Binge Drinking and Europe

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Needless to say, any errors or omissions in the content of the report are the sole responsibility of the author.

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SUMMARY

Binge drinking in Europe

Some 80 million Europeans aged 15 years plus (over one fifth of the adult EU population) reported binge drinking (defined as five or more drinks on an occasion, 50g alcohol) at least once a week in 2006, a proportion that has increased since 2003, at least for the adult population of the EU15[1]. Some 25 million Europeans aged 15 years plus (1 in 15 of the adult population) reported that binge drinking was their usual pattern of consumption during the previous month. Whereas 24% of those aged 15-24 years reported binge drinking at least once a week in 2006, binge drinking was also common amongst those aged 55+ years, with 18% binging at least once a week. The average amount of alcohol consumed by EU 15-16 years olds on their last drinking occasion was six drinks, 60g alcohol (2003 data). Over 1 in 6 (18%) of EU 15-16 year olds have binged (5+ drinks on a single occasion, 50g alcohol) three times or more in the last month (2003 data). Binge drinking has increased across Europe amongst 15-16 years olds since 1995, although less so in recent years.

The harm done by binge drinking

Alcohol is a toxic substance that can harm almost any system or organ of the body, and is related to more than 60 different disorders with short and long term consequences. For many conditions there is an increasing risk with increasing levels of alcohol consumption, with no evidence of a threshold effect below which alcohol can be regarded as entirely risk free. Alcohol use and a pattern of binge drinking are associated with an increased risk to the individual of negative social consequences, reduced work performance, injuries, drink driving accidents, brain damage, alcohol dependence, suicide, stroke, irregular heart rhythms, coronary heart disease, sexually transmitted diseases, and premature death. Alcohol use and a pattern of binge drinking are associated with an increased risk to people other than the drinker (third party harm) including negative social consequences, injuries at work, violence and crime, interpersonal violence, accidents from others' drink driving, sexually transmitted diseases, and to the unborn child, a range of neuro-behavioural deficits running through to adolescence and with lifelong consequences.

The consequences of binge drinking in Europe

Across different European countries, it has been estimated that some 7% to 80% of crime and some 16% to 71% of domestic or intimate partner violence is linked to intoxication. Each year in the European Union, episodic heavy drinking is related to 2,000 homicides (4 in 10 of all murders), 17,000 deaths from road traffic accidents (1 in 3 of all road traffic fatalities), including 10,000 deaths of people other than the drink-driver, 27,000 accidental deaths, 10,000 suicides (1 in 6 of all suicides), 16% of all child abuse and neglect, with some 5-9 million children living in families adversely affected by alcohol. Alcohol is a cause of 7.4% of the total burden of disability and premature death facing Europe, with a high proportion of this burden due to alcohol-related injuries. Alcohol-related injuries are also an important cause of inequalities in health between and within European countries. Throughout Europe, changes in death rates from accidents, homicides and suicides parallel changes in overall levels of alcohol consumption.

Regulating the availability and marketing of alcohol

There is a wealth of evidence across different countries that making alcohol more expensive, primarily though taxation, reduces a wide range of harms done by intoxication and binge drinking, including road traffic accidents and fatalities, intentional and unintentional injuries, rapes and robberies, homicides, crime, and violence. Similarly, there is a wealth of evidence that raising the minimum purchasing age reduces alcohol related road traffic accidents, and that reducing the density of alcohol outlets reduces drunkenness, assaults, and road traffic fatalities. Extending the hours and days of sale spreads acute alcohol related problems over a longer period of time at the cost of an increased number of problems. Similarly, reducing hours and days of sale reduces problems of binge drinking. A number of well designed longitudinal studies show that the volume of advertisements and media exposure increase the

[1] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

likelihood of young people starting to drink, the amount they drink, and the amount they drink on any one occasion.

Creating safer drinking environments and communities

There is growing evidence for the impact of strategies that alter the drinking context in reducing the harm done by binge drinking. However, these strategies are primarily applicable to drinking in bars and restaurants, and their effectiveness relies on adequate enforcement. Passing a minimum drinking age law, for instance, will have little effect if it is not backed up with a credible threat to remove the licenses of outlets that repeatedly sell to the under-aged. Such strategies are also more effective when backed up by community-based prevention programmes.

Educating to reduce binge drinking

Although there are individual examples of the beneficial impact of school-based education in reducing binge drinking, systematic reviews and meta-analyses find that the majority of well-evaluated studies show no impact even in the short-term. A policy that fails more often than not cannot be considered an effective policy option. There is considerable experience of what might be best practice in school-based education programmes, but currently unconvincing evidence for their effectiveness. This is not to imply that education programmes should not be delivered, since all people do need to be informed about the consequences of binge drinking, but school based education should not be seen as an effective measure to reduce the harm done by binge drinking. Public service announcements, public education campaigns, and those that focus on low risk drinking guidelines also have limited evidence for effectiveness, although media advocacy approaches are important to gain public support for policy changes.

Health care interventions and binge drinking

There is a considerable evidence base that brief advice delivered in primary health care settings and in accident and emergency departments is effective in reducing hazardous and harmful alcohol consumption and alcohol related harm, including an overall risk of death. However, although a number of studies have found an effect in reducing the consequences of binge drinking, such as alcohol-related injuries, a meta-analysis of the small number of studies that have measured binge drinking itself find no evidence of an effect of brief advice.

Cost effective approaches to reducing binge drinking

There have been no specific analyses of the cost effectiveness of different alcohol policy measures in reducing alcohol-related harm specifically from binge drinking, although the World Health Organization's CHOICE project modelled five policy options to reduce the disability adjusted life years that were due to alcohol consumption of more than 20g alcohol a day for women and more than 40g alcohol a day for men. The model found that the most cost-effective policy options in reducing alcohol-related DALYs in the European Union were taxation, restricted access, and advertising bans. According to a Eurobarometer survey undertaken at the end of 2006, two thirds of the European Union population (68%) believe that higher prices for alcohol would not discourage young people and heavy drinkers from alcohol consumption. On the other hand, 87% of EU citizens stated that they agree with the banning of selling and serving alcohol to people under the age of 18 years, and three quarters would approve the banning of alcohol advertising targeting young people.

1. INTRODUCTION

Alcohol is a ubiquitous toxin that can harm almost any system or organ of the body, with the average amount of alcohol drunk, the amount drunk on any one drinking occasion and the frequency of drinking all related to a number of adverse health and social outcomes, including alcohol-related accidents and injuries and interpersonal violence. Binge-drinking, defined as drinking occasions above a given cut-off level of alcohol consumed (with most definitions ranging from 50g to 60g alcohol) is a cause of a particular range of health and social consequences. This report will describe the prevalence of binge drinking in Europe, the harm that binge drinking can bring to the individual and to European society as a whole, and what can be done to reduce binge drinking and its harm.

Alcohol is not an ordinary commodity (Babor et al 2003), but rather a substance that can harm almost any system or organ of the body, exacerbating pre-existing mental and physical disorders, and adversely interacting with other illicit drugs (World Health Organization 2007). Following consumption of a given amount, alcohol shows wide individual variation in its toxic effects, with no threshold below which it can be regarded as entirely risk free (Anderson & Baumberg 2006). No matter how drinking is measured, both the volume of alcohol consumption and a pattern of drinking larger amounts on an occasion increase the risk of dependence and depression and stimulation of the central nervous system, with no means of identifying whether or not an individual is at risk, or not at risk, of becoming dependent.

This report discusses the consequences of drinking relatively large amounts of alcohol on any one occasion (described as binge drinking - see below), and how these consequences might be reduced. Binge drinking is a cause of a particular range of consequences (discussed in Chapters 3 and 4), and even for risk of overall alcohol-related death, a pattern of binge drinking seems to exacerbate the risk at any given overall level of alcohol consumption. Given that the average amount of alcohol drunk by 15-16 year olds on their last drinking occasion is 60g alcohol, and, given that 1 in 7 of all European adults consume 50g or more of alcohol on an occasion at least several times a week, then such a pattern of binge drinking inevitably brings with it an increased risk of all the long term harms done by alcohol, including cancers, cardiovascular, and liver diseases. It is in this sense, that, although binge drinking has its own peculiar set of consequences and responses, it is often difficult to separate a discussion of these from the consequences and responses related to regular heavy drinking.

