC surveys, described in the previous chapter. Using the 1999 ESPAD survey data from six countries (Bulgaria, Croatia, Greece, Romania, Slovenia and U.K.), Kokkevi, Richardson, Florescu, Kuzman and Stergar (2007) investigated the role of individual-level factors such as antisocial behaviour and depression as well as factors related to friends, siblings and parents. The authors found that adjusting for country most of the studied factors were associated with using alcohol more than ten times during the last thirty days. Relatively strong associations were observed for older siblings', as well as friends', smoking, alcohol and cannabis use, low parental monitoring, and school truancy, with antisocial behaviour, anomie (lack of social norms), and depressive mood also associated with frequent drinking in both boys and girls. In a separate analysis, few statistically significant interactions between the risk factors and country of study were observed, suggesting a similar role for these factors in these six European countries (Kokkevi et al., 2007).

A special topic of the 2007 HBSC survey was inequalities in adolescent health and health-related behaviours, including socio-economic differences (Currie et al., 2008). Thus, the HBSC study report also included information on associations between family affluence and alcohol use behaviours in different European countries. The associations

of family affluence with weekly drinking, having been drunk on two or more occasions, and age at first drunkenness were varied: for each of the outcomes, an association with family affluence was observed in less than half of the countries, and there was no easily discernible pattern of differences between countries. In the countries where an association was found, higher family affluence was generally associated with higher rates of weekly drinking and drunkenness. A similar pattern of mixed findings emerged from analyses of the 2001/2002 HBSC survey data with regard to family affluence, parental occupation and SES (Richter, Leppin, & Nic Gabhainn, 2006; Richter et al., 2009).

In addition to directly analyzing comparable cross-national data, information on risk factors in different European countries can be gauged from meta-analytic and systematic reviews of risk factors for adolescent alcohol use. Such reviews attempt to identify and create a synthesis of all available studies that are relevant to the topic, and they can also assess between-study heterogeneity. A systematic review of longitudinal studies on parenting-related factors and adolescent alcohol use identified 77 studies, of which 16 were European (Ryan et al., 2010). The authors classified the parenting factors into 12 different variables. Most European studies included data on parents' alcohol use, and there was some inconsistency in the European findings; altogether seven European studies found a positive association between parental alcohol use and later adolescent drinking (three studies were conducted in the Netherlands, two in Finland, one in the U.K., and one in Germany), whereas two studies found the opposite result, a negative association (one study from the Netherlands, one from Iceland). In addition, two Dutch studies included in the systematic review found contradictory results concerning the association between quality of parent-child relationship and adolescent alcohol use (Ryan et al., 2010). This heterogeneity of findings even within a single country suggests that comparing risk factors between different countries is not an easy task, and the differences found may be due to chance or be related to methodological differences in, for example, sampling and instruments used in data collection. A similar conclusion can be reached based on the findings of a systematic review of longitudinal studies on SES in childhood and later alcohol use (Wiles et al., 2007). This analysis identified nineteen relevant articles, of which eight were based on

European samples. As was the case in HBSC data, there was little consistent evidence of an association between childhood SES and later alcohol use, and also the included European studies (three studies from Finland, three from Sweden, and two from the U.K.) reported both positive and negative as well as no associations.

Comparisons between Europe and North America

The influence of parents and peers has been compared in only a few North American and European studies. The general consensus is that peers exert similar influences on adolescent drinking in both continents (e.g., Adler & Kandel, 1982; Agostinelli & Grube, 2003; Link, 2008), and that deviant peers and perceived peer drinking are significantly and positively associated with adolescent alcohol use (Bank et al, 1985; Link, 2008).

Data from the 2005/2006 HBSC survey of 11,277 adolescents (ages 11.5 to 13.5 years) in Greece, Scotland, Switzerland, and the U.S. also found that perceived peer and adolescent alcohol use were positively associated in all countries (Farhat et al., 2012). Interestingly, an interaction effect was found, such that the association between perceived peer drinking and own monthly alcohol use was weaker in Greece than in other countries. Morover the associations were weaker, however, among boys in Greece than in Scotland and among girls in Greece than in Switzerland. The authors hypothesized that this interaction reflected a difference in the drinking culture, specifically the more tolerant attitudes toward adolescent wine-drinking in Greece compared to the other countries. When the analysis was repeated excluding wine from the alcohol use outcome, no differences among the countries in the association between own and peer drinking were observed. The authors concluded that the association between peer and adolescent drinking may depend on country-level variation in contextual factors of alcohol use (Farhat et al., 2012).

Among adolescents (ages 12-18 years) in Australia, France, Norway, and the U.S., peer modelling and peer norms had significant effects on adolescent drinking in all four countries (Bank, 1985).

Another cross-cultural study surveyed adolescents from three unique cultural contexts (Caldwell, Weichold, & Smith, 2006); specifically post-apartheid South Africa (n=2,342), post-communist Germany (n=278),

and a rural U.S. setting (N=629). Across these very diverse cultural and socio-economic samples, peer influence was positively associated with alcohol use for these adolescents, leading the authors to conclude that "peer influence is a universal influence on substance use" (p. 264).

Likewise, parental influence on adolescent drinking is found in both Europe and the U.S. In a comparison of adolescents in France, Israel, and the U.S, parents' drinking (along with peer use) was a more powerful predictor of alcohol use than the adolescents' personal attitudes or demographics (Adler & Kandel, 1982). Across these countries, which have quite different patterns of alcohol use, parental tolerance of drinking as well as the parents' own drinking were associated with increased adolescent alcohol use in all three samples. The effects of parents were stronger, however, among Israeli adolescents than among the French, and were much stronger in Israel and France than in the U.S..

In another study of adolescents in Australia, France, the U.S. and Norway, parental modelling had significant effects on the alcohol use of adolescents in Australia and France, but not in Norway or the U.S. (Bank et al., 1985). Further, parental norms were significantly associated with adolescent drinking in Australia and the U.S. but not in France or Norway. Thus, for French adolescents, parents' drinking behaviour has greater influence than the messages their parents provide. The authors also suggested that Norwegian parents may be less likely to provide strong messages about drinking than parents in Australia or the U.S.. Further, a comparison of American and Finnish parents indicated almost unanimous agreement that parents should not drink in the presence of small children (Raitasalo, Holmila, & Mäkelä, 2011), yet 38% of Finnish parents indicated that drunkenness in the presence of small children was acceptable as long as someone remained sober to take care of the children. These apparently contradictory views arise when norms are in conflict (Room, 2011). Moreover, in the absence of strong and consistent messages and modelling by parents, adolescents look to their peers for decisions about drinking.

In a more general comparison of risk and protective factors in the U.S. and Netherlands, similar factors were found in both countries (Oesterle et al., 2011). One difference, however, was that Dutch youth perceived

their parents as having more favourable attitudes toward alcohol use, and these attitudes were more strongly associated with adolescents' regular drinking in the Netherlands than in the U.S. As was described in the section comparing different European countries, there appears to be nuanced differences in the effects of parents on adolescent drinking in Europe and the U.S..

Studies of alcohol expectancies between the U.S. and European countries have often focused on Ireland, possibly because Ireland has a high proportion of both abstainers and alcohol dependent individuals, in contrast to the U.S. and Canada where the distribution of consumption is less extreme (Young & Oei, 1993). In comparison to adolescents in the U.S., Irish adolescents expected less social benefit, less improvement of cognitive and motor functioning and less sexual enhancement, but greater aggression from drinking (Christiansen & Teahan, 1987). In a study of Irish and American college students, Irish, compared to American, men expected more camaraderie and cheerfulness from drinking. Irish women indicated that they used alcohol to relieve sexual inhibitions (Teahan, 1987), whereas American women endorsed more tension reduction and disinhibition expectancies (Teahan, 1987).

In a more recent study of college drinking and consequences among American and Swedish first year students, expectancies were similar among the men, but American women scored higher than Swedish women, especially on aggression expectancies (Stahlbrandt et al., 2008). In both countries, positive alcohol expectancies were significantly associated with harmful drinking, but the association was stronger among Swedish men than American men. In a study of college students from Cyprus and the U.S., positive and negative alcohol expectancies were predictive of alcohol use in both cultures (Strahan, Panayiotou, Clements, & Scott, 2011). Students from Cyprus, however, endorsed fewer positive and more negative expectancies than students in the U.S.. Lastly, using data from the Gender, Alcohol and Culture International Study (GENACIS) three indicators of positive expectancies for social, relational, and intimate dimensions were studied in 11 countries (Nigeria, Uganda, India, Japan, the Czech Republic, Spain, Sweden, the United Kingdom, the U.S., Argentina, and Costa Rica). Despite these quite varied cultures and continents, the three expectancy dimensions formed

generally similar patterns of endorsement (Bergmark & Kuendig, 2008). The most striking findings from this study were not by country, but by gender. As with peer influences, it appears that the effects of alcohol expectancies on underage drinking is generally, similar in the U.S. and in Europe (and other countries). Generally both men and women who expected alcohol to make it easier to be open with others (especially their partners) drank more than those who did not hold those beliefs. In addition, women who believed alcohol made social life easier and sexual activity more pleasurable drank more than those women who did not hold those beliefs.

CONCLUSIONS

Risk and protective factors range from the biological (genetic) level to the cultural level, with relevant influences, at many different levels of description (genetics and personality, cognitions, family and peer influences and socio-cultural influences). Two important characteristics of risk and protective factors are their causal status and whether they can be changed (malleability). It is important to consider whether they are mere correlates, or whether there is evidence that the risk or protective factor is involved in the causal pathway towards drinking. In terms of malleability, whereas genes and SES are difficult to change, some psychological characteristics can successfully be changed leading to positive outcomes. This will be explored further in the next chapter on prevention. While the more distal factors such as genetic factors have been briefly summarized, we have focused here on the psychological and social factors that are amenable to change.

Personality. Both externalizing and internalizing personality characteristics confer risk for underage drinking. Externalizing traits, or the tendency towards impulsive, disinhibited behaviours and sensation seeking, are associated with earlier onset of drinking and a greater likelihood of later alcohol-related problems. Self-regulation, or the ability toward self-control, can serve as a protective factor. Whereas poor self-control in childhood has been associated with adolescent substance use and problems, good self-control is associated with delayed onset of substance use and can buffer against increases in substance use in the

face of peer use. Internalizing personality characteristics, such as introversion-hopelessness and anxiety sensitivity, are risk factors for heavy drinking and alcohol-related problems, respectively, among underage drinkers. Both types of internalizing characteristics may exert their influence primarily through drinking motives or reasons for drinking. For example, introversion-hopelessness may manifest itself through drinking to cope with feelings of depression, and anxiety sensitivity may operate through drinking to decrease negative emotions and peer pressure. The interface between personality characteristics and reasons for drinking illustrates the association between more distal risk factors, such a genetically-based personality traits, and more proximal risk factors, such as drinking motives, outcome expectancies, and implicit associations.

Alcohol-related cognitions have been argued to constitute a "final common pathway", mediating (some of) the effects of other influences. It has also been demonstrated that it is important to distinguish between more automatic or implicit cognitive processes and more explicit processes, and that both ot them uniquely contribute to adolescent drinking. In fact, they are moderated by executive control and self-regulation capacities (i.e., there is a stronger influence of implicit cognitions in adolescents with weak control capacities and a stronger influence of explicit cognitions in adolescents with good control capacities). Explicit cognitions, such as alcohol expectancies, drinking motives, and perceived norms may all be malleable by a variety of interventions, making them particularly interesting candidates for preventive interventions. In addition, novel interventions have targeted implicit cognitive processes, with encouraging results (see Chapter 3).

Parenting. Parental alcoholism and other parental characteristics, such as low education and SES, are related to an increased risk for heavy drinking in adolescence, yet the non-genetic influences are complex and interact with environmental factors. For example, neighbourhood characteristics are confounded with low SES and ethnic heterogeneity that contribute to increased rates of crime and delinquency. Yet, both economic disadvantage and affluence have been found to contribute to underage drinking. Both may operate through social norms, school climate, and differing values on achievement. High value on academic

achievement can serve as a protective factor for alcohol use and related behaviours, but excessive pressures to succeed in academics or sports can lead to stress that exacerbates underage drinking. A good balance in economic resources, social opportunities, and achievement values are most likely to help prevent underage drinking and related problems.

Parental alcohol use has both direct effects, via modelling of drinking behaviour and availability of alcohol in the home, and indirect effects on the drinking behaviour of their children. The indirect effects of parental drinking can manifest in poor parenting practices, such as failure to effectively monitor or set rules for the adolescent, which can result in earlier onset and heavier alcohol use. Conversely, good parenting practices, including monitoring, nurturance, and consistent rule enforcement, can serve as protective factors against underage drinking. Perhaps the most powerful effect of parents on the alcohol use of their adolescents operates through the messages parents convey. Consistent and uniform parental disapproval of underage drinking has been found to be one of the strongest deterrents to underage drinking across both North America and Northern Europe. Yet, it should also be noted that the influence of parents' behaviours and attitudes appears to vary across different cultures, with evidence for strict rule-setting regarding alcohol coming from North America and Northern Europe, while the scarce evidence from Southern Europe appears to indicate a positive role for alcohol-related socialization in the family.

Peers. Peer influence is one of the most consistent correlates of underage drinking. Even after controlling for individual and family influences, having heavy drinking peers is the strongest predictor of heavy drinking among adolescents. Peers can have both direct and indirect influences on adolescent drinking. Peers can provide alcohol and model drinking behaviour, but more importantly, they can encourage heavy drinking. Peers exert their influence on adolescent drinking through the processes of both selection and socialization, with the importance of these social processes changing across development. Younger adolescents appear to select peers based on a peer's alcohol use. Once adolescents have joined a peer group that drinks alcohol, they are further socialized into heavier drinking. Because peer selection is especially important for younger adolescents, parents should be active in

monitoring and influencing their adolescent's selection of friends during the early adolescent years. Once older adolescents are established in a peer group, it is important that parents remain involved in their adolescent's activities, meeting their friends and monitoring their adolescent's social activities. Because parental involvement is not a panacea, adolescents must also learn to cope with peer pressure, which is an important challenge.

Summary. In summary, evidence supports the strong effects of personality traits, peer influence, and the early and continued influence of parents on their offspring's alcohol use. In all of these cases, evidence suggests that the associations are not fully causal but also reflect effects of genetic risk and environmental factors. Furthermore, the influence of parents' behaviours and attitudes seems to vary across different cultures, with some countries being more permissive than others. Although the idea of a "final common pathway" may not be fully explanatory, alcohol-related cognitive processes are important in predicting underage drinking, and appear to be more easily changeable than a number of more distal risk-factors at different levels of description (e.g., genetics, neighbourhood, etc.). Lastly, with a few exceptions, there was considerable similarity in the risk and protective factors between North America and Europe and within Europe. Peers are the most consistently identified potential risk factor across the different geographic locations. The most notable cross-national inconsistencies relate to the potential influence of SES, neighbourhood, and family affluence (within Europe). Differences also emerge in terms of parental attitudes toward drinking, with some European countries having more permissive attitudes about adolescent drinking. Because of the importance of parental disapproval of underage drinking, this is one area that warrants greater attention.

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Chapter 3

Prevention of Alcohol Use and Misuse in Youth: a Comparison of North America and European Approaches

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The current chapter provides a review of the different prevention approaches targeting alcohol use in young people. A number of systematic reviews on this issue are available, particularly through the Cochrane Review library (see Foxcroft & Tsertsvadze, 2011a-c). What these former reviews do not offer is a comparison across the different types of approaches to alcohol prevention. Therefore, we review the theoretical bases of the different approaches to alcohol prevention, and we describe some programmes with the strongest evidence-base and review their efficacy to facilitate comparisons of the evidence across approaches. In reviewing specific programmes, our intent is to be representative rather than comprehensive. Furthermore, special attention is dedicated to the cultural context in which a particular programme or approach has been evaluated to provide policy makers with recommendations on how alcohol prevention might be implemented in new cultural contexts.

KEY FINDINGS

• The goals of alcohol prevention programmes often vary according to cultural context. While most U.S.-based programmes have abstinence as their primary goal, most European programmes include reductions in alcohol use as a viable outcome.

• Delivering alcohol prevention in the school context captures a larger percentage of youth and yields the most consistent effects, relative to programme delivery within the community or family context. The most effective universal school-based programmes are comprehensive, concurrently addressing normative attitudes about drinking, and teaching generic and alcohol refusal skills.

• The most effective family-based programmes for preventing or reducing alcohol use in young people emphasise active parental involvement and work to develop competence, self-regulation, and parenting skills. Family-based programmes have small effects, but their effects are generally consistent and lasting.

• Selective interventions targeted towards at-risk groups (e.g., high personality risk for alcohol use disorders) have been shown to be effective in reducing alcohol use in young people. Such programmes can also delay drinking onset if introduced in early adolescence prior to the onset of alcohol use.

• Personalized feedback interventions are designed to correct misperceptions about drinking norms in college and high school students. Such programmes are indicated as a strategy for reducing drinking in those whom have already started drinking, especially those who drink more heavily.

Adolescence and young adulthood is a critical period of social and emotional development (Spooner, Mattick, & Noffs, 1996), a time when young people move toward independence and autonomy and decrease dependence on families and schools. For these reasons, this developmental period is also the time when acceptance by peers becomes more important and when risk-taking behaviour is high. It is

also a period when individual differences in risk for psychopathology begin to manifest themselves in substance misuse and other psychiatric symptoms. If left untreated, adolescent-onset disorders can become chronic and can cause severe disability (Andrews, Henderson, & Hall, 2001). It is therefore important that prevention programmes be implemented prior to onset of psychiatric symptoms and before social and emotional influences come into full effect. Furthermore, such programmes should be introduced before initial exposure to alcohol, to reduce the adverse impacts of alcohol use on the developing brain. Implementing alcohol prevention programmes early will ensure young people are provided with the knowledge and skills they need to make responsible and informed decisions about drinking (Dielman, 1995) and programmes that can effectively delay onset of drinking, particularly heavy drinking, will ensure that alcohol is not interfering with this critical period of social, cognitive, and neural development.

Alcohol prevention can be delivered in the school, to the family, and/or in the community. Prevention programmes can be universal (offered to all members of the population), selective (offered to only those who are at high-risk for the disorder), or indicated (offered only to those who already show signs of the disorder); the latter two types are often collectively referred to as targeted approaches. Approaches to alcohol prevention can vary widely based on the desired end goal of the intervention whether it be abstinence, reduction in drinking quantity, reduced alcohol-related problems, or delayed onset. Desired outcomes may vary across cultural contexts. For example, while most U.S.-based prevention programmes have abstinence as the primary goal, European prevention trials typically are more tolerant and include reductions in alcohol use as a viable treatment outcome. We organise our chapter around the location in which the intervention is delivered (e.g., school-based context), but consider whether the intervention described is universal, selective, or indicated, and what type(s) of alcohol-related outcomes are used to assess efficacy.

SCHOOL-BASED APPROACHES

School-based alcohol prevention programmes offer numerous advantages over other prevention approaches because attending school is a mandatory requirement in most Western countries and is where young people spend over a quarter of their waking lives (Cuijpers, 2002). Schools offer a location where educators are able to reach large audiences at one time, keeping costs low and retention relatively high (Botvin, 1999; Botvin, 2000; Cuijpers, 2003; Gottfredson, Gottfredson, & Skroban, 1996; Jones, Sumnall, Burrell, McVeigh, & Bellis, 2006; Shin, 2001; Wenter et al., 2002).

School is also where youth experience most peer interaction and influence, which can both positively and negatively influence alcohol-related behaviours and attitudes. It is primarily in the school-age years when drinking behaviours have their onset (Botvin & Griffin, 2003; Sharma, 2006). Alcohol prevention programmes can be easily implemented in the school context (Berkowitz & Begun, 2003) and school research suggests that it is best to deliver prevention in sequential and developmentally-appropriate stages (Ballard, Gillespie, & Irwin, 1994; Dusenbury & Falco, 1995; Meyer & Cahill, 2004). School-based alcohol and drug prevention programmes have been shown to be appealing both to students and educators over and above other types of prevention delivery (Lisnov, Harding, Safer, & Kavanagh, 1998). Other practical and economic advantages to delivering prevention in schools include: being able to capture large numbers of youth at one time, availability of educational resources, and that programmes can be easily tailored and delivered to different development stages (McBride, 2003).

Universal prevention addresses the entire population within a particular setting, regardless of their level of risk for alcohol use and aims to delay the onset of alcohol use by equipping individuals with the information and skills that they need to prevent use. In schools, universal programmes focus largely on teaching awareness education (knowledge and harms), normative education, social and drink-refusal skills, and promoting pro-social peer relationships. Universal programmes offer the advantage of being delivered on a large scale and, as such, they have the potential ability to reduce alcohol use and related harms to a greater

audience (Jones et al., 2006; Midford, 2008). Importantly, they avoid the risk of stigmatising individuals, given the sensitive nature of alcohol use disorders and risk (Offord, 2000).

A recent review of school-based universal prevention has identified some effective programmes (Foxcroft & Tsertsvadze, 2011a). Many effective programmes of this type incorporate a social influence or skill development approach to prevention.

SOCIAL INFLUENCE APPROACH

The 'social influence approach' to prevention was developed in the 1980s and is based on Bandura's (1977) social learning theory and McGuire's (1964, 1968) social inoculation theory. The approach is based on the assumption that young people start to use alcohol as a result of social and psychological pressure from peers, family, and the media (Donaldson et al., 1996). The goal of social influence programmes is to teach young people to avoid using alcohol by resisting external pressure and increasing alcohol-related coping skills (Botvin, 2000). The social influence approach emphasizes three major components: information, normative education, and resistance-skills training (Botvin, 2000). The emphasis in the information component is to highlight short-term rather than long-term consequences of alcohol use since the short-term corresponds to the typical thinking style of young people (Berkowitz & Begun, 2003). The component of normative education is based on findings that heavy drinking adolescents generally overestimate the prevalence of alcohol and other substance use in peers (Perkins, 2007). Therefore, one main component is to correct perceptions by providing students with the most current and accurate data, usually from large and relevant population-based surveys. This approach has been shown to change students' beliefs about the prevalence and attitudes about acceptability of alcohol use by young people, and delay the onset of alcohol use (Botvin, 2000; Botvin & Griffin, 2007; Cuijpers, 2003; Cuijpers, Jonkers, Weerdt, & Jong, 2002; Hansen & Graham, 1991b; Moskowitz, 1989).

The social influence approach also addresses the findings on how pro-alcohol social influences from peers and the media also influence youth drinking by teaching alcohol resistance skills. This generally involves teaching students how to recognise, handle or avoid high-risk situations, increasing students' awareness of media influences, and training them in drink refusal skills. The inclusion of resistance skills training in school-based prevention has been associated with enhanced effectiveness (e.g., Botvin, 2000). However, in the absence of normative education, resistance skills training has been found to be relatively ineffective and potentially iatrogenic (Hansen et al., 1991b), possibly because the social normative component is necessary to motivate students to utilise peer-resistance strategies.

Until recently the most well-documented, school-based alcohol and other drug prevention programme based on the social influence approach was the Drug Abuse Resistance Education (DARE) programme. The DARE programme is typically taught in the fifth grade (10 years of age). What distinguishes the programme from others is that it is taught by police officers. Although some early studies found the programme to impact positively on alcohol and drug-related attitudes, knowledge and behaviour, these studies have since been criticised for their weak or inadequate research methods (Rosenbaum & Hanson, 1998). More recently, studies with stronger designs and analytic methods have shown the DARE programme to have minimal or no impact on reducing alcohol and drug use (Birkeland, Murphy-Graham, & Weiss, 2005; Ennett, Rosenbaum, Flewelling, & Bieler, 1994; Rosenbaum, Flewelling, Bailey, Ringwalt, & Wilkinson, 1994; Rosenbaum & Hanson, 1998). The ineffectiveness of the DARE programme has been suggested to result from the instructional, non-interactive method of delivery by authority figures (Tobler & Stratton, 1997; White & Pitts, 1998).

Aside from the DARE programme, a considerable number of studies have examined the efficacy of other social influence programmes in preventing alcohol use when delivered by other members of the community, including teachers. When delivered in this way, the social influence approach has been found to be effective in not only increasing knowledge and attitudes towards alcohol, but importantly in reducing the use of alcohol as reviewed in the evidence section below (e.g., Botvin,

Griffin, Paul, & Macaulay, 2003; Cuijpers, 2003; Cuijpers et al., 2002; Faggiano et al., 2008; Hansen, 1992; Midford, 2000; Perry & Kelder, 1992; Roona, Streke, Ochshorn, Marshall, & Palmer, 2000; Shope, Copeland, Marcoux, & Kamp, 1996; Soole, Mazerolle, & Rombouts, 2005; Tobler, Lessard, Marshall, Ochshorn, & Roona, 1999; Tobler et al., 2000).