1.1. BINGE DRINKING DEFINED

Binge drinking can mean different things to different people. Previously, it meant a pattern of heavy drinking that occurred in an extended period set aside for the purpose (World Health Organization 2005). However, it is now commonly used in describing a single drinking session that includes consumption above a given cut-off level of alcohol. Sometimes it is also referred to as episodic heavy drinking, which has been defined as a drinking occasion that includes consumption of at least 60g of alcohol, although other definitions (such as 5 or more ‘standard drinks’) have also been used. The US based National Institute of Alcohol and Alcoholism (NIAAA) defines binge drinking as a pattern of drinking alcohol that brings the blood alcohol

concentration (BAC) to 0.8g/L or above. For the typical adult, this pattern corresponds to consuming 70g alcohol or more (male) or 56g or more (female) in about two hours (NIAAA 2007).

Binge drinking is different from intoxication, which can be defined as a condition that follows the administration of alcohol and results in disturbances in the level of consciousness, cognition, perception, judgement, affect, or behaviour, or other psychophysiological functions and responses (World Health Organization 2005). The disturbances are related to the acute pharmacological effects of, and learned responses to, alcohol and resolve with time, with complete recovery, except where tissue damage or other complications have arisen. Alcohol intoxication is manifested by such signs as facial flushing, slurred speech, unsteady gait, euphoria, increased activity, volubility, disorderly conduct, slowed reactions, impaired judgement and motor incoordination, insensibility, or stupefaction. The behavioural expression of a given level of intoxication is strongly influenced by cultural and personal expectations about the effects of alcohol, and, for different people on different 'single drinking occasions', there can be a wide variation in how intoxicated people become from a given alcohol intake (see e.g. Beirness, Foss, and Vogel-Sprott 2004).

As will be noted in this report, different definitions of binge drinking have been used by different surveys, making comparisons difficult. This calls for a set of flexible but standardised definitions for binge-drinking and episodic heavy drinking. Until the definition of binge drinking is reviewed by an expert group at the European level, it is proposed that a working definition of binge drinking is a consumption of 60g alcohol (men) and 40g alcohol (women) in a period of about two hours.

1.2. METHOD OF PREPARING THE REPORT

This report is not meant to be a series of new meta-analyses or systematic reviews, but rather an expert synthesis of published reviews, systematic reviews, meta-analyses and individual papers. To begin with, source materials were identified from Anderson & Baumberg (2006), with additional source material to update the evidence base identified through literature searches using PubMed,[2] MEDLINE,[3] and PsychINFO[4], with the following search terms:

Binge drinking OR episodic heavy drinking OR intoxication OR drunkenness with:
Prevalence, Epidemiology, Survey, Adults, Young people, Adolescents, Europe, Accidents, Injuries, Intentional injuries, Unintentional injuries, Crime, Violence, Aggression, Domestic violence, Child abuse, Suicide, Murder, Homicide, Heart disease, Cardiovascular diseases, Strokes, Price, Tax, Legal age, Availability, Advertising, Drink driving, Education, Mass media, Information, Server training, Bars, Communities, Treatment, Safety.

The report is dependent on the available published literature, which is not always representative of all countries, cultures and population groups. Although the literature base is growing throughout Europe (Sanchez-Carbonell *et al.* 2005), it is still heavily dominated by North American literature.

The report has followed the definitions of evidence-based medicine modified for the purpose of alcohol policy. This can be defined as 'the conscientious, explicit and

[2] http://www.pubmedcentral.nih.gov/.
[3] http://medline.cos.com/.
[4] http://www.psycinfo.com/.

judicious use of current best evidence in informing decisions about alcohol policy' through an approach that 'promotes the collection, interpretation, and integration of valid, important and applicable research-derived evidence that can support alcohol policy' (adapted from Sackett *et al.* 2000). In adopting an evidence-based approach, it is relevant to note the importance of doing this pragmatically and realistically. As Gray (Gray 2001) states, *'The absence of excellent evidence does not make evidence-based decision making impossible; what is required is the best evidence available, not the best evidence possible'.*

Policies that impact on drinking and driving are not included in this report, since they are covered in a companion document in reducing drinking and driving in Europe (Anderson 2007).

1.3. STRUCTURE OF THE REPORT

Chapter 2 of the report will describe the prevalence of binge drinking in the European Union, noting that different surveys have used different definitions of binge drinking making comparability across surveys sometimes difficult. Chapter 3 will describe the harms done by binge drinking to individuals, and Chapter 4 to Europe as a whole, noting that it is often difficult to separate the specific harms done by binge drinking from regular heavy drinking, since for many people, binge drinking is a common or normal pattern of drinking.

Chapter 5 will review the evidence of the impact of policy measures that affect the price, availability and marketing of alcohol on binge drinking, and Chapter 6 the evidence of creating safer drinking environments and safer communities.

Chapter 7 will review the impact of educational interventions (school based measures and mass media programmes) on binge drinking, and Chapter 8, the impact of brief advice programmes, delivered in primary care and accident and emergency departments.

Chapter 9 will will discuss the cost effectiveness of different policy options in reducing harmful alcohol consumption and will describe the extent of public support for policy measures that might reduce binge drinking. Finally, chapter 10 will provide some conclusions and recommendations.

2. BINGE DRINKING IN EUROPE

Some 80 million Europeans aged 15 years plus (over one fifth of the adult EU population) reported binge drinking (defined as five or more drinks on an occasion, 50g alcohol) at least once a week in 2006, a proportion that has increased since 2003, at least for the adult population of the EU15[5]. Some 25 million Europeans aged 15 years plus (1 in 15 of the adult population) reported that binge drinking was their usual pattern of consumption during the previous month. Whereas 24% of those aged 15-24 years reported binge drinking at least once a week in 2006, binge drinking was also common amongst those aged 55+ years, with 18% binging at least once a week. The average amount of alcohol consumed by EU 15-16 years olds on their last drinking occasion was six drinks, 60g alcohol (2003 data). Over 1 in 6 (18%) of EU 15-16 year olds have binged (5+ drinks on a single occasion, 50g alcohol) three times or more in the last month (2003 data). Binge drinking has increased across Europe amongst 15-16 years olds since 1995, although less so in recent years.

2.1. OVERALL PREVALENCE AND TRENDS OF BINGE DRINKING

Eurobarometer surveys

Use of alcohol According to the 2006 Eurobarometer survey, 75% of EU25[6] citizens aged 15+ years consumed alcohol at least once during the previous 12 months, and 65% had consumed alcohol during the previous 30 days.

Binge drinking amongst past year drinkers Twenty eight percent of past year EU25 drinkers (80 million people) reported that they consumed five or more drinks (50g alcohol) on one occasion at least once a week on average during the previous 12 months, Figure 2.1[7]. The proportion of the total population who were binge drinkers was 54% in Ireland and 33% in Spain, being much higher than in Finland (17%) and Sweden (11%). A much higher proportion of all men (31%) than women (12%) had binged at least once a week. Whereas 24% of all of those aged 15-24 years had binged at least once a week, binge drinking was also common amongst those aged 55+ years, with 18% binging at least once a week, Figure 2.2[6].

Binge drinking amongst past month drinkers Of the two thirds of EU25 citizens aged 15+ years who had drunk alcohol at least once during the previous 30 days, one in ten reported that they usually had 5 or more drinks (50g alcohol) on one occasion when they consumed alcohol. Of the past month drinkers, a pattern of binge drinking was most common in Ireland, where 36% reported to drink 3-4 drinks (30-40g alcohol) on one occasion and a further 34% 5 or more drinks (50g alcohol), Figure 2.3.

The proportion of EU15 adults who normally drank five or more drinks on a drinking occasion remained the same in 2006 as in 2003 (10%). However, given that 67% of EU15 adults reported alcohol consumption within the past 30 days in 2006 compared

[5] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

[6] Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

[7] Please note Figures 2.1 and 2.2 gives percentages of past year drinkers, whereas the data in this paragraph is the perecnatge of all people, including non-past year drinkers.

with 61% in 2003, the actual number of EU15 adults who normally drank five or more drinks (50g alcohol) on an occasion increased by 10% between 2003 and 2006.