COMPREHENSIVE APPROACH

Social influence programmes generally assume that young people use alcohol as a result of peer influence and a lack of drink refusal skills. However, they fail to take into account other factors which can influence alcohol use such as dealing with low self-esteem, depression, or anxiety. Comprehensive programmes were designed to take such etiological risk factors into account. This approach is also known as the competence enhancement approach to prevention (Botvin, 1999; Botvin et al., 2003), but differs from selective or indicated programmes by promoting generic skills in the general population. Selective programmes, by contrast, promote specific skills in youth identified as lacking these specific skills and/or requiring specific learning conditions.

The comprehensive approach is based on Bandura's (1977) social learning theory and Jessor's (1977) problem behaviour theory. The approach conceptualises alcohol misuse as a socially learned behaviour that results from the interplay of a variety of social factors (such as modelling and imitation) which influence personal factors (such as beliefs, attitudes and pro-alcohol cognitions) (Botvin, 2000). Teaching general personal and social skills in the absence of other components of the social influence approach such as drink refusal skills training and normative education has only been found to have a minimal impact on alcohol use (Caplan et al., 1992). However, when elements of the social influence approach are included into the model, effects appear to be more robust (Botvin, 2000). Another essential ingredient of the comprehensive approach to prevention is an interactive delivery style which generally involves class discussions, instruction and demonstration, group feedback and reinforcement, role-plays, and practice (Botvin et al., 2003).

REVIEW OF THE EVIDENCE FOR THE SOCIAL INFLUENCE AND COMPREHENSIVE APPROACHES

In a recent Cochrane review of universal alcohol prevention programmes, Foxcroft and Tsertsvadze (2011a) identified 11 alcohol-specific prevention programmes that involved a rigorous randomised controlled trial. Of these, five trials showed no significant differences between their experimental and control groups (Duryea, 1984; Goodstadt & Sheppard, 1983; Newman, Anderson & Farrell, 1992; Sheehan, Schonfeld, Ballard, & Schofield, 1996; Williams, DiCicco, & Unterberger, 1968) and in the other six trials some significant differences between groups were reported (Dielman, Shope, Butchart, & Campanelli ,1986; McBride, Midford, Farringdon, & Phillips, 2000; Morgenstern, Wiborg, Isensee, & Hanewinkel, 2009; Perry & Grant, 1988; Vogl et al., 2009; Wilhelmsen & Laberg, 1994). These six trials were conducted with children across the world, all living in developed countries, such as Germany, Norway, Switzerland, Australia, and Chile. The programmes all involved in-class alcohol education and drink refusal skills training ranging in duration from four to ten+ sessions. Results showed significant reductions in drinking and binge drinking in intervention groups and effects were observed up to 12 months post-intervention. However, in two of these six trials, effects were limited to subgroups such as girls or those who were not drinkers at baseline. And, as with all systematic reviews, there is the potential lack of inclusion of 'file drawer' results (i.e., negative findings that are simply never published and thus not accessible to the reviewers).

Alcohol non-specific prevention programmes addressing all substance use outcomes were also evaluated by Foxcroft and Tsertsvadze (2011a) for their effects on youth drinking behaviour. Twenty-four trials showed no significant differences between their experimental and control groups (Allison, Silverman, & Dignam, 1990; Beaulieu & Jason, 1988; Bond et al., 2004; Botvin et al., 2003; Brewer, 1991; Clayton, Cattarello, & Walden, 1991; D'Amico & Fromme, 2002; Durrant, 1986; Ellickson & Bell, 1990; Furr-Holden, Ialango, Anthony, Petras, & Kellam, 2004; Goldberg et al., 2000; Hansen, Johnson, Flay, Graham, & Sobel, 1988;

Hansen & Graham, 1991a; Johnson, Shamblen, Ogilvie, Collins, & Saylor, 2009; Koning et al., 2009; Moskowitz, Malvin, Schaeffer, & Schaps, 1984; Perry et al., 2003; Ringwalt, Ennett, & Holt, 1991; Ringwalt, Clark, Hanley, Shamblen, & Flewelling, 2009; Spoth, Redmond, Trudeau, & Shin, 2002; St. Pierre, Osgood, Mincemoyer, Kaltreider, & Kauh, 2005; Sun, Dent, Sussman, & Rohrbach, 2008; Werch, Moore, & DiClemente, 2008; Werch et al., 2010) and 14 trials showed significantly greater reduction in alcohol use when comparing intervention and control groups (Botvin, Baker, Renick, Filazzola, & Botvin, 1984; Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995; Botvin, Griffin, Diaz, & Ifill-Williams, 2001; Caplan et al., 1992; Cook, Lawrence, Morse, & Roehl, 1984; Eisen, Zellman, Massett, & Murray, 2002; Ellickson, McCaffrey, Gosh-Dastidar, & Longshore, 2003; Faggiano, Richardson, Bohrn, & Galanti, EU-Dap Study Group, 2007; Griffin, Holliday, Frazier, & Braithwaite, 2009; Hecht et al., 2003; Kellam et al., 2008; Scaggs, 1985; Schinke, Tepavac, & Cole, 2000; van Lier, Huizink, & Crijnen, 2009). Two studies showed comprehensive programmes to be effective over the medium-long term (Botvin et al., 1995; Scaggs, 1985) and three studies showed this approach to be effective over the longer term (i.e., over three years; Botvin et al., 1995; Schinke et al., 2000; Spoth, Redmond, & Shin, 2001). Most of these studies, with the exception of the European Unplugged programme, were conducted in the U.S.

The most popular and most well-evaluated of the comprehensive programmes is the Life Skills Training (LST) model developed by Botvin (1998). The LST was identified in the Foxcroft and Tsertsvadze (2011a) Cochrane Review as having the strongest evidence-base of the comprehensive programmes. This programme emphasises personal and social risks that underpin lifestyle and health behaviours and aims to teach students ways to avoid these risks. This is done by teaching decision making and problem-solving skills, assertiveness training, skills to resist peer and media influences, techniques to communicate effectively and develop healthy personal relationships, ways to enhance one's self-esteem, and ways to manage stress and anxiety (Botvin, 2000). Various formats of the LST programme have been developed and evaluated, but the most common format consists of 15 lessons in year seven, and ten booster sessions over years eight and nine. Numerous

studies testing the efficacy of the LST competence enhancement approach on alcohol use have found the programme to significantly reduce drinking behaviours (e.g., Botvin, 1998; Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990; Botvin et al., 2001; Botvin & Kantor, 2000; Eisen, Zellman, & Murray, 2003; Faggiano et al., 2008; Soole et al., 2005). First tested in primarily white middle class communities in the U.S., the programme was shown to have consistently significant effects. However, these effects were small, accounting for only 10% of the variance in drinking outcomes (e.g., Botvin et al., 1995). More recently, the programme has been evaluated in minority populations, inner-city minority populations, and high-risk youth (i.e., those reporting high-risk characteristics at baseline, such as having peers who have initiated use or low academic achievement). These studies all indicate that the LST programme can be modified to different cultural contexts and is effective, and possibly more effective when delivered to high-risk youth. One study by Botvin et al. (2001) reported over 50% fewer binge drinkers in the intervention group at follow-up relative to the control group when the study sample consisted primarily of inner-city African-American youth. There is also evidence that the LST programme is slightly more effective when it is adapted to the cultural context in which it is delivered (e.g., Botvin et al., 1995) and when delivered in higher risk populations (e.g., Griffin, Botvin, Nichols, & Doyle, 2003).

Another important test of the reliability of an intervention effect is when a programme is evaluated by a research team that is independent of the original evaluator (as programme evaluator has been shown to have significant effects on treatment outcome studies). Spoth et al. (2002) evaluated the LST programme against a combined condition that included both LST and a family-based programme or a control condition. Drug initiation outcomes (alcohol, tobacco, and cannabis) were evaluated one year after cluster-randomization in a sample of rural Midwestern American high school students. The LST intervention was found to be effective on a substance initiation index (combining all substances). However, when alcohol initiation was evaluated separately, LST was not shown to significantly prevent onset of drinking in adolescents. Effects of the LST intervention on binge drinking or drunkenness were not reported in this study. The evidence in favour of the LST programme has also been criticised by Gorman (2002) who

highlighted problems with the sampling methodology of the most prominent LST effectiveness study. Botvin and colleagues (2000) reported a six-year follow up of a randomised controlled trial of the LST programme but restricted the analysis to only a small subset, namely 7.5% of participants in the study, thus violating the fundamental principles of intent-to-treat analyses (Gorman, 2002). Hence, the long-term effectiveness of the LST programme may be less conclusive than originally thought and caution should be used when making inferences about the robustness of such programmes in producing long-term effects on alcohol and other substance-related behaviour. In addition, a large study in the U.S. was conducted recently to evaluate the effectiveness of the Take Charge of Your Life (TCYL) programme, a comprehensive universal programme delivered by trained police facilitators of the DARE programme. Results from this study found an overall negative effect of the TCYL programme, with intervention students reporting an increase in their use of alcohol and cigarette use, and no differences between groups reported for cannabis use (Sloboda et al., 2009). The authors are actively studying the effect of the intervention on mediators and modifiers in order to explain the reason for these disappointing findings; however, it appears that the more reasonable explanation is that the providers of the intervention were law enforcement officers, and that this could have reduced the possible effect of intervention among at-risk students.

More recent evidence for the comprehensive approach comes from the European 'Unplugged' Programme, a school-based curriculum against youth alcohol and other substance use which includes components such as normative education and resistance skills (Van Der Kreeft et al., 2009). The programme was packaged into standardised materials and adapted for seven European countries (Belgium, Germany, Spain, Greece, Italy Austria, and Sweden) and it was evaluated within the frame of the European Drug Addiction Prevention (EU-Dap) study, a randomised controlled community trial, conducted between September 2004 and May 2006. The first follow-up was conducted three months after the end of the delivery and showed that the programme was associated with a reduction of episodes of drunkenness, but not drinking problems, or drinking frequency or quantity (Faggiano et al., 2008). At the 18-month follow-up, the effect on drunkenness survived statistical

tests (Faggiano et al., 2010): the intervention was associated with a 20% reduced prevalence of any drunkenness (prevalence odds ratio=0.80) and a 38% reduced prevalence of frequent drunkenness (prevalence odds ratio=0.62). Relative reduction rates for alcohol initiation and weekly drinking were not significant (Faggiano, 2009). This programme has subsequently been shown to be ineffective for students attending schools classified as having medium or high socio-economic status, and more effective for those attending schools classified as having low socio-economic status. Once this important moderator is considered, this programme was shown to have significant effects on any drinking, weekly drinking, and problem drinking symptoms (Caria, Faggiano, Bellocco, & Galanti, 2011). Finally, another moderator analysis revealed that this programme was more effective in preventing onset of binge drinking in boys, but that the programme was equally effective in preventing progression to regular drunkenness in boys and girls (Vigna-Taglianti et al., 2009). However, it is unclear if this finding is a reflection of how girls drink (progressing more quickly to heavy drinking; see Stewart, Gavric, & Collins, 2009) or of gender-specific effects of the intervention.

Another European-based trial of the effectiveness of the LST programme was conducted by Morgenstern et al. (2009). They reported that the intervention significantly reduced risk of lifetime binge drinking at 4 month and 12 month follow-ups with an adjusted odds ratio of 0.56 at four months, suggesting a 44% reduction in binge drinking prevalence, and 0.74 at 12 month, suggesting a 36% reduction in binge drinking prevalence.

In summary, the comprehensive approach, particularly the LST programme, can be culturally adapted for new contexts and produces reliable effects on binge drinking, but limited effects on drinking initiation or frequency of drinking. Overall effects on drinking behaviours are small (10%-30% relative reductions), with little support for the effects on drinking initiation, drinking frequency, or drinking problems and stronger support for effects on drunkenness or binge drinking. Furthermore, these reductions have been shown to last up to three years. The programme appears to be effective for both minority populations and majority populations, in both the U.S. and European

contexts, and for both girls and boys. There is some evidence suggesting that the more at-risk the population, the greater the effects of the programme (e.g., Botvin et al., 2001; Caria et al., 2011). Another feature identified but not systematically tested as a potential moderator of programme efficacy is the extent of intervention deliverer's affiliation with law-enforcement (Sloboda et al., 2009).