	Several times a week	Once a week	Once a month	Less than once a month	Never
EU25	13%	15%	16%	24%	**31%**
BE	9%	15%	17%	22%	**37%**
CZ	7%	18%	17%	26%	**31%**
DK	8%	14%	23%	**37%**	18%
DE	15%	19%	20%	**23%**	**23%**
EE	4%	17%	21%	**30%**	28%
EL	6%	9%	15%	23%	**46%**
ES	**28%**	21%	11%	16%	22%
FR	6%	9%	16%	30%	**39%**
IE	17%	**37%**	14%	20%	11%
IT	21%	13%	7%	12%	**46%**
CY	6%	7%	12%	21%	**54%**
LV	2%	8%	15%	22%	**52%**
LT	4%	8%	16%	31%	**40%**
LU	10%	9%	14%	21%	**46%**
HU	14%	11%	14%	25%	**36%**
MT	4%	22%	11%	**33%**	30%
NL	8%	12%	17%	27%	**36%**
AT	**24%**	20%	17%	18%	20%
PL	4%	13%	22%	**37%**	21%
PT	14%	6%	6%	18%	**55%**
SI	7%	14%	17%	23%	**39%**
SK	10%	16%	19%	26%	**28%**
FI	5%	16%	**25%**	**31%**	23%
SE	1%	11%	20%	33%	**34%**
UK	12%	19%	16%	24%	**29%**
CY(tcc)	19%	14%	17%	20%	**29%**
BG	14%	13%	9%	18%	**45%**
RO	14%	18%	15%	23%	**29%**
HR	10%	11%	14%	24%	**40%**
Highest percentage within a country			**Highest percentage in the EU25**		

Figure 2.1 Frequency of having had five or more drinks on one occasion during previous year (2006) by EU and European country (age 15+ years; % of those who had consumed alcohol at least once during previous 12 months). Source: Eurobarometer (2007).

	Several times a week	Once a week	Once a month	Less than once a month	Never
EU25	13%	15%	16%	24%	**31%**
Sex					
Male	18%	19%	17%	**23%**	22%
Female	7%	11%	14%	26%	**41%**
Age					
15-24	10%	22%	21%	**26%**	20%
25-39	12%	18%	19%	**26%**	24%
40-54	12%	15%	16%	26%	**30%**
55 +	16%	11%	10%	19%	**44%**
Education (End					
15	18%	14%	11%	18%	**38%**
16-19	13%	17%	17%	23%	**29%**
20+	9%	13%	17%	28%	**32%**
Still Studying	8%	20%	19%	**28%**	24%
Respondent occupation scale					
Self- employed	17%	19%	14%	20%	**29%**
Managers	9%	17%	18%	27%	**28%**
Other white collars	12%	15%	17%	26%	**29%**
Manual workers	14%	18%	20%	**25%**	22%
House persons	10%	12%	14%	22%	**41%**
Unemployed	14%	18%	18%	24%	**25%**
Retired	15%	10%	9%	20%	**46%**
Students	8%	20%	19%	**28%**	24%

Figure 2.2 Frequency of having had five or more drinks on one occasion during previous year (2006) by demographic variables (% of those who had consumed alcohol at least once during previous 12 months). Source: Eurobarometer (2007).

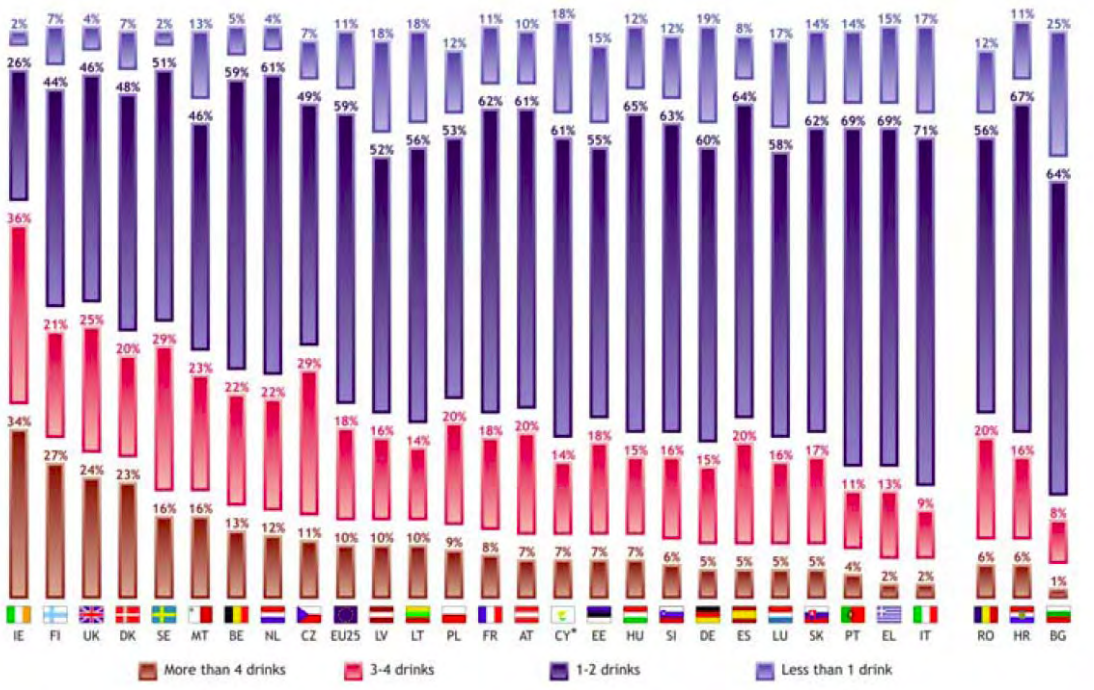


Figure 2.3 Reported amounts of alcohol consumed (drinks) on a drinking occasion by EU and European country (age 15+ years; % of those who had consumed alcohol at least once during previous 30 days). Source: Eurobarometer (2007).

European Comparative Alcohol Study

The European Comparative Alcohol Study found that binge-drinking (defined as consuming 2.3 litres of beer, 1 bottle of wine or 25cl of spirits on a single occasion) as a proportion of all drinking occasions was highest in Ireland and the UK, but much lower in France and Italy (Hemström, Leifman, and Ramstedt 2001). For the numbers of weekly binge-drinkers, Sweden had a lower frequency than every country except France. The average number of binge-drinking episodes for Italy was also more than that for Finland. At the lower end of the spectrum, there were a greater number of people who binge-drank very rarely/never in Germany, France and Italy than elsewhere. At the top end, however, the share of frequent binge-drinkers in Italy was relatively high, being greater than in Sweden and Germany for both genders.

Other comparative surveys

No other European comparative studies exist to investigate binge drinking further, as relevant surveys either have no relevant data for southern Europe (GENACIS) or look solely at smaller country groups (the Nordic comparative surveys). Even for the case of Sweden, the GENACIS surveys confirm the low Swedish figures (Mäkelä *et al.* 2005) but the Nordic surveys show no sign that Sweden has a lower rate of binge-drinking than Finland or Norway (see Mäkelä *et al.* 1999).

Even when looking solely at measures of binge-drinking, a further problem is that many studies are not comparable due to different measurement techniques. Using the most common definition (5 or more "standard drinks" on a single occasion), 11% of male drinkers in Spain were weekly binge-drinkers compared to 20%-30% in the EU10[8], with similar patterns for women in the range of 3%-6% (World Health Organization 2004). Better information is available from a comparative survey conducted in the Baltic region, which found that 40%-50% of men reported binge-drinking at least monthly in Estonia, Finland, Latvia, and Lithuania. Here Estonia reported a prevalence of less than 10% for monthly binge-drinking in women, but the other countries were all higher at 10%-20% (Helasoja *et al.* 2005). A separate comparative survey with yet another definition (80g or more on an occasion) also found the rate of monthly binge-drinking in 45-64 year olds to be 12% and 2% for men and women in Poland, compared to 17% and 4% in the Czech Republic (Bobak *et al.* 2004).

2.2. GENDER DIFFERENCES

In nearly every culture ever studied, irrespective of that culture's level or pattern of drinking, adult men are more likely to drink than adult women, and drink more when they do (Fillmore *et al.* 1991; Wilsnack, Vogeltanz, and Wilsnack 2000). These gaps are greater for riskier behaviour – for example, men's share of total consumption in Europe is around two to three times that of women's (Leifman 2002; Mäkelä *et al.* 2005), but men tend to report three to six times as much binge-drinking (Bloomfield *et al.* 1999; Ramstedt and Hope 2003).

2.3. SOCIAL DIFFERENCES

The most consistent patterns are that lower socioeconomic groups – those with less education, a lower occupational level or less income, as well as the unemployed – are more likely to abstain from alcohol, a finding that holds for nearly all of the EU25

[8] Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia

(Hupkens, Knibbe, and Drop 1993; Marmot 1997; Simpura *et al.* 1999). This is true for both sexes, although the consistently higher level of abstinence in women compared to men seems to be lowest in those with more education (Knupfer 1989; Bongers *et al.* 1998).

At first sight there appears to be few trends for the total amount drunk, with studies from some countries showing manual workers having heavier consumption while others show the exact opposite (Péquignot *et al.* 1988; Marmot 1997; Bongers *et al.* 1998; Hemmingsson, Lundberg, and Diderichsen 1999). The lack of a fixed relationship is particularly obvious from a historical study from Sweden (Romelsjö and Lundberg 1996; Norström and Romelsjö 1998), where managerial non-manual workers were replaced over the period from 1970 to 1994 by manual workers as the heaviest drinking group. Other patterns are further complicated by age effects, in that young unemployed people in some countries drink more than their employed counterparts, but this is reversed from age mid-20s onwards (Temple *et al.* 1991; Casswell, Pledger, and Hooper 2003).

The clearest results can be seen for men with a low level of education, who are likely to drink more than other men, although it should be remembered that alcohol use can also negatively affect educational outcomes (Bongers *et al.* 1998; Casswell, Pledger, and Hooper 2003; Schnohr *et al.* 2004; Bloomfield *et al.* 2005) (although see European Commission 2003b). It has been suggested that this is in fact due to two separate trends, where those with more education drinking less on each occasion, but drinking more often. This has received partial support (e.g. Knupfer 1989), but other studies have not found a clear link of education to drinking frequency (Eurobarometer 2003; Helasoja *et al.* 2005), instead finding that only income predicts a more frequent use of alcohol, and this is not found in all populations (McKee *et al.* 2000; Casswell, Pledger, and Hooper 2003). What seems to be more consistent is that adult men in lower occupational or educational groups in most of Europe are more likely to drink to intoxication or drink very heavily, and are least likely to drink smaller amounts (Ahlström 1987; Knupfer 1989; Jacobsen 1989; Norström and Romelsjö 1998; Bongers *et al.* 1998; Mackenbach *et al.* 2000; Eurobarometer 2003; Kuntsche, Rehm, and Gmel 2004; Estonia and Latvia in Helasoja *et al.* 2005). Even here, however, there are some countries where there is no real class gradient in drinking to intoxication (UK, Ireland, Finland) – although given these are the countries where men in higher occupational groups drink more often and more in total, this means that lower SES men are still much likely on a given drinking occasion to get drunk (Kelleher *et al.* 2003; Rickards *et al.* 2004; Yarnell *et al.* 2005) with heavy drinking also concentrated in deprived areas (Law and Whincup 1998; Yarnell *et al.* 2005).

This picture changes for women, probably due to the link of gender inequalities to both drinking practices and socioeconomic status. One consequence of this complexity is that different countries exhibit different trends – for example, a number of studies show that women with more education drink more than other women, although the reverse has also been shown in other times and countries (Bongers *et al.* 1998; Ahlström, Bloomfield, and Knibbe 2001; Helasoja *et al.* 2005). In general, it appears as though women in higher socioeconomic groups drink more often than other women to an even greater degree than in men, meaning that the gender gap in frequency of drinking is smaller in those with more income or education than in those with less (Ahlström 1987; McKee *et al.* 2000; Casswell, Pledger, and Hooper 2003; Helasoja *et al.* 2005). In many countries, it is also true that women with more education are more likely to be heavy drinkers, although drinking to intoxication may be more commonly associated with lower educational groups (Ahlström 1987; Kuntsche, Rehm, and Gmel 2004; Bloomfield *et al.* 2005; Helasoja *et al.* 2005).

2.4. YOUNG PEOPLE

Nearly all (over 9 in 10) 15-16 year-old students have drunk alcohol at some point in their life (Currie *et al.* 2000), starting on average just after 12½ years of age. Data from the 2003 European School Survey Project on Alcohol and Other Drugs (ESPAD) found that the average amount of alcohol drunk by 15-16 year olds on the last drinking occasion was 60g of alcohol, Figure 2.6. No EU15 country outside of southern Europe has an average level below 56g, while in the UK and Ireland the amount drunk on the last occasion even reaches over 80g of pure alcohol. Last occasion drinking levels are slightly lower in the EU10[9] and significantly lower in southern Europe, which averaged 38g of pure alcohol.

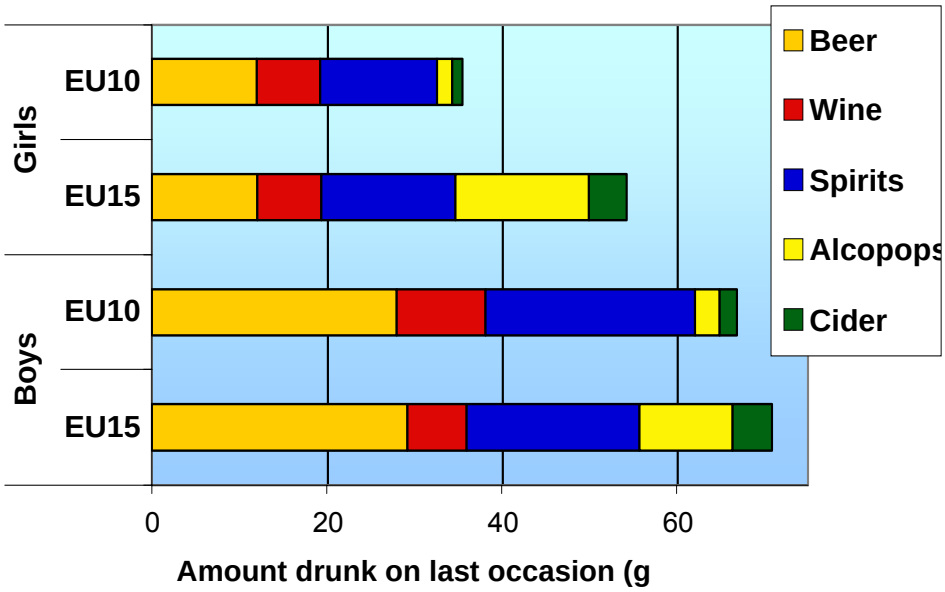


Figure 2.6 A picture of 15-16 year students' last drinking occasion (amount drunk on the last drinking occasion. Source: Hibell et al (2004).

As shown in Figure 2.7, the highest levels of both binge-drinking and drunkenness are found in the Nordic countries, UK, Ireland, Slovenia and Latvia. This contrasts with the low levels found in France, Italy, Lithuania, Poland and Romania – for example, binge-drinking 3+ times in the last month was reported by 31% of boys and 33% of girls in Ireland, but only 12%-13% of boys and 5%-7% of girls in France and Hungary. Perhaps surprisingly, the differences between regions of Europe in Figure 2.7 are not visible at earlier ages, with the variation mainly occurring between the ages of 13 and 15 years. Across the whole EU though, over 1 in 8 (13%) of 15-16 year old students have been drunk more than 20 times in their life, and over 1in 6 (18%) have binged (5+ drinks on a single occasion) three times or more in the last month.

[9] Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.

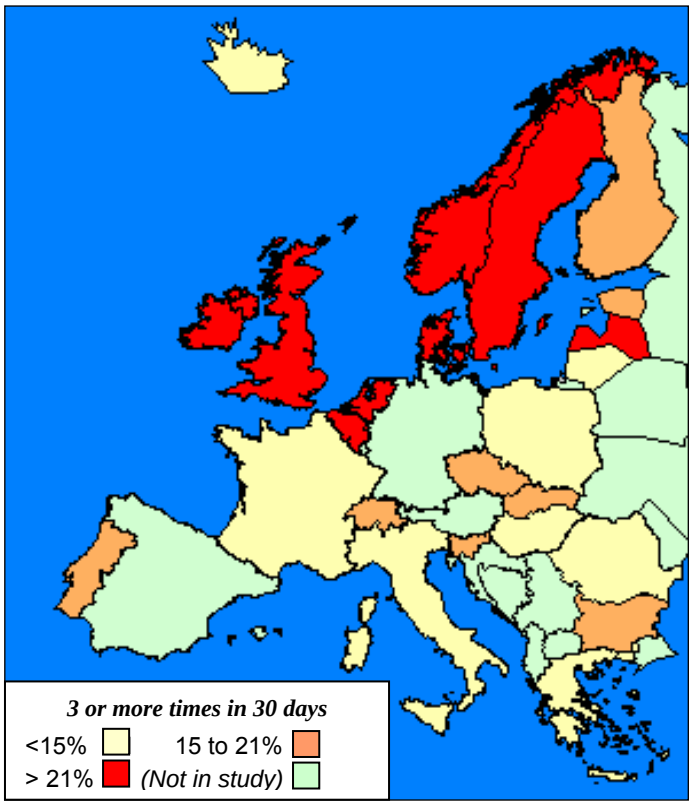


Figure 2.7 Binge-drinking in 15-16 year old students in Europe *Defined as 5+ drinks on a single occasion*

Source: ESPAD 2003 (Hibell et al 2004)

To some degree this picture is sensitive to the particular variable used, with the numbers of those binge-drinking *at all* in the last 30 days (taken from the same dataset) showing no difference between differently conceptualised groups of 'wine' and 'spirits' countries (Room 2005). Similarly, students from southern Europe are about five times less likely than those from elsewhere in the EU15 to report being drunk more than 20 times in their life (as in Schmid *et al.* 2003), although they are only half as likely to report drinking 5+ drinks on a single occasion more than 3 times in 30 days. Other individual countries also show large discrepancies between the two measures (e.g. Malta and Cyprus reporting five times as much binge-drinking as self-reported drunkenness, in contrast to Denmark that saw more drunkenness).