PEER-LED INTERVENTION

Like drink refusal skills training, peer-led interventions are based on the idea that altering peer influences can have beneficial effects (Velleman, 2009). In the peer-led intervention context, peers are trained to become educators and attitude-formation leaders. The rationale is that peers have the power to influence one another's attitudes and behaviour if given the information and skills to do so. Moreover, people of the same age feel freer to talk to one another. There is some evidence that peer-led interventions do not always work, however. For example, one study showed no effects of a peer support programme on adolescents' knowledge, attitudes, or use of alcohol (Webster, Hunter, & Keats, 2002). Interestingly, some research suggests that peer-led interventions may work more for those delivering rather than those receiving the intervention (Sumnall et al., 2006). One study demonstrated the possibility of interactions between peer education and the makeup of the peer network (Valente et al., 2007). Specifically, deleterious effects of the peer-led interventions were found among those with peer networks that support alcohol and drug use.

SELECTIVE VERSUS UNIVERSAL PREVENTION

Considering the large literature on childhood risk factors for early onset drinking and problems with alcohol (reviewed in Chapter 2), and the results reviewed above showing possible beneficial effects of universal programmes in higher-risk populations, there is an argument for developing and delivering prevention programmes that target specific populations. Selective interventions have the advantage of allowing the focus of limited resources to be used on those most at need. They also

address individual needs of homogeneous at-risk groups and offer an opportunity to tailor interventions to the etiological processes implicated in different risk profiles (Conrod, Castellanos-Ryan, & Strang, 2010; Conrod, Mackie, & Castellanos, 2008; Conrod, Stewart, Comeau, & Maclean, 2006; Thush et al., 2007). Selective prevention programmes are often overlooked due to their practical limitations. It is not only difficult to initially identify those individuals at greatest risk, but finding suitable, cost-effective ways to screen and deliver interventions can also be challenging (Offord, 2000). However, in recent years we have seen the development of selective programmes which are showing that these ethical and practical obstacles can be overcome.

One such approach, known as the Personality-Targeted Approach, is a brief, selective programme that presents a novel approach to alcohol and other substance misuse prevention by targeting personality risk-factors for early-onset drinking or illicit drug use. It is the first and only school-based alcohol and drug prevention programme that has been shown to prevent growth in alcohol and substance misuse in three separate trials across Canada (Conrod et al., 2006) and the United Kingdom (Conrod et al., 2010; Conrod et al., 2008; Conrod et al., in press; O'Leary-Barrett, Mackie, Castellanos-Ryan, Al-Khudhairy, & Conrod, 2010), through targeting youth with elevated scores on four personality risk-factors for early-onset substance misuse and other risky behaviours: Hopelessness, Anxiety-Sensitivity, Impulsivity, and Sensation-Seeking (Battista, Pencer, McGonnell, Durdle, & Stewart, in press; Krank et al., 2011; Woicik, Stewart, Pihl, & Conrod, 2009). Youth are screened in classroom settings during school hours, and those scoring one standard deviation above the school mean on one of these four personality traits, as measured using the Substance Use Risk Profile Scale (Battista et al., in press; Krank et al., 2011; Woicik et al., 2009), are invited to participate in coping skills workshops. Each of the four personality-specific interventions involve adolescents selected for particular personality profiles to work together over two 90-minute group sessions guided by a trained facilitator and co-facilitator at school. The interventions are manualised and incorporate psycho-educational, motivational enhancement, and cognitive-behavioural components, and include real life 'scenarios' shared by high-risk youth in specifically-organised focus groups. A novel

component to this intervention approach is that all exercises discuss thoughts, emotions, and behaviours in a personality-specific way.

Three separate randomised-controlled trials have shown that this intervention approach is associated with reduced drinking, binge drinking, and problem drinking symptoms in high-risk youth over six months (Conrod et al., 2010; Conrod et al., 2008; Conrod et al., 2006; O'Leary-Barrett et al., 2010), with one of these trials, the Preventure Trial, showing two-year reductions in problem drinking symptoms and illicit drug use in high-risk youth (Conrod et al., 2010; Conrod, Castellanos-Ryan, & Mackie, 2011). A recent cluster-randomised trial, known as the Adventure Trial, replicated the preventative effects of personality-targeted interventions on alcohol use when delivered by trained school-staff (Conrod et al., in press; O'Leary-Barrett et al., 2010), thus suggesting that this intervention approach can operate within an implementation model that has a higher likelihood of being adopted by schools in a sustainable manner. The results of this recent study are central to the development of an effective (as opposed to merely efficacious) intervention. This trial demonstrates that targeted interventions can be successfully delivered by educational staff have been trained and supervised, and that targeted interventions have the potential to become a sustainable school-based prevention model.

Effect sizes for binge drinking from the Adventure trial were similar to those from previous clinician-run personality-targeted intervention trials, with odds ratios between 0.4 and 0.5 across all trials for youth who had already consumed alcohol by 13 years of age (i.e. a particularly high-risk group). These odds ratios correspond to a 50-60% decreased likelihood of having binge drinking six months post-intervention. The corresponding odds ratios for a sample including youth who were non-drinkers at baseline were 0.65-0.7, representing a 30-35% decreased likelihood of reporting binge drinking six months later. 'Numbers Needed to Treat' across the three trials for baseline alcohol users ranged from four to six, indicating that four to six individuals are required to receive an intervention in order to prevent one case of binge drinking. These effect sizes are remarkable given, that the most effective universal alcohol prevention programmes have 'Numbers Needed to Treat' values from nine to 30 (Faggiano et al., 2008), which requires targeting at least

double the number of adolescents in order to prevent one case of binge drinking. A more recent two-year follow-up of this programme which involved two-part latent growth models to evaluate onset and progression to heavier drinking over time indicated long-term effects of the intervention on drinking rates, binge drinking rates, and growth in binge drinking and problem drinking in high-risk youth, such that high-risk youth showed 43% reduced odds of binge drinking and 29% reduced odds of reporting problem drinking over the course of the trial (42% reduced odds of problem drinking at the two-year follow-up; Conrod et al., in press). High-risk youth were also shown to benefit from the interventions over the 24-month follow-up on drinking quantity, and growth in binge drinking frequency. Furthermore, some herd effects in (untreated) low-risk youth were observed, specifically on drinking rates and growth of binge drinking. In this context, herd effects refer to risk reduction in untreated individuals secondary to reductions in drinking among treated individuals in the population. The idea is that because drinking has been reduced in the high-risk youth through the targeted intervention, this can result in reduced drinking/binge drinking even among untreated low-risk youth by reducing modelling of drinking, and peer pressure and opportunities to drink within students' social networks. This study reported that the intervention was associated with a 29% reduced odds of drinking over the course of the trial in students attending intervention schools relative to students in control schools which compares favourably to some of the best results from universal comprehensive programmes. Importantly, however, the effect only required intervening upon 45% of the population. There is also an added benefit of this approach: by targeting underlying personality risk factors for substance misuse that are also implicated in vulnerability to other mental disorders, this programme also produces benefits in mental health outcomes, such as depression, anxiety, and conduct disorder symptoms (e.g., Castellanos & Conrod, 2006).

Another selective programme worth mentioning is one developed in Quebec, Canada which targets high-risk boys with persistent aggressive tendencies in childhood (Tremblay, Pagani-Kurtz, Mâsse, Vitaro, & Pihl 1995; Tremblay & Schaal, 1996). This programme was evaluated within a longitudinal study of primary school children in which 172 boys attending kindergarten in low socio-economic neighbourhoods of

Montreal underwent a randomised controlled trial for disruptive behaviour. The intervention was delivered for two years (when the boys were seven to nine years old). It consisted of two main components: a) social and problem-solving skills training for the boys in a group setting, and b) parent training on effective child-rearing skills. Adolescent substance-use, up to eight years post-intervention, was shown to be reduced in those who received the intervention, with effect sizes ranging from .46 to .67, suggesting large effects. More importantly, findings showed that the intervention effect on alcohol-use frequency at 14 years and on growth in number of different drugs used across adolescence (14-17 years) were explained, respectively, by reductions in both antisocial behaviours and affiliation with less deviant peers, and by a reduction of impulsivity during pre-adolescence (11 to 13 years; Castellanos-Ryan, Vitaro, Parent, Tremblay, & Seguin, 2012).

In summary, the selective personality-based approach to alcohol prevention appears to be highly effective for youth with personality risk factors for early onset alcohol misuse and evidence exists for both the North American and European contexts. There is also preliminary evidence that this approach might also indirectly delay onset and growth of drinking in the general lower-risk population.

INDICATED PROGRAMMES

In contrast to selective prevention programmes carried out with groups at-risk for alcohol problems, indicated prevention programmes are those that are carried out with individuals who are already showing signs/symptoms of an alcohol use disorder. Since indicated interventions hold much in common with alcohol use disorder treatment, they are generally beyond the scope of this chapter on alcohol prevention. Nonetheless, there are some school-based indicated programmes that are worthy of mention here. In the next sections, we briefly review the evidence for the efficacy of brief interventions for college students, like the Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999), as well as expectancy challenge interventions. It should be noted here that while these interventions are often used as indicated interventions, many are

used with volunteers (sometimes heavy drinkers) or universally. In fact, several randomised controlled studies of these approaches deliberately screen out problem drinkers when testing intervention efficacy. Thus, while these interventions are classified as indicated approaches within our review, they do not fit readily within the universal/selective/ indicated organizational framework.

Brief Interventions for College Students

Because the legal drinking age in the U.S. is 21, there are many underage drinkers on U.S. college campuses. As U.S. youths transition from high school to college, they often experience significant increases in their prevalence, frequency, and quantity of drinking (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; White, Labouvie, & Papadaratsakis, 2005), especially if they leave their parents' home (White, McMorris, Catalano, Fleming, Haggerty, & Abbott, 2006). Along with these increases comes a host of alcohol-related negative consequences, including fatal and nonfatal accidents, academic failure, violence and other crime, and unsafe sexual behaviour (Hingson, Zha, & Weitzman, 2009; Presley, Meilman, & Cashin, 1996; Wechsler, Lee, Kuo, & Lee, 2000; Wechsler, Lee, Nelson, & Lee, 2001). Therefore, college campuses have developed numerous prevention programmes to reduce the harms associated with heavy drinking by college students. These programmes target factors associated with student drinking, such as alcohol expectancies and perceived norms for other student drinking and acceptance of drinking (similar to the social norms approach discussed earlier), as well as attempt to increase protective behavioural strategies and motivations to change drinking behaviour (Cronce & Larimer, 2011). Because most of this report focuses on drinking earlier in adolescence, we only briefly discuss these prevention programmes here (for greater detail, see Cronce & Larimer, 2011). Note, however, that some of these programmes could be modified for use with younger adolescents.

Larimer and Cronce (2002, 2007), and Cronce and Larimer (2011), reviewed individual-based alcohol prevention programmes for college students. Overall, they found a lack of support for education and awareness programmes, which were solely didactic (instructive) or used

values clarification approaches. On the other hand, they found consistent support for the efficacy of brief, personalised, individual motivational feedback interventions, alcohol expectancy challenge interventions (see next section), other types of skills training (e.g., self-monitoring), and stand-alone personal feedback interventions. In addition, there was some limited support for multi-component alcohol education interventions if they included elements of personal feedback (for greater details on these types of interventions, see Cronce & Larimer, 2011).

As stated above, one type of brief intervention that has been particularly effective with college students is brief personalised feedback interventions. Personalised feedback interventions provide written and graphical feedback on a student's drinking pattern relative to other college students (i.e., normative feedback), peak blood alcohol concentration, alcohol-related problems, and personal risk factors (e.g., dependence symptoms, family history of alcoholism) (Cronce & Larimer, 2011; Dimeff et al., 1999). Some feedback sheets also include protective behavioural strategies and/or highlight consequences that are especially salient for students, such as the calories they gain from drinking and the amount of money they spend on alcohol.

Although personalized feedback interventions are sometimes used as stand-alone interventions, they are often provided within the context of a brief motivational intervention. Brief motivational interventions, which are usually delivered in one or two sessions, aim to increase the student's motivation and readiness to change their drinking behaviour. The motivational interview context relies on motivational enhancement techniques to increase students' readiness for change and to help guide them through the change process (Dimeff et al., 1999). They are also dependent on the student being pre-identified as having experienced a problem related to their alcohol use (e.g., identified in the emergency room, through mass screening, or through university security). Facilitators use a motivational interviewing style, which presents feedback in an empathetic, non-judgmental manner (Miller & Rollnick, 2002). Brief motivational interventions often also include presentation of general alcohol education (e.g., effects at various BACs, cognitive effects

of alcohol) as well as a discussion of harm reduction strategies (e.g., how to pace drinks) (Cronce & Larimer, 2011).