Binge-drinking in young people has increased across much of Europe in the last 10 years, more so in the early part of this period. Most countries are above the dashed line in Figures 2.8 and 2.9 showing that the numbers binge-drinking regularly has increased since 1995 (or where 1995 data is not available, since 1999). For the vast majority of these countries (coloured in red), the change has been a noticeable size of more than 2%. However, this rise was not seen everywhere in Europe, with a small number of countries showing a fall in this period (coloured in blue).

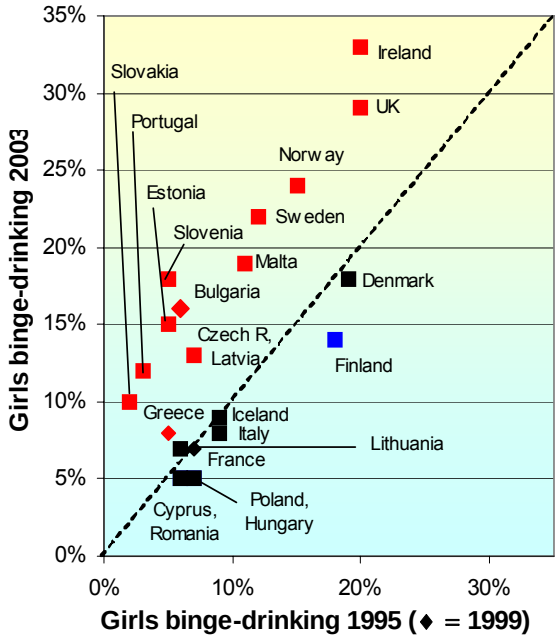


Figure 2.8 Trends in binge-drinking in 15-16 year old ***female*** students, 1995-2003

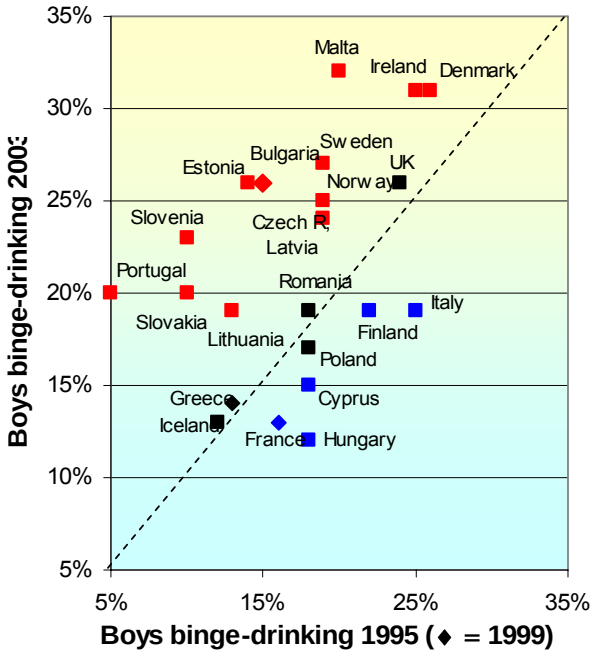


Figure 2.9 Trends in binge-drinking in 15-16 year old ***male*** students, 1995-2003

5+ drinks on a single occasion 3+ times in last 30 days. Source: ESPAD surveys (Hibell et al. 1996; 2000; 2004) ***A point above the dashed line means that binge-drinking has increased.*** *Countries in red have seen more than a 2% increase; countries in blue have seen more than a 2% decrease. Countries in black have seen less than a 2% change.*

2.5. CONCLUSIONS

Binge drinking, defined as five or more drinks on a single occasion, seems to be a very common European phenomenon. Some 80 million European adults (over 1 in 5) reported binge drinking at least once a week in 2006, and as many as 25 million (1 in 15) reported that binge drinking was their usual pattern of consumption during the previous month (in other words they were also regular heavy drinkers). Binge drinking is not the prerogative of the young. Eighteen per cent of those aged 55 years of age and over reported binge drinking at least once a week in 2006, compared with 24% of those aged between 15 and 24 years. Nor is binge drinking a prerogative of northern Europeans. One third (33%) of respondents from Spain and 20% of respondents from Italy reported binge drinking at least once a week in 2006, compared with 11% of respondents from Sweden and 17% of respondents from Finland. Binge drinking is also relatively common amongst 15-16 year olds, with over 1 in 6 (18%) having binged (5+ drinks on a single occasion, 50g alcohol) three times or more in the last month (2003 data). Binge drinking has increased across Europe amongst 15-16 years olds since 1995, although less so in recent years.

The harm that binge drinking can do to the individual is described in the next chapter, and, considering the extent of binge drinking in Europe, it is no surprise to find that binge drinking poses an extensive range of health and social problems for Europe as a whole, which are summarized in chapter 4.

3. THE HARM DONE BY BINGE DRINKING

Alcohol is a toxic substance that can harm almost any system or organ of the body, and is related to more than 60 different disorders with short and long term consequences. For many conditions there is an increasing risk with increasing levels of alcohol consumption, with no evidence of a threshold effect below which alcohol can be regarded as entirely risk free. Alcohol use and a pattern of binge drinking are associated with an increased risk to the individual of negative social consequences, reduced work performance, injuries, drink driving accidents, brain damage, alcohol dependence, suicide, stroke, irregular heart rhythms, coronary heart disease, sexually transmitted diseases, and premature death. Alcohol use and a pattern of binge drinking are associated with an increased risk to people other than the drinker (third party harm), including negative social consequences, injuries at work, violence and crime, interpersonal violence, accidents from others' drink driving, sexually transmitted diseases, and to the unborn child, a range of neuro-behavioural deficits running through to adolescence and with lifelong consequences.

Alcohol can risk health and well-being through three intermediate and linked ways, direct biochemical effects, episodic heavy drinking (binge drinking), and dependence, Figure 3.1.

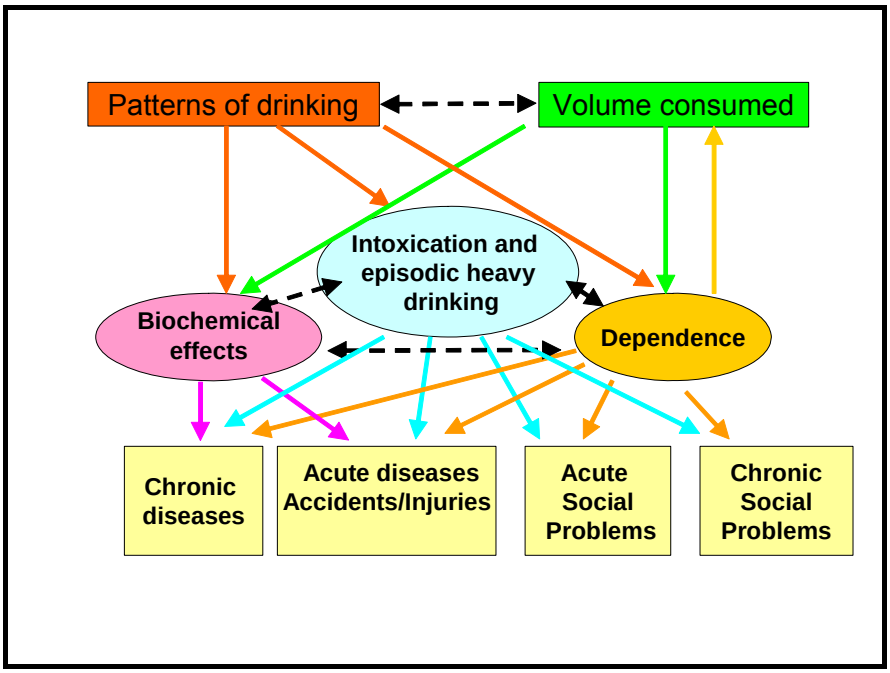


Figure 3.1. The relationship between alcohol consumption, intermediate variables and alcohol related outcomes. Source: Rehm et al (2004), modified.