Overall, evaluations of personalised feedback interventions for college students within the context of a brief motivational intervention and as stand-alone interventions (e.g., written feedback only or web-based feedback), have found them to be more efficacious than educational interventions or assessment-only control conditions (for reviews, see Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Cronce & Larimer, 2011; Larimer & Cronce, 2002, 2007; Walters & Neighbors, 2005; White, 2006). Support for brief personality feedback and motivational interventions have also been found for students attending Further Education Colleges in the United Kingdom when delivered by trial therapists or trained professionals in the college setting (Grey, McCambridge, & Strang, 2005; McCambridge & Strang, 2004). However, in one study in the U.K., the effects reported for brief interventions were short-lived (McCambridge & Strang, 2004), did not generalise to all drinking outcomes, and were more effective for those reporting greater alcohol use at baseline. Furthermore, according to a more recent trial, there is little evidence that this approach will be effective for universal prevention of alcohol misuse in college students. McCambridge, Hunt, Jenkins, & Strang (2011) recently reported the results of a cluster randomised trial investigating whether brief motivational interviewing could be effective for universal preventions, that is, for students who had not necessarily initiated use or begun to experience problems with alcohol or other substances. This trial involved 416 students aged 16-19 years old recruited in 12 London Further Education Colleges compared the effect of a one-session individualised motivational intervention with a standard practice classroom-delivered Drug Awareness intervention. No group differences in prevalence, initiation and cessation of alcohol consumption were reported at 3 and 12 months post intervention. On the other hand, findings have been inconsistent in the U.S. as to whether these interventions were better for heavier than lighter drinkers, but some do show long-term benefits (Mun, White, & Morgan, 2009). More research is needed to: 1) identify the components of feedback that are necessary and sufficient and the best methods for delivery to enhance the preventative effects of brief motivational interventions; 2) evaluate potential mechanisms of intervention efficacy; 3) understand why the

intervention is only effective for heavier drinkers; and 4) identify ways to prolong the long-term effects of these interventions (Cronce & Larimer, 2011; Walters & Neighbors, 2005; White, 2006). There is some limited research indicating that personalised feedback interventions may be efficacious with adolescents (e.g., D'Amico & Fromme, 2002). However, much more research is needed to test brief individualised interventions with underage drinkers.

Expectancy-Based Interventions

As discussed in Chapter 2, positive alcohol expectancies and motivations to drink are risk factors for drinking among adolescents. One important implication of the notion that alcohol-related cognitions are a central construct in the prediction of drinking in young people, is that they would be a prime target for prevention and early intervention (Goldman, 1999). Indeed, both explicit and implicit alcohol-related cognitions (see Chapter 2) have been targeted in interventions. Expectancies have been targeted using alcohol expectancy-challenge procedures (Darkes & Goldman, 1993; Darkes, Greenbaum, & Goldman, 1998). These procedures involve comparing the actual effects attributable to alcohol to those which an individual expects from drinking alcohol, to make drinkers more aware of the degree to which their drinking behaviours and responses to drinking are impacted by expectancies (Cronce & Larimer, 2011). Because alcohol expectancy challenge procedures often involve actual and perceived alcohol administration, they are rarely used with underage drinkers for legal and ethical reasons. Instead, they have been used mainly with young adults. The alcohol expectancy challenge procedure has been shown to lead to changes in explicit expectancies, but to have minimal impact on implicit cognitions (Wiers, van de Luitgaarden, van den Wildenberg, & Smulders, 2005). Two studies tested whether the change in explicit expectancies 'mediated' or helped explain a change in drinking behaviour, with one reporting a positive result (Wiers et al., 2005), and one a negative result (Wood, Capone, Laforge, Erickson, & Brand, 2007). In other targeted prevention programmes, expectancies are also discussed (e.g., BASICS; Dimeff et al., 1999). Motives to drink are a prime target in Motivational Interviewing. Motivational Interviewing has been shown to be a successful intervention in adults (Miller, 1998) and college students (Cronce &

Larimer, 2011), but has yielded more mixed results with adolescents (Grenard, Ames, Pentz, & Sussman, 2006). Motivational Interviewing does not appear to affect implicit cognitions (Thush et al., 2009). It is worth noting that some alcohol expectancy challenge studies use videotapes of other people drinking and would, therefore, be amenable for use with underage drinkers (for greater detail, see Darkes et al., 1993, 1998).

Recently, researchers have begun to directly target implicit cognitive processes in addiction through cognitive retraining programmes. For example, an attentional bias for alcohol (i.e., the tendency to selectively attend to alcohol-related cues) has been successfully re-trained, with positive results on drinking outcomes in adult problem drinkers (Fadardi & Cox, 2009) and in alcoholic patients (Schoenmakers et al., 2010). Similarly, an approach bias for alcohol (i.e., the automatic tendency to approach alcohol) has been successfully re-trained in hazardous drinking university students (Wiers, Rinck, Kordts, Houben, & Strack, 2010). Positive alcohol associations (i.e., the automatic tendency to associate alcohol cues with positive outcomes) have also been successfully changed through evaluative conditioning procedures, with positive results on drinking in the short-term (Houben, Havermans, & Wiers, 2010). Finally, recent research also indicates that training executive control may be helpful in problem drinkers (Houben, Nederkoorn, Wiers, & Jansen, 2011). Although these results are promising, it should be noted that none of these studies have included adolescents as of yet and none have been shown to prevent either the onset of drinking or harmful drinking.

Effective principles for school-based alcohol prevention

Newton, Vogl, Teesson, and Andrews (2011) recently reviewed the principles that have consistently been associated with effective alcohol prevention programmes in schools (Ballard et al., 1994; Cuijpers, 2002; Dusenbury & Falco, 1995; Meyer & Cahill, 2004; Midford, Munro, McBride, Snow, & Ladzinski, 2002). Effective programmes were identified as being: evidence-based and theory driven, targeted to risk factors for substance use and psychopathology, developmentally

appropriate, implemented prior to harmful patterns of use being established, part of a comprehensive health education curriculum, based on a skill-building approach (which must include providing resistance skills training, and normative education), immediately relevant to students, interactive, but keeping teacher as the central role, sensitive to the cultural characteristics of the target audience, able to provide adequate initial coverage and continued follow-up in booster sessions; and delivered within an overall framework of harm minimization, rather than being abstinence-based.

Obstacles to effective drug education in schools

There are many barriers or 'obstacles' which can impede the effectiveness of prevention programmes even when they are evidence-based (Botvin, 2004; Dusenbury & Hansen, 2004; Elliott & Mihalic, 2004; Kaftarian, Robinson, Compton, Davis, & Volkow, 2004). A number of issues, particularly those related to implementation and dissemination of programmes, have been identified as causing the greatest obstacles and interfering with programmes being able to have an impact on behavioural outcomes (Cahill, 2007; Castro, Barrera, & Martinez, 2004; Ennett et al., 2003; Greenberg, 2004; Pentz, 2004; Rohrbach & D'Onofrio, 1996).

The dissemination of alcohol prevention programmes into schools is not always entirely successful (Botvin et al., 2003; Cuijpers, 2003), but can be achieved with extensive training and close supervision (O'Leary-Barrett et al., 2010). Two large studies recently reported that less than 15% of schools in the U.S. implemented evidence-based programmes or reported following a programme guide or manual very closely (Ennett et al., 2003; Ringwalt et al., 2003), and one of these studies reported that one-fifth of teachers reported not using a curriculum/ programme guide at all when delivering drug and alcohol prevention. It is well established that programmes delivered with high fidelity lead to superior outcomes for students and programmes delivered with poor fidelity lead to poorer outcomes (e.g., Dane & Schneider, 1998).

Internet-based technology offers a practical means of improving implementation fidelity while delivering evidence-based programmes.

Computer-based drug prevention programmes have been designed for both universal (Duncan, Duncan, Beauchamp, Wells, & Ary, 2000; Gregor et al., 2003; Gropper, 2002; Schinke, Schwinn, DiNoia, & Cole, 2004; Williams, Griffin, Macaulay, West, & Gronewold, 2005) and targeted populations (Bosworth, Gustafson, & Hawkins, 1994; Schinke, Schwinn, & Ozanian, 2005) and involve youth navigating through simulated real life scenarios (Gregor et al., 2003; Schinke et al., 2004). There is a small literature to suggest that such programmes are both feasible and acceptable (Bosworth et al., 1994; Duncan et al., 2000; Gregor et al., 2003; Schinke et al., 2004; Schinke et al., 2005; Williams et al., 2005).

While computerised alcohol prevention programmes are showing promise in terms of affecting behaviours proximal to alcohol use outcomes (e.g., increase alcohol-related knowledge and attitudes; decrease pro-drinking attitudes; Gropper, 2002; Marsch, Bickel, Badger, 2006; Newton, Teesson, Vogl, & Andrews, 2010; Newton, Andrews, Teesson, & Vogl, 2009; Newton, Vogl, Teesson, & Andrews, 2009; Schinke et al., 2004; Williams et al., 2005), the evidence for behavioural change is more limited as most studies have failed to collect behavioural measures (Duncan et al., 2000; Gregor et al., 2003; Gropper, 2002). Of course, this criticism applies to many alcohol prevention programmes delivered in a variety of formats and the lack of behavioural outcome data is not unique to web-based interventions. One Internet-based programme which has demonstrated positive effects in reducing actual alcohol and other drug use is the series of Climate Schools programmes for alcohol and drug prevention specifically designed to overcome factors which typically compromise programme efficacy. The modules are contemporary, cartoon-based, educational programmes based on a social influence approach to prevention, and consistent with the effective harm minimisation framework (McBride, Farringdon, Muleners, & Midford, 2006). Each Climate Schools module consists of six 40-minute lessons. The first half of each lesson is completed individually online where students follow a cartoon storyline of teenagers experiencing real life situations and problems with alcohol and cannabis. The cartoon storylines are used to engage and maintain student interest and involvement over time (Schinke et al., 2004). The second part of each

lesson is a predetermined activity delivered by the teacher to reinforce the information learned in the cartoons.

The efficacy of the Climate Schools model has been demonstrated for stress reduction (Van Vliet & Andrews, 2009) and alcohol misuse (Newton, Andrews et al., 2009; Vogl et al., 2009). In one study (Newton, Vogl et al., 2009), the Alcohol module of Climate Schools was more effective than usual classes in decreasing average alcohol consumption, frequency of binge drinking (drinking in excess), and alcohol-related harms. A feasibility trial of the Climate Schools programme in the United Kingdom is ongoing and will provide data on the acceptability of this universal programme in the European setting (Newton & Conrod, in preparation).

These findings suggest that the Internet offers a promising delivery method for preventing alcohol and other drug use in adolescents. While there is a strong push to adapt programmes for this delivery method, we also caution that this work should be done with careful evaluation of effects on behaviour, considering the results of studies in which small modifications to the implementation of evidence-based prevention programmes led to iatrogenic effects on behaviour.

Family-based prevention programmes

Universal prevention programmes have also been delivered in the family setting. These approaches typically aim at supporting the development of parenting skills including parental support, nurturing behaviours, clear communication, establishing and enforcing clear boundaries or rules, and parental monitoring. In addition, universal family-based prevention can include components focused on the adolescent such as the development of social skills, peer resistance skills, and appropriate behavioural norms. However, unlike school-based programmes, the latter skills and norms are instilled indirectly, via parents and family, rather than directly to the adolescents themselves. The underlying assumption of family-based prevention is that if young people have a positive family environment, and develop good peer resistance and social skills, they are more likely to develop and adopt the behavioural norms displayed within their families

and to be resilient against external influences such as peer pressure (Foxcroft & Tsertsvadze, 2011b).

At least two systematic reviews have assessed the efficacy of various family-based programmes (Foxcroft & Tsertsvadze, 2011b; Petrie, Bunn, & Byrne, 2007). Petrie et al. (2007) conducted a systematic review of controlled studies of parenting programmes to prevent substance abuse in children and adolescents under the age of 18 years. Data were collected on actual or intended use of alcohol and other substances (tobacco and/or other drugs), and associated risk or antecedent behaviours. Twenty studies met their inclusion criteria. Of these five focused exclusively on alcohol (Loveland-Cherry, Ross, & Kaufman, 1999; Park et al., 2000; Perry et al., 2002; Werch, Owen et al., 2003; Williams, Grechanaia, Romanova, Komro, Perry, & Farbakhsh, 2001), and nine on alcohol and tobacco and/or other drugs (Bauman, Foshee, Emmett, Hicks, & Penberton, 2001; Forman & Brondino, 1990; Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; Johnson et al., 1990; Lochman & Wells, 2003; Pentz et al., 1989; Spoth et al., 2001; Perry et al., 2003; Spoth et al., 2002). Of these 14 studies focusing on alcohol outcomes, 13 were conducted in the U.S. and the remaining study was conducted in Russia (Williams et al., 2001). None were conducted in Europe. Unqualified statistically significant reductions of alcohol use were found in six of these 14 studies (Lochman & Wells, 2003; Park et al., 2000; Pentz et al., 1989; Perry et al., 2002; Spoth et al., 2001; Spoth et al., 2002). Three others showed significant reductions in alcohol use, but only for certain subgroups (i.e., for boys only, Perry et al., 2003; only in a school where kids were bussed in, Werch, Owen et al., 2003; only for those students with no alcohol use prior to the intervention, Loveland-Cherry et al., 1999). One of the 14 studies showed a statistically significant increase in alcohol use, but only for those young people who had already started drinking by the time of the intervention (Loveland-Cherry et al., 1999). Thus, parent-based prevention programmes can be effective in reducing or preventing alcohol use. This review concluded that the most effective approaches are those that emphasise active parental involvement as well as developing skills in social competence, self-regulation, and parenting (Petrie et al., 2007). However, the authors also noted significant heterogeneity in the methodology of the studies, and stressed that more

work is needed to investigate further the long-term effectiveness of parenting programmes.

Of the trials included in the Petrie et al. (2007) review, the only non-North American study was conducted in Russia, with materials based on the American 'Project Northland' programme (Perry et al., 1996). Although the programme increased parent-child communication and led to increases in students' knowledge about the negative consequences of underage drinking, there were no changes in adolescents' actual alcohol use rates by the end of the first year of the three-year programme (Williams et al., 2001). This is in spite of efforts to make the intervention culturally appropriate for the Russian context such as starting a year earlier due to Russian young people's earlier onset of drinking relative to North American youth (Williams et al., 2001). At first glance, this may appear to suggest that other important cultural differences were neglected in the attempted transfer of this parent-based prevention programme, developed in Minnesota, to a non-North American context. However, the original American 'Project Northland' did not achieve changes in students' alcohol use until the third year of the intervention by which time a multi-component intervention had been implemented in addition to the parent-based programme (Perry et al., 1996). We cover multi-component interventions in a later section.

Recently, Foxcroft and Tsertsvadze (2011b) conducted a Cochrane systematic review of evidence on the effectiveness of universal family-based prevention programmes in preventing alcohol misuse in school-aged children and adolescents. Twelve randomised controlled trials evaluating universal family-based prevention programmes and reporting outcomes for alcohol use in students 18 years of age or younger met their criteria and were included in the analysis (Bauman et al., 2002; Brody et al., 2006; Haggerty, Skinner, MacKenzie, & Catalano, 2007; Koning et al., 2009; Loveland-Cherry et al., 1999; O'Donnell, Myint, Duran, & Stueve, 2010; Schinke, Cole & Fang, 2009a; Schinke, Fang, & Cole, 2009b; Schinke, Fang, & Cole, 2009c; Spoth, Lopez Reyes, Redmond, & Shin, 1999; Stevens et al., 2002; Werch et al., 2008). As this review was conducted more recently, only one of the 14 trials covered by Foxcroft and Tsertsvadze (2011b) (i.e., Loveland-Cherry et al., 1999) overlapped with the studies reviewed by Petrie et al. (2007). This review

also built upon the review by Petrie et al. (2007) by examining persistence of effects over the longer term in addition to immediate post-treatment outcomes. The authors found that the reporting quality of trials was poor, and that inadequate reporting of the method of randomization and programme allocation concealment was common. Incomplete data was adequately addressed in about half of the trials and this information was unclear for close to one-third of the trials. Due to extensive heterogeneity across interventions, populations, and outcomes, the results were summarised only qualitatively. Eight of the twelve trials showed statistically significant evidence of effectiveness compared to a control or other intervention group, with persistence of effects over the medium and longer-term (i.e., Brody et al., 2006; Loveland-Cherry et al., 1999; O'Donnell et al., 2010; Schinke et al., 2009a; Schinke et al., 2009b; Schinke et al., 2009c; Spoth et al., 1999; Werch et al., 2008). Four of the effective interventions were gender-specific, focusing on young females and (primarily) their mothers (O'Donnell et al., 2010; Schinke et al., 2009a; Schinke et al., 2009b; Schinke et al., 2009c). One study, with a small sample size, showed positive effects that were only marginally significant at $p = .10$ (Bauman et al., 2002), and three studies with larger sample sizes reported no significant benefits of the family-based intervention for reducing alcohol misuse (Haggerty et al., 2007; Koning et al., 2009; Stevens et al., 2002). In fact, the Stevens et al. (2002) study suggested the intervention resulted in a larger proportion of 'ever drinkers' at the three year follow up relative to a control intervention focusing on other safety behaviours (e.g., helmet, seatbelt use). Taken together, these findings led the authors to conclude that the effects of family-based prevention interventions are small but generally consistent, and also persistent into the medium- to longer-term (Foxcroft & Tsertsvadze, 2011b). The authors also noted that although the effects may be small in magnitude, even small effects can be important from a public health perspective (Foxcroft & Tsertsvadze, 2011b).

All of the studies included in the Foxcroft and Tsertsvadze (2011b) review, save one, were conducted in the United States. The exception was a single European trial, conducted in the Netherlands, which focused on parental rule-setting around their offspring's alcohol use (Koning et al., 2009). This parent intervention was modeled after the Swedish 'Orebro Prevention Programme' which had been tested

previously in a quasi-experimental study and which had been shown to be effective in reducing underage drunkenness in Sweden (Koutakis, Stattin, & Kerr, 2008). Koning et al.'s (2009) objectives were to test this intervention more rigorously (in a randomised controlled design), and to examine the generalizability of the effects of this parental intervention in a context where adolescent drinking is much more prevalent than in Sweden (see Chapter 1). In the Dutch study, the parental intervention was compared to a school-based, youth-focused, intervention, each provided alone or in combination in a two by two factorial design. Unlike the Swedish findings (Koutakis et al., 2008), the parental intervention alone had no significant effects on any of the alcohol outcomes (heavy weekly drinking, weekly drinking, drinking frequency) at either 10 or 22 months post-intervention. The results suggest that parental rule setting alone may be less effective in deferring the onset of adolescent drinking in countries with more liberal alcohol policies and lower legal drinking ages (e.g., the legal drinking age in the Netherlands is 16 years and there is weaker enforcement of laws that prohibit selling of alcohol to minors). It would be interesting to see if parental interventions are any less effective in Canada than in the U.S. given the differences between these two North American countries in legal drinking age. Despite the absence of any evidence of efficacy of the parental intervention alone in the Koning et al. (2009) study, there were clear and persisting effects of the combined parent- and child-focused intervention on a variety of alcohol outcomes. These findings of this study are discussed in the next section, and suggest that both parents and children should be targeted simultaneously in multi-component interventions to achieve best results, at least in the Dutch context.

Before concluding this section, it is worth reiterating that two of the trials reviewed by Petrie et al. (2007) and Foxcroft and Tsertsvadze (2011b) showed evidence of increases in alcohol use in the experimental group receiving the family based intervention (i.e., Loveland-Cherry et al., 1999; Stevens et al., 2002). These findings warn of the potential for iatrogenic effects of these interventions in certain cases. But as Foxcroft and Tsertsvadze (2011b) caution, the possibilities that these effects may have arisen by chance, or that they are secondary to differential attrition across groups or to confounding factors, need to be ruled out before we

can conclude any iatrogenic effects of particular family-based interventions.

MULTI-COMPONENT PREVENTION PROGRAMMES

Multi-component prevention approaches are programmes where the intervention is delivered in multiple different settings. For example, the intervention might occur in both family and school settings, potentially combining a parental intervention with school-based prevention curricula, as described in earlier sections. Thus, in school settings, a multi-component prevention typically takes the form of alcohol awareness education, social and peer resistance skills training, normative feedback, and/or development of behavioural norms, and positive peer affiliations. The family-based component often aims to support the development of parenting skills and parental monitoring, and/or helping parents to establish clear rules around alcohol use (Foxcroft & Tsertsvadze, 2011c). The parent- and child-focused components are most commonly delivered simultaneously.

A Cochrane systematic review was recently conducted on universal multi-component programmes in preventing alcohol misuse in school-aged children and adolescents (Foxcroft & Tsertsvadze, 2011c). The authors identified 20 parallel-group randomised controlled trials evaluating prevention programmes where the intervention was delivered in more than one setting and reported outcomes for alcohol use in students up to age 18 years (i.e., Brown, Catalano, Fleming, Haggerty, & Abbott, 2005; Eddy, Reid, & Fetrow, 2000; Furr-Holden et al., 2004; Hawkins et al., 2009; Komro et al., 2006; Koning et al., 2009; Perry et al., 1996; Perry et al., 2003; Reddy et al., 2002; Schinke et al., 2004; Shortt, Hutchinson, Chapman, & Toumbourou, 2007; Simons-Morton, Haynie, Saylor, Crump, & Chen, 2005; Slater et al., 2006; Spoth, Redmond, Trudeau, & Shin, 2002; Spoth et al., 2007; Werch & Pappas et al., 2000; Werch, Moore et al., 2003; Werch, Moore, DiClemente, Bledsoe, & Jobli, 2005a; Werch et al., 2005b; Wu et al., 2003). Of these 20 trials, two were previously reviewed by Petrie et al. (2007) (i.e., Perry et al., 2003; Spoth et al., 2002) and one was previously reviewed by Foxcroft and

Tsertsvadze (2011b) (i.e., Koning et al., 2009). As in the previous systematic reviews, the methodological quality of the trials and reporting of study details was noted to be poor, and extensive heterogeneity across interventions, populations and outcomes was once again found. In 12 of the 20 trials reviewed by Foxcroft and Tsertsvadze (2011c), some evidence of effectiveness was found for the multi-component intervention compared to a control or other intervention group (Brown et al., 2005; Eddy et al., 2000; Hawkins et al., 2009; Koning et al., 2009; Perry et al., 1996; Reddy et al., 2002; Schinke et al., 2004; Slater et al., 2006; Spoth et al., 2002; Werch, Pappas et al., 2000; Werch et al., 2005a; Werch et al., 2005b; Wu et al., 2003). The comparison groups included a no intervention control, educational booklets, face to face interviews, and parent post cards. Four of the 12 effective interventions only assessed immediate post-treatment outcomes (i.e., Brown et al., 2005; Hawkins et al., 2009; Perry et al., 1996; Reddy et al., 2002) while the other eight assessed and demonstrated durability of effects ranging from three months (Werch et al., 2005b) to three years (Eddy et al., 2000; Schinke et al., 2004) post-treatment.

Assessment of the additional benefit of multiple versus single component interventions was possible in seven of the 20 trials reviewed by Foxcroft and Tsertsvadze (2011c). Only one of them clearly showed a benefit of having multiple components. Interestingly, this was the Dutch trial (Koning et al., 2009) discussed earlier in the review of family-based preventions. This trial found the combined, multi-component, student-parent intervention to show substantial and statistically significant effects on heavy weekly drinking, weekly drinking, and frequency of drinking at post-treatment and sustained effects on weekly drinking and frequency of drinking at 22 month follow up. The systematic review by Foxcroft and Tsertsvadze (2011c) thus concluded that there is some evidence that multi-component interventions for alcohol misuse prevention in young people can be effective. They also concluded, however, that there is little evidence that interventions with multiple components are more effective than those with a single component (Foxcroft & Tsertsvadze 2011c).

Of the 20 studies reviewed by Foxcroft and Tsertsvadze (2011c), 17 were conducted in the U.S., one in the Netherlands (Koning et al., 2009), one in Australia (Shortt et al., 2007), and one in India (Reddy et al., 2002).

Of those conducted outside of the U.S., two showed evidence of efficacy of the multi-component intervention (Koning et al., 2009; Reddy et al., 2002). The Dutch trial has been discussed previously. The Indian trial, conducted in New Delhi, was a school- plus family-based intervention focused on improving children's cardiovascular health through better nutrition, better diet, and decreased smoking; alcohol use was *not* a focus of the intervention. The multi-component intervention was compared to the school-based intervention alone and to a no treatment control. The school-based programme was multifaceted and included training in refusing offers to smoke. The family-based intervention consisted of a series of six booklets containing information and family activities focused on improving children's cardiovascular health. The family booklets were culturally adapted from those used in similar previous work in the U.S. (Luepker et al., 1996; Perry, Luepker, Murray, & Hearn, 1989). Even though the intervention did not focus on alcohol, significant effects of the two interventions were found relative to the control group in terms of reductions in proportion of children reporting ever using alcohol and those intending to drink as adults. The authors speculated that these effects on alcohol outcomes may have been due to the fact that since alcohol and tobacco use are very often co-occurring behaviours, an intervention which is effective in reducing tobacco use may also delay alcohol use (Reddy et al., 2002). There were no differences between the school-based only intervention and the multi-component intervention indicating that there was no additional benefit on alcohol use of sharing the booklets with the families. This may have been due to an insufficient dose of the family-based component, the unsupervised nature of the booklet activities, and/or the lack of interactive intervention with the parents.