Alcohol can cause harm through both short term, and often brief and intense use such as episodic heavy drinking (or binge drinking), described as the *acute effects* of alcohol, and through prolonged or long term use, described as the *chronic effects* of alcohol. The disorders include those of sudden onset, whose duration is often brief, described as *acute consequences*, and those which last a long time, described as

chronic consequences. It is important to note that there can be considerable overlap between acute and chronic exposure and between acute and chronic outcomes for individuals and for certain conditions.

The average volume of alcohol consumption, the amount drunk on any one occasion and the frequency of drinking are all related to a number of outcomes, including alcohol-related aggression and alcohol-related injuries. This is well illustrated in a study of alcohol-related aggression in young American men and women who were asked how often they had 'gotten into an argument or fight' during or after drinking in the previous 12 months (Wells et al 2005). They were asked about how frequently they drank (drinking frequency), how much they drank overall (drinking volume), and the number of days in which five or more drinks had been consumed on the same occasion during the past 30 days (episodic heavy drinking). The study found that drinking frequency, drinking volume and episodic heavy drinking were all independently associated with an increased risk of fights after drinking. When these three drinking variables were analyzed together, it was found that a considerable proportion of the independent relationship between episodic heavy drinking and aggression was due to the frequency and volume of drinking. When all three drinking variables were considered together, only the frequency of drinking remained statistically significant in its relationship with aggression. Thus, whilst episodic heavy drinking (binge drinking) is important as a risk factor for aggression, at least, in this study, how often the young people drank was more important.

In a Finnish study, an increasing volume of alcohol consumption increased the risk of fatal injury, Figure 3.2 (Paljärvi et al 2005). However, when analyzing drinking occasions, drinking at the level of one to two drinks on an occasion, regardless of frequency, did not increase the risk of fatal injury, Figure 3.3. Drinking four or more drinks at a time increased the risk of fatal injury, with the risk increasing with the frequency of drinking four or more times on an occasion, and with no evidence that tolerance to alcohol lowered the risk of fatal injuries among frequent heavy drinkers.

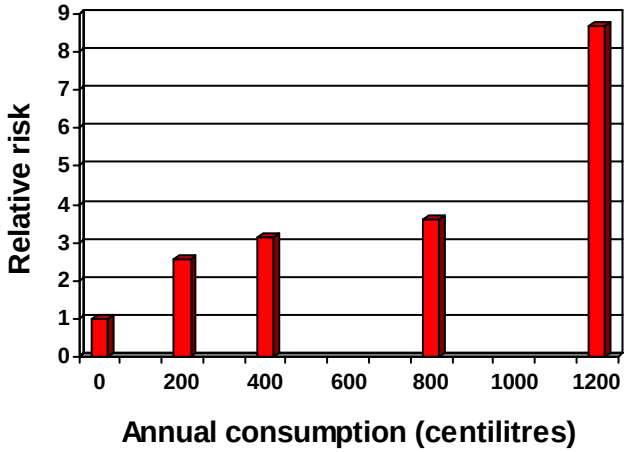


Figure 3.2. The relationship between volume of alcohol consumption and risk of fatal injury amongst Finnish men. Source: Paljärvi et al (2005).

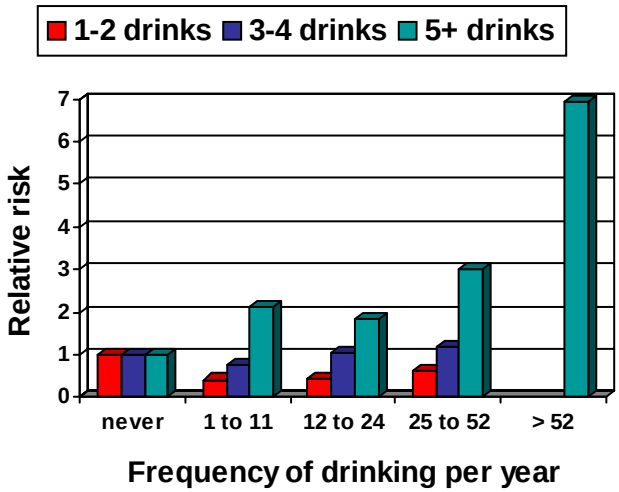


Figure 3.3. The relationship between frequency of drinking per year and the average number of drinks per drinking occasion and risk of fatal injury amongst Finnish men. Source: Paljärvi et al (2005).

3.1. SOCIAL CONSEQUENCES OF DRINKING

The risk of the most commonly experienced negative social consequences of alcohol – such as getting into a fight, harming home life, marriage, work, studies, friendships or social life – increases proportionally to the amount of alcohol consumed, with the slope of the curve varying across countries, Figure 3.4. An eight year follow up study from Switzerland found that both a daily consumption of more than 40g of alcohol and weekly heavy drinking occasions (50g of alcohol or more per occasion) were associated with at least one of six negative social consequences (Rehm and Gmel 1999). In this study, episodic heavy drinking appeared to increase the risk of social consequences, independent of the overall volume of consumption.

Social harms from other people's drinking are also common, being more common for less severe consequences (such as being kept awake at night by drunk people) than for being harassed in public places, being harassed in private parties, being insulted and being afraid of drunk people in public areas, as well as more severe types of consequences (such as being physically hurt or property damage) (Rossow and Hauge 2004). Studies show that a small proportion of the population are harmed repeatedly and in various ways, with younger people, women, those who report a higher annual alcohol intake, more frequent episodes of intoxication and more frequent visits to public drinking places being more likely to have received harm from someone else's drinking (Rossow 1996; Mäkelä *et al.* 1999). The drinking behaviour of the typical victim of social harms from others' drinking very much resembles the drinking behaviour of those who experience various kinds of alcohol-related social harms from their own drinking (Hauge and Irgens-Jensen 1986; Room *et al.* 1995; Midanik 1999; Mustonen and Mäkelä 1999; Rehm and Gmel 1999).

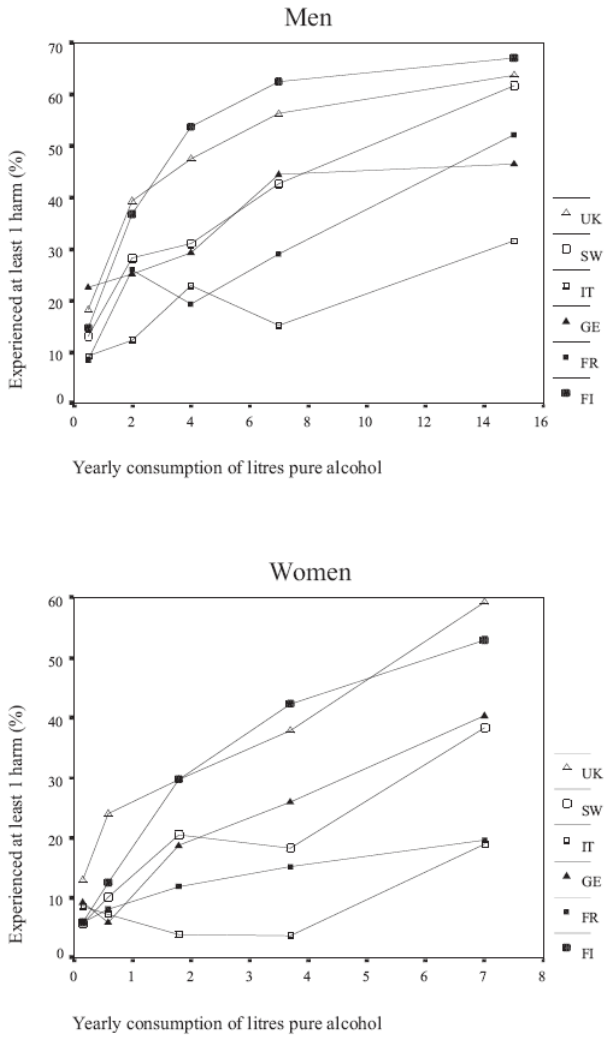


Figure 3.4 Increasing the risk of at least one negative social consequence (getting into a fight, harming home life, marriage, work, studies, friendships or social life) by yearly alcohol consumption for selected European countries. UK United Kingdom, SW Sweden, IT Italy, GE Germany, FR France, FI Finland. Source: Norström (2001).