The Australian trial (Shortt et al., 2007), conducted in Melbourne, examined the outcome of the Resilient Families intervention which involved both school-based and parent-based components. For the school based component, the student curriculum included communication skills, relationship problem solving, emotional awareness training, peer resistance skills building, and conflict resolution skills among the adolescents. The parents were offered both brief and extended training in enhancing parenting skills and encouraging a more positive relationship between parents and their adolescents (Shortt et al.,

2007). Although the Resilient Families programme did increase within-family connectedness and problem solving skills as intended, and although it was associated with improvements in both the educational and family environments, intervention effects were not statistically significant predictors of student alcohol use after controlling for other important influences (e.g., peer influences). There are several potential explanations for the lack of significant effects of this multi-component intervention on student alcohol use outcomes. First, the intervention may need to be implemented earlier given the high prevalence of alcohol use in the sample. Second, it is possible that effects still may be observed as this analysis was only for the first year of the intervention. Third, it is certainly possible that the failure to observe effects was due to the lack of interventions focusing specifically on alcohol (e.g., no training for parents in monitoring children's alcohol use, nor in setting rules about their children's alcohol use; no specific training for students in drink refusal skills). Finally, not all parents attended the parent sessions. Those who did were already higher in family connectedness, potentially reducing the usefulness of these sessions for these particular families. Future work might examine cross-cultural similarities and differences in the efficacy of multi-component interventions involving both school- and family-based components in preventing, or decreasing (heavy) alcohol use in adolescents.

Besides parents and the family, multi-component approaches can also involve a broader community initiative, such as consultation with the police, health professionals, city officials, or local residents, to formulate and support the intervention. Wood, Shakeshaft, Gilmour, and Sanson-Fisher (2006) conducted a systematic review of school-based prevention trials that also involved the community. The authors reviewed 16 studies (Abbey, Pilgrim, Hendrickson, & Buresh, 2000; Aseltine, Dupre, & Lamlein, 2000; Cuijpers et al., 2002; D'Amico & Fromme, 2002; Dedobbeleer & Desjardins, 2001; Dixon & McLearen, 2002; Ellickson et al., 2003; Peleg, Neumann, Friger, Peleg, & Sperber, 2001; Perry et al., 2002; Perry et al., 2003; Schinke et al., 2000; Spoth et al., 2001; Spoth et al., 2002; Werch, Carlson, Pappas, Edgemont, & DiClemente, 2000; Werch, Owen et al., 2003; Williams et al., 2001), 15 of which examined alcohol use outcomes (i.e., all but Abbey et al., 2000). Several of these studies were included in previously discussed systematic reviews (Perry et

al., 2002; Perry et al., 2003; Spoth et al., 2001; Spoth et al., 2002; Werch, Owen et al., 2003; Williams et al., 2001). The authors' goal was to describe and critique the methodologies of multi-component intervention studies that were school-based, but also incorporated a broader community intervention component. Like previous reviews, the authors identified that reviewed studies were often methodologically lacking (Wood et al., 2006). These authors did not conduct a full meta-analysis because of the poor methodological quality of the studies and the heterogeneity in alcohol outcome measures employed. But they did include a brief analysis of effect sizes for the 15 studies that examined alcohol use (i.e., lifetime use, past year use, use in past week or month, initiation into drinking, or binge drinking) as an outcome. In general, limited effectiveness was found, with initial effect sizes that were relatively small in magnitude. However, Wood et al. (2006) noted that most studies used relatively few community components (e.g., only three studies used more than six community components). Thus, they suggested that there is a need for additional studies that attempt to enhance the efficacy of school-based programmes by including broader community components such as media, community services, and alcohol retailer involvement (Wood et al., 2006). In fact, from a more theoretical viewpoint, it has been argued that effective long-term prevention programmes for the reduction of youth drinking require strategies for the wider community and societal change (Wagenaar & Perry, 1994).

Of the 15 studies reviewed by Wood et al. (2006), 11 were conducted in the U.S., one was conducted in the Netherlands (Cuijpers et al., 2002), one in Canada (Dedobbeleer & Desjardins, 2001), one in Israel (Peleg et al., 2001), and one in Russia (Williams et al., 2001). The Russian trial was discussed previously. The Israeli study involved randomising grade ten youth to an active intervention or no intervention control. The multi-component intervention involved collaboration between the schools and the community and was put on by school staff and the psychological counseling service in Israel. The intervention took place over three days and included guest lectures by experts as well as adolescent workshops, on topics such as peer pressure, effects of advertising on behaviour, and taking responsibility for one's actions. Students viewed relevant films and took part in role plays. Efficacy of the intervention was examined at one and two year follow-up. While there was growth in alcohol use in the

control group, there was no significant change from baseline in the intervention group over the follow-up, suggesting that the intervention reduced growth in alcohol use over time. The results thus support the efficacy of a multi-component school- plus community-focused intervention in the Israeli context (Peleg et al., 2001).

The Dutch study was a quasi-experimental study of the Healthy School and Drugs project (Cuijpers et al., 2002). This programme is run by a coordinating committee (including school and community representatives) and involves parents. The student-focused component involves three lessons about alcohol (information, development of a healthy attitude towards alcohol use, and drink refusal skills). Schools develop clear policies on alcohol use at school and school events, plans for early detection of students with alcohol problems, and provision of support and counseling for identified students. Significant effects of the intervention on alcohol use were found which persisted at two years following the intervention (Cuijpers et al., 2002).

The Canadian trial, however, provided less promising results regarding the efficacy of multi-component interventions involving both the school and community in changing adolescent alcohol use. Dedobbeleer and Desjardins (2001) studied the efficacy of the multi-component 'Coalition for Youth Quality of Life Project' which was designed to prevent alcohol use and misuse among multi-ethnic youth in Montreal. The intervention was delivered through four channels: schools, community organizations, local government, and families. They targeted sixth and eighth graders who were followed up at 18 and 30 months. Although the programme led to significant effects on several hypothesised mediators (e.g., higher self-esteem and superior peer-resistance skills in the younger students; more leisure alternatives to alcohol and other substance abuse in the older students), the programme had no significant effects on alcohol use. Several possible explanations were considered by the authors including differential attrition across treatment arms, insufficient power, insufficient dose of intervention, and lack of booster sessions (Dedobbeleer & Desjardins, 2001). Since this particular programme has only been assessed in Canada, it is difficult to know to what degree cultural factors might play a role in the failure of this multi-component intervention to exert effects on adolescent drinking behaviour. However,

considering the lack of strong cultural effects on other school-based programmes, it is not likely that the cultural context can entirely explain these null findings.

SUMMARY

There are several contexts in which youth alcohol prevention can be delivered. The school context appears to capture a larger percentage of the target population and yields the most consistent effects relative to other contexts, such as the family context or the community. The school-based programmes that are most effective are comprehensive programmes which concurrently address normative attitudes about drinking and teach generic and alcohol refusal skills. Universal programmes delivered in high schools to students before the normal age of onset of drinking show consistent effects on drinking behaviour, mostly binge drinking, and have been shown to have effects in the North American, European, and Australian contexts. However the effects are small, accounting for only 10% of the variance in drinking behaviour, and there are signs that these programmes might be more effective if delivered to populations at greater risk for early drinking and problem drinking. There is new research from Australia suggesting that the effectiveness of universal, comprehensive programmes might be enhanced with the addition of web-based resources. However, web-based programmes have not been tested in Europe and the U.S. high school context, with a number of pilot studies and ongoing trials suggesting that this modification is feasible and might lead to improved fidelity when implementing evidence-based universal intervention programmes.

Effective selective prevention strategies include those that target youth with known individual risk factors for alcohol misuse, including personality risk factors or behavioural problems prior to the onset of alcohol use. These programmes show stronger and long-term effects on drinking onset, binge drinking onset and problem drinking symptoms in high-risk populations. Two studies show that they might also benefit peers in the broader social network of high-risk youth. Therefore, while

these evidence-based selective programmes only target a portion of the adolescent population, they might also have universal effects. The selective approach has been shown to be equally effective in the North American and European contexts and shows some advantages relative to other approaches in that it is also effective in reducing and preventing mental health problems that tend to co-occur with alcohol misuse. Large trials of personality-targeted interventions for high school students are currently being conducted in Canada, the Netherlands, and Australia to address some outstanding questions, such as how does this approach compare to, and combine with, evidence-based universal programmes?

While not all indicated prevention programmes were reviewed in this chapter, brief interventions with college students who show early signs of heavy drinking or problem drinking do show promise. Specifically, interventions that include personalised feedback and normative feedback, as well as some brief motivational principles do show some effects on drinking behaviour among college students, and there is some limited research indicating that this approach could be effective with adolescents. There is also some experimental research on expectancy challenges and cognitive control training, but the evidence is limited so far, with more rigorous research needed to support this approach over and above other evidence-based approaches.

The family is another context in which prevention programmes are delivered. These are delivered to parents alone or in combination with a child-focused intervention (multi-component). While the family-based approach is less practical and economical to deliver than the school-based approach, one advantage is that it has the potential to address underlying family factors implicated in a number of alcohol and behavioural problems. The evidence in favour of the approach is consistent and suggests small effects that are persistent over the medium to long term. However, the evidence is only positive for the U.S. context and no study has yet shown this approach to be effective outside the U.S. Finally, comparative studies in the U.S. and Europe suggest that parent training does not offer any incremental effects over an effective school-based comprehensive programme.

Several conclusions can also be drawn about the use of multi-component programmes (school plus family; school plus community). First, multi-component interventions can be effective for alcohol misuse prevention in young people. However, generally speaking, interventions with multiple components are no more effective than those with a single component, raising questions as to cost-effectiveness of multi-component programmes. Nonetheless, multi-component programmes may be particularly useful in some cultural contexts. For example, there is some limited evidence that both parents and children should be targeted simultaneously in countries like the Netherlands with more liberal alcohol policies and lower legal drinking ages.

CONCLUSIONS

While some comparative research has been conducted to investigate the relative and incremental effects of these approaches, much more research is needed in this regard. It will be important to investigate how universal comprehensive programmes compare and combine with selective prevention approaches to improve outcomes in low- and high-risk adolescents. The Australian Climate Schools and Preventure (CAP) Study (Newton, Teesson, Barrett, Slade, & Conrod, 2012; https://www.capstudy.org.au) is one trial that begins to address these questions. Furthermore, research on the mediators and moderators of these evidence-based programmes will help us better understand how they are having their effects on youth drinking behaviour, which might also lead to more refined and more effective interventions. Another question worthy of further investigation is how web-based materials and resources enhance evidence-based universal and selective approaches. However, as with all preventative interventions, this should be done with careful evaluation, given the potential for negative effects of poorly implemented programmes. Finally, while some experimental research is showing that cognitive and behavioural control training might improve outcomes for alcoholics and problem drinkers, there is a need to investigate how interventions that target some of the implicit and automatic aspects of addiction vulnerability can further improve outcomes for the general adolescent population and those at-risk.

To improve implementation of evidence-based alcohol prevention programmes, many jurisdictions have developed and disseminated prevention standards. For example, the Canadian Centre on Substance Abuse (CCSA) has developed a portfolio of *Canadian Standards for Youth Substance Abuse Prevention*. These consist of three separate documents outlining school-based standards (CCSA, 2010a), family skills-based standards (CCSA, 2010b), and community-based standards (CCSA, 2010c), respectively. Each was developed following a review of the evidence by a panel of experts. A useful future direction would be to create a set of standards that apply to youth alcohol prevention in the international context. Such international standards could include guidelines for adapting alcohol prevention programmes that have been demonstrated effective in one context, for use in new cultural contexts.

RECOMMENDATIONS

With the direct and indirect costs of alcohol misuse being somewhere in the range of U.S. $500-$1500 per capita (Rehm, Patra, Gnam, Sarnocinska-Hart, & Popova, 2011), there is clearly an argument for government investment in the evidence-based programmes highlighted in this chapter. Studies involving health economic analyses of alcohol and drug prevention programmes have estimated that for every dollar invested in prevention, five to ten dollars are directly returned (e.g., Spoth, Greenberg, & Turrisi, 2008). Therefore, even programmes that yield small effects can be justified economically and will lead to real public health benefits. Nevertheless, prevention programmes often comprise less than 1% of government alcohol-related costs (Rehm et al., 2006). In addition to more research on the incremental effects of evidence-based interventions, health-economic data on these programmes are needed to help guide policy makers around improving children's access to these effective intervention programmes. As shown in this chapter, we now have many North American and European programmes that have been demonstrated to be effective in alcohol prevention among youth which now can be disseminated. Further research on these approaches needs to go hand-in-hand with a massive implementation strategy in order for youth to maximally benefit from these programmes.

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Recommendations

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This chapter attempts to draw recommendations based on evidence presented in Chapters 1 - 3 on *underage* drinking in European countries, the U.S., and Canada. As stated in previous chapters, *underage* drinking means different things in different cultures so this review has focused on research covering the second decade of life, which includes mostly studies on adolescent drinking, especially middle and high school students, as well as some relevant studies on college student drinking. The literature review has led us to provide a number of recommendations aimed at: 1) delaying the age of onset of drinking and 2) preventing heavy episodic (i.e., binge) drinking (usually defined as 4 or more drinks per occasion for females and 5 or more for males) and intoxication among youthful drinkers. By achieving these goals, many of the short-term and long-term problems associated with drinking by youth will be reduced.

We would like to work towards a situation where all young people can have access to effective prevention programmes with good fidelity. Considering the harms associated with early onset use, all policies, whether they target demand for, or supply of alcohol to young people, should be aimed at delaying the onset of regular or heavy drinking. However, only evidence-based policies should be promoted and this report offers policy-makers with a review of the evidence-base for interventions aimed at reducing demand on the part of young people. A similar review of the interventions aimed at reducing supply/availability

of alcohol to young people in Europe and North America should be made available to policy makers to further protect young people from alcohol-related harm.

The current prevalence and patterns of *underage* drinking are set out in Chapter 1. This chapter concludes that drinking is a normative behaviour among adolescents in both the European and North American contexts. Lifetime and annual prevalence rates are on average much higher in Europe than in the U.S. and Canada yet prevalence rates for drunkenness do not differ that greatly across the two continents. However, this conclusion masks some differences across individual countries in terms of frequency, quantity, and intoxication levels. Some countries, mostly in the north of Europe, and to some extent Canada, show a drinking culture with less frequent drinking but a tendency to drink to intoxication. In the south of Europe, the drinking culture is characterized by drinking more moderately and more frequently, while in the U.S. the drinking culture is generally moderate compared to most of the other countries examined in Chapter 1. However, the traditional classification of countries into "dry" and "wet" drinking cultures does not fit well for classifying the drinking of contemporary young people. This is due to many factors, one of them being the converging alcohol consumption levels in countries across Europe with per-capita consumption among the general population falling in southern and rising in northern Europe. Although, the most recent data show a decline in adolescent drinking in the U.S. and Europe (trend data are not available for Canada as a whole), the fact that last year 39% of European 15- or 16-year-olds consumed five or more drinks at least once in the last month and 15% of U.S. 10^{th} graders consumed that amount in the last two weeks indicates that there is still a serious problem around *underage* drinking.

RECOMMENDATIONS FOR PREVENTION

Chapters 2 and 3 clearly indicate that there are some risk factors which cannot easily be modified, such as genetics (although the expression of genetic risk may be moderated) and socio-economic status, which may be addressed by public policy or environmental interventions, such as

efforts to reduce child poverty. Fortunately, there are also many other risk factors which do respond to effective interventions and which inform the recommendations made below. In addition, there are a variety of actions which can effectively reduce drinking in young people and prevent associated harms. The evidence base for all the recommendations set out below appears in the previous chapters. The recommendations are grouped by subject. It should be highlighted that we recommend that all interventions should adhere to evidence-based treatment protocols and be delivered by trained personnel. Furthermore, we note that there is a need for more research to evaluate evidence-based programmes, especially outside of the U.S. Finally, we need to determine whether those interventions which are effective in one country are transferrable to another country and what types of changes need to be made to an intervention in order to make it culturally appropriate for delivery in another country. In addition, we recommend that all interventions should be implemented with careful evaluation of behavioural outcomes.

Recommendations Regarding the Role of Parents and Families

- Parents should provide effective parental monitoring, consistent rule setting, and clear communication about alcohol.
- Parents should consistently disapprove of binge/heavy drinking.
- In most instances, except perhaps family or religious gatherings, parents should avoid providing alcohol to adolescents.
- Parents should maintain an active involvement with the activities of their children, including helping direct their selection of a peer group.
- Parents should be encouraged to monitor their children's social media sites, especially for their alcohol content.
- Parents should avoid modelling heavy drinking or intoxication.
- In selecting alcohol prevention programmes, it should be kept in mind that parent-based programmes can be effective in preventing or reducing alcohol use in young people and that the most effective parent-based programmes emphasise active parental involvement as well as development of competence, self-regulation, and parenting skills.

- In selecting an alcohol prevention programme, family-based prevention programmes should be considered. Although their effects are small, they are generally consistent and long lasting, and even small effects can be important from a public health perspective.
- In countries with more liberal alcohol policies and lower legal drinking ages, parental programmes should be combined with other evidence-based programmes.

Recommendations for School Programmes

- Policy makers and service deliverers should attempt to deliver programmes that have been shown to be evidence-based within a cultural and social context that closely matches the context in which they wish to deliver that particular programme.
- Small modifications to programme delivery methods and content should always be tested, considering the potential for iatrogenic effects in alcohol prevention.
- It is best to deliver alcohol prevention in sequential and developmentally appropriate stages.
- Normative feedback, especially for high school students, should be provided in the context of a comprehensive approach to skill development.
- Universal interventions should not be exclusively delivered by police or other authority figures.
- Prevention programmes should use an interactive delivery style.
- Targeted school-based prevention programmes should be introduced in the early adolescent years, ideally before initial exposure to alcohol.
- Selective interventions should be targeted toward at-risk groups, particularly those with personality or behavioural traits that put them at-risk for alcohol use disorders and for whom targeted interventions have been shown to be effective. Other at-risk groups have been identified, but should only be targeted in prevention with programmes that have an evidence base for those particular populations.
- Strategies such as personalized feedback designed to correct misperceived norms for both high school and college students

should not be used as a method to prevent onset of drinking and are indicated as a method to reduce drinking in those who have already begun to drink, particularly those who drink more heavily.

- Researchers and practitioners should consider adapting evidence-based programmes for use on the Internet, but more research is needed in both Europe and North America before this becomes standard practice (see research recommendations below).
- When disseminating an efficacious alcohol prevention programme, it is very important to attend to intervention fidelity including adequate training and supervision of those delivering the intervention.
- As it has been shown that school staff can be trained to effectively deliver evidence-based universal (e.g., Life Skills Training/ Unplugged) and selective (e.g., Personality-targeted) programmes, we recommend public investment in broader dissemination of training in these and other evidence-based practices
- Greater investment in comparative effectiveness and cost effectiveness research will guide policy makers to develop effective strategies for broader dissemination of alcohol prevention.
- An international system for evaluating and disseminating evidence-based practices in alcohol prevention should be made available to the public and maintained by a research organisation that is neutral with respect to a theoretical approach to prevention, yet experienced with respect to reviewing and synthesizing the evidence base.

Recommendations Regarding Multi-component Programmes

- When selecting an alcohol prevention programme, it should be kept in mind that multi-component interventions for alcohol misuse prevention in young people can be effective, although generally speaking, interventions with multiple components are no more effective than those with a single component.
- However, there is some limited evidence from one study that both parents and children should be targeted simultaneously in multi-component interventions in countries with more liberal alcohol policies and lower legal drinking ages.

RECOMMENDATIONS FOR FURTHER STUDY

The research reviewed in Chapters 1-3 identified several gaps in the literatures. Most importantly, there has been inadequate evaluation of interventions for youth to prevent alcohol onset and later heavy drinking and a paucity of cross-cultural studies comparing intervention approaches. Below we list some additional areas of research, which we think are critical for guiding future development of appropriate interventions and enactment of policies to deal with the problems related to youthful drinking.

Epidemiological Research

- Definitions and measurement of drinking patterns, including heavy episodic (binge) drinking should be standardized across studies.
- Better assessment of the exact amounts consumed should be collected and details reported in national surveys.
- In addition to analysing drinking behaviours across all youth, some analyses should provide results for drinkers only, to shed more light on cross-cultural differences in drinking patterns.
- Data should be collected to better estimate blood alcohol concentration levels (i.e., information on duration of consumption, gender, and weight).
- More qualitative research is needed to understand youth's perceptions of and motivations for drunkenness and how these attitudes are culturally influenced.

Research on Risk and Protective Factors

- Better controlled studies are needed for regional and cross-national comparisons to understand the influence of parental supervised alcohol use within the family setting on *underage* drinking in different cultural/drinking contexts.
- More quantitative and qualitative research is needed to compare risk and protective factors and their association with drinking outcomes across European and North American countries.

- More research utilizing "natural experiments" (e.g., adoption studies, twin studies, longitudinal studies of samples experiencing important secular changes) is needed to clarify the causal status of several risk factors.
- More research is needed on both implicit and explicit alcohol-related cognitions in adolescents to determine the causal status of these cognitive processes in youth.
- Controlled, experimental studies are needed within naturalistic settings, such as those relating exposure to alcohol-related content in films/movies with adolescent drinking.
- Research is needed on the effects of social media and, in particular, the practice of posting alcohol-related messages by *underage* people (on Facebook, Twitter, etc.).

Intervention Research

- More research comparing peer-led versus professionally-led interventions is needed to clarify their relative effectiveness in different situations, and what factors might moderate their effectiveness.
- More research should evaluate the use of web-based adaptations of evidence-based programmes for adolescents and parents, with an emphasis on evaluating their behavioural outcomes.
- More research should evaluate web-based adaptations of evidence-based training programmes for teachers and providers.
- More research should evaluate the use of social media and other technologies to promote youth access to evidence-based interventions.
- Research is needed to evaluate the use of social media and the internet to better disseminate knowledge and guidelines for evaluating the evidence in support of prevention programmes and policies.
- More research should systematically evaluate the cultural and policy-level contexts that may enhance or interfere with the impact of evidence-based programmes.

- More work is needed to further investigate the effectiveness of parent-based alcohol prevention programmes, especially in different cultures.
- Future work should examine cross-cultural similarities and differences in the efficacy of multi-component interventions involving both school- and family-based components in preventing or decreasing alcohol use in adolescents.
- There is a need for additional studies that attempt to enhance the efficacy of school-based programmes by including broader community components such as media, community services, and alcohol retailer involvement within a multi-component intervention.
- Research has demonstrated that both implicit and explicit alcohol-related cognitions are malleable in adults with promising outcomes, but hardly any research has been done in adolescents. More research is needed on this topic to develop new intervention strategies to moderate drinking in this age-group.
- More data are needed on the health-economics of alcohol prevention programmes with youth to help guide policy makers around improving young people's access to effective intervention programmes.

CONCLUSIONS

This report represents an attempt to provide information to researchers and policy makers from Europe and North America to help them address the issues related to *underage* drinking. We hope that a dialogue will begin and that we will move towards the development and implementation of efficacious programmes that can delay the onset of drinking among youth and reduce the extent of heavy and problematic drinking on both continents. More governmental funding of research and greater spending on evidence-based prevention programmes and comparative research evaluating programmes will help achieve these goals.

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The complexity and importance of underage drinking prompted ERAB and ABMRF to initiate a state of the art review. It explores the extent of underage drinking across Europe and North America, as well as our current understanding of factors that increase the risk of this behaviour and potentially effective evidence-based approaches to prevent underage drinking. Unfortunately, the problem is complex and a single solution or policy to prevent underage drinking does not exist. Nevertheless, a number of strategies are effective in some circumstances and warrant further study in different populations. Preventing risky drinking requires understanding of the important influence of family and peers. It is also important to recognize that some genetic traits like impulsivity, anxiety, sensation seeking and emotional dysregulation can also influence harmful drinking. These aspects (family and peers and genetic influence) are affected by cultural and environmental influences which, in turn, can influence each other.

The overall goal of this project was to develop a set of recommendations that could be used by public health departments and key stakeholders in the individual countries that make up Europe and the United States and Canada. It is clear that a single solution to this problem cannot be identified, given the different cultural backgrounds. In addition to providing a menu of effective strategies, recommendations on the best method for applying them in different cultural settings are included.
Although individual interventions may have low efficacy when used in isolation, combining several interventions may improve overall effectiveness.

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