3.2. WORK PERFORMANCE

Studies analyzing absenteeism rates of people at all levels of alcohol consumption have yielded mixed results (Gmel and Rehm 2003). Some have found no association between absenteeism and drinking. For example, Ames *et al.* (1997) found no significant association between absenteeism and the drinker's usual volume of consumption or frequency of heavy drinking occasions (which they defined as occasions during the past year when a person had 10 or more drinks). Moreover, though drinking at the workplace and hangovers at work were related to other negative consequences, such as workplace injuries, they were not related to absenteeism. A longitudinal study in the UK found that male abstainers had an increased risk of sickness absence compared with lighter drinkers (Marmot *et al.* 1993). A J-shaped relationship has been found in other studies for sickness absence (Vahtera *et al.* 2002), as well as for unemployment (Mullahy and Sindelar 1996) and earnings (Hamilton and Hamilton 1997), although it is not clear in all these studies the extent to which characteristics of the non-drinkers explain the findings, or the

extent to which the absenteeism simply reflects a higher extent of health problems in the abstainers as opposed to the light drinkers.

On the other hand, harmful alcohol use and episodic heavy drinking increase the risk of arriving to work late and leaving work early or disciplinary suspension, resulting in loss of productivity; turnover due to premature death; disciplinary problems or low productivity from the use of alcohol; inappropriate behaviour (such as behaviour resulting in disciplinary procedures); theft and other crime; and poor co-worker relations and low company morale (Marmot *et al.* 1993; Rehm and Rossow 2001; Gmel and Rehm 2003). One study conducted at 114 work sites (Mangione *et al.* 1999) showed an almost linear relationship between increasing average consumption and a summary measure of job performance, finding the strongest associations between consumption and getting to work late, leaving early, and doing less work, and only a weak association with missing days of work. Thus, alcohol consumption may have more effect on productivity on the job than on the number of workdays missed.

One study in Denmark, Finland, Norway and Sweden found that 3%-6% of all men and 1%-4% of all women have not gone to work at least once in the past year due to their drinking. Consequences of this type were also much more common for 19-34 year olds than older ages for both men and women (Mäkelä *et al.* 1999). In total, nearly 5% of drinking men and 2% of drinking women across seven EU15 countries reported a negative impact of alcohol on their work or studies in the past year (Ramstedt and Hope 2003). This ranged from 3% or less for men in Sweden and France, to over 9% in the UK and Ireland (the same pattern also holding for women). In Ireland (data not reported for other countries), young people were much more likely to report problems with work than other age groups, particularly young women (10% at age 18-29 years compared to 1% for 30-49 year-olds). It has been estimated that alcohol caused a potential €9bn-€19bn worth of productivity to be lost in the EU in 2003 due to absenteeism, and a further €6bn-€23bn of lost productivity due to unemployment (Anderson & Baumberg 2006).

3.3. VIOLENT CONSEQUENCES OF DRINKING

Aggression and violent crime

A substantial proportion of incidents of aggression and violent crime involve one or more participants who have been drinking (Murdoch, Pihl and Ross 1990; Budd 2003; Pernanen 1991; Collins 1993; Wells, Graham and West 2000; Pernanen *et al.* 2002; Allen *et al.* 2003), with 25%-85% of violent crimes relating to alcohol, the proportion varying across countries and cultures. There is a relationship between alcohol consumption and the risk of involvement in violence, including homicide, which is stronger for intoxication than for overall consumption (Rossow 2000; Wells *et al.* 2000). A large number of studies have demonstrated a significantly increased risk of involvement in violence among heavy drinkers, who are also more likely to be the recipients of violence (Rossow *et al.* 2001; Greenfield and Henneberg 2001).

Episodic heavy drinking, frequency of drinking and drinking volume are all independently associated with the risk of aggression (Wechsler *et al.* 1994; Wechsler *et al.* 1995; Wechsler *et al.* 1998; Komro *et al.* 1999; Bonomo *et al.* 2001; Swahn 2001; Richardson and Budd 2003; Swahn and Donovan 2004; Wells *et al.* 2005), with frequency of drinking appearing to be the most important (Wells *et al.* 2005). Drinking volume was associated with alcohol-related aggression in a general population sample, without any evidence of a threshold effect, even when high-quantity drinking was controlled (Room, Bondy and Ferris 1995).

Alcohol is related to aggression in both men and women, with some evidence that alcohol has a greater effect on male aggression than on female aggression (Giancola *et al.* 2002), although one study found similar or slightly increased risks of aggression for women compared with men at the same level of alcohol consumption variables (Wells *et al.* 2005). In this study, aggression was more related to drinking in public places for women, but not for men, when controlling for the drinking variables.

There is an overall relationship between greater alcohol use and criminal and domestic violence, with particularly strong evidence from studies of domestic and sexual violence (Mirrlees-Black 1999; Abbey *et al.* 2001; Caetano *et al.* 2001; Brecklin and Ullman 2002; White and Chen 2002; Lipsey *et al.* 1997; Greenfeld 1998). The relationship is attenuated when other characteristics, such as culture, gender, age, social class, criminal status, childhood abuse, and use of other drugs in addition to alcohol are taken into account. Generally the higher the level of alcohol consumption, the more serious is the violence (Gerson and Preston 1979; Martin and Bachman 1997; Sharps *et al.* 2001). Studies from the United Kingdom (Mirrlees-Black 1999) and Ireland (Watson and Parsons 2005) indicate that one third of intimate partner violence occurs when the perpetrator is under the influence of alcohol. Violence against strangers is more likely to involve alcohol than is violence against intimate partners (Abbey *et al.* 2001; Testa and Parks 1996).

High blood alcohol levels or high levels of consumption are commonly reported not only in the perpetrators of violence, but also in the recipients (Makkai 1997; Mirrlees-Black 1999; Brecklin and Ullman 2002). Alcohol-related sexual assaults by strangers seem to be more likely to occur the greater the alcohol consumption of the recipient, whereas the risk of alcohol-related sexual assaults by partners or spouses seems to be independent of the alcohol consumption of the recipient (Kaufman Kantor and Asdigian 1997; Chermack *et al.* 2001). Many recipients develop drinking problems as a response to sexual violence (Darves-Bornoz *et al.* 1998).

Biological mechanisms

Aside from epidemiological and experimental research relating intoxication and violence (Graham and West 2001; Haines and Graham 2005), there is also research indicating specific biological mechanisms that link alcohol to aggressive behaviour (Bushman 1997; Lipsey *et al.* 1997; Leonard 2005), which are moderated by situational and cultural factors (Wells and Graham 2003). The pharmacological effects of alcohol include increased emotional lability and focus on the present (Graham, West and Wells 2000), decreased awareness of internal cues or less self-awareness (Hull 1981), decreased ability to consider consequences (Hull and Bond 1986; Pihl, Peterson and Lau 1993; Ito, Miller and Pollock 1996) or reduced ability to solve problems (Sayette, Wilson and Elias 1993), and impaired self-regulation and self-control (Hull and Stone 2004). However, these biological pathways are mediated by people's expectations about how people act after drinking (including how acceptable it is to act drunkenly and how accepted certain behaviours are when drunk), in what has been termed 'drunken comportment'.

Alcohol also appears to interact with personality characteristics and other factors related to a personal propensity for violence, such as impulsivity (Zhang *et al.* 1997, Lang and Martin 1993). Injuries from violence may also be more closely linked to alcohol dependence than other types of alcohol-related injury (Cherpitel 1997). In addition to alcohol consumption and drinking pattern, the social context of drinking is also important for alcohol related aggression (Eckardt *et al.* 1998; Fagan 1990; Martin 1992; Collins and Messerschmidt 1993; Graham *et al.* 1998; Parker and Auerhahn 1998), especially for young people whose drinking behaviour is influenced strongly by peers (Hansen 1997). A meta-analysis found that the effects of alcohol

were greater in situations characterized by greater anxiety, inhibition conflict and frustration, while differences between sober and intoxicated persons were smaller in situations involving high provocation or self-focused attention (Ito *et al.* 1996). Further, given sufficient disincentives for aggression the effects of alcohol on aggression can be reduced or even eliminated altogether (Hoaken *et al.* 1998; Jeavons and Taylor 1985).

Public drinking establishments

Public drinking establishments are high-risk locations for alcohol-related aggression (Pernanen 1991; Stockwell *et al.* 1993; Archer, Holloway and McLouglin 1995; Rossow 1996; Leonard, Quigley and Collins 2002; Quigley & Leonard 2004). However, drinking contexts by themselves do not explain the relationship between alcohol and aggression, since the impact of alcohol also acts independently of the context or setting in which drinking is taking place (Wells *et al.* 2005). The environment for alcohol-related aggression is also not independent of drinking. Although a few incidents that occur in bars involve interpersonal conflict between friends or couples that might have occurred in another setting, almost all incidents of aggression that occur in bars are unplanned, emerge from the social interaction in the bar (Graham and Wells 2001) and often involve strangers. The Comparative Risk Assessment study of the World Health Organization concluded that it seems reasonable to assume that almost all incidents of violence occurring in bars and other environments where drinking is the main activity should be considered attributable to alcohol, either directly through the pharmacological effects of alcohol or indirectly through the social norms related to drinking (Rehm *et al.* 2004).

Marital harm and violence

A large number of cross-sectional studies have demonstrated a significant positive association between heavy drinking and the risk of marital breakdown (Leonard and Rothbard 1999), but only a few well-designed studies have demonstrated a significantly increased risk of separation or divorce among married heavy drinkers as compared to others (Fu and Goodman 2000). A large number of cross-sectional studies (Lipsey *et al.* 1997; Leonard 2005) and a few longitudinal studies on alcohol consumption and marital aggression have shown that husbands' heavy drinking increases the risk of marital violence (Quigley and Leonard 1999), in a dose dependent manner (Kaufman Kantor and Straus 1987). Testa *et al.* (2003) reported that episodes of violence in which the husband was drinking involved more acts of violence and were more likely to involve severe violence compared to sober violence episodes. It also seems that treatment for alcohol dependence reduces intimate partner violence (O'Farrell and Choquette 1991; O'Farrell *et al.* 1999; O'Farrell *et al.* 2000; O'Farrell *et al.* 2003; Stuart *et al.* 2003). Thus, it seems reasonable to conclude that alcohol can be a contributing cause of violence (Leonard 2005). Women with alcohol-related problems often have marital problems (Blankfield and Maritz 1990), and are less confident about resolving marital disagreement (Kelly *et al.* 2000). Women who are alcohol-dependent report high rates of aggression in their spouses (Miller *et al.* 1989, Miller and Downs 1993) and women who are in receipt of alcohol related violence tend to drink more (Olenick and Chalmers 1991).

Child abuse

Parental drinking can affect the environment in which a child grows up through financial strain, poor parenting, marital conflicts and negative role models (Gmel and Rehm 2003). A large number of studies have reported a variety of childhood mental and behavioural disorders to be more prevalent among children of heavy drinkers than others, although many of these studies have been criticized for inadequate methodology (Miller *et al.* 1997; Rossow 2000; Widom and Hiller-Sturmhofel 2001). A few recent reports from well-designed studies have shown a higher risk of child

abuse in families with heavy drinking parents (Rossow 2000). Systematic reviews have suggested that alcohol is a cause of child abuse in 16% of cases (English *et al.* 1995; Ridolofo and Stevenson 2001).

3.4. INTENTIONAL AND UNINTENTIONAL INJURIES

Drinking and driving

The risk of drinking and driving increases with both the amount of alcohol consumed and the frequency of high volume drinking occasions (Midanik *et al.* 1996), and blood alcohol concentration levels (Blomberg *et al.* 2002; Hingson and Winter 2003). A review of 112 studies provided strong evidence that impairment in driving skills begins with any departure from a zero blood alcohol concentration level (BAC) (Moskowitz and Fiorentino 2000). Comparison of blood alcohol concentrations (BACs) of drivers in accidents with the BACs of drivers not involved in accidents find that male and female drivers at all ages who had BACs between 0.2g/l and 0.49g/l had at least a three times greater risk of dying in a single vehicle crash. The risk increased to at least 6 times with a BAC between 0.5g/L and 0.79g/L and 11 times with a BAC between 0.8g/l and 0.99 g/L (Zador *et al.* 2000). The risks are greater for serious and fatal crashes, for single-vehicle crashes, and for younger people. Even relatively low doses of alcohol consumption (20g of alcohol) can impair driving in the presence of relative sleep deprivation (Horne *et al.* 2005). The use of alcohol increases both the possibility of being admitted to hospital from drink-drive injuries, and the severity of the injuries (Borges *et al.* 1998).

Injuries

There is a relationship between the use of alcohol, largely in the short term, and the risk of fatal and non-fatal accidents and injuries (Cherpitel *et al.* 1995; Brismar and Bergman 1998; Smith *et al.* 1999; Macdonald *et al.* 2005). In an Australian study, the risk of sustaining an injury after consuming more than 60g of alcohol in a 6-hour period was ten times greater for women and two times greater for men (McLeod *et al.* 1999). People who usually drink alcohol at lower levels, but who engage periodically in drinking large quantities of alcohol, are at particular risk (Watt *et al.* 2004). Alcohol increases the risk of attendance at hospital emergency rooms in a dose dependent manner (Cherpitel 1993; Cherpitel *et al.* 2003; Borges *et al.* 2004; Cherpitel *et al.* 2005); between 20% and 80% of emergency room admissions can be alcohol-related (Hingson and Howland 1987). Alcohol alters the treatment course of injured patients and can lead to surgical complications (Smith *et al.* 1999) and a greater likelihood of death (Li *et al.* 1994).

Suicide

Heavy drinking is a major risk factor for suicide and suicidal behaviour among both young people and adults (Lesage *et al.* 1994, Andrews and Lesinsohn 1992; Beautrais 1998). There is a direct relationship between alcohol consumption and the risk of suicide and attempted suicide, which is stronger for intoxication than for overall consumption (Rossow 1996).

3.5. NEUROPSYCHIATRIC CONDITIONS

Adolescent binge drinking

Heavy drinking during adolescence and young adulthood is associated with poorer neurocognitive functioning during the young adult years, and particularly with impairment of attention and visuospatial skills (Tapert et al 2004). Brain imaging and studies of event-related potentials have demonstrated that heavy alcohol

consumption during adolescence and young adulthood also can lead to subtle but significant abnormalities in brain structure and function. The alterations observed include reduced hippocampal volume, disturbed white-matter integrity, delayed neural response during information processing, and reduced brain response in key regions during tasks requiring working memory. These abnormalities may represent subtle early harm to brain cells and other constituents that may result from the neurotoxic effects of alcohol.

Alcohol dependence

No matter how drinking is measured (Grant and Harford 1990; Muthen *et al.* 1992; Dawson and Archer 1993; Hall *et al.* 1993; Caetano and Tam 1995; Midanik *et al.* 1996; Caetano *et al.* 1997), the risk of alcohol dependence increases with both the volume of alcohol consumption and a pattern of drinking larger amounts on an occasion (Caetano *et al.* 1997; Caetano and Cunradi 2002). Both the UK based OPCS national psychiatric morbidity survey (Farrell *et al.* 2001) and the US based NHIS-88 survey (Caetano *et al.* 1997) found that the risk of alcohol dependence increased linearly with the volume of alcohol consumption, with a pattern of drinking that included the consumption of five or more drinks per day considerably increasing the risk in the US study.

The association between alcohol consumption and dependence should not be seen as flowing in one direction only, i.e. from drinking to alcohol dependence. One of the characteristics of alcohol dependence is self-perpetuation. Once installed, dependence itself influences both the pattern and volumes of alcohol consumption, which in turn leads to the maintenance of dependence.

Alcohol dependence is particularly common amongst young adults (Farrell *et al.* 2001; Caetano 1999; Caetano and Cunradi 2002), with frequent drinking at ages 14-15 years predicting alcohol dependence at age 20-21 years (Bonomo *et al.* 2004), and binge drinking at age 16 years predicting alcohol dependence at age 30 years. There is a progression from alcohol use through harmful use to alcohol dependence, and an increasing risk of dependence with duration of exposure to alcohol. One half of people who eventually become dependent do so within ten years of the first use of alcohol (Wagner and Anthony 2002), although the most severe forms of alcohol dependence are rare before the age of 30 years (Coulthard *et al.* 2002).

The two factors that contribute to the development of alcohol dependence are psychological reinforcement and biological adaptation within the brain (World Health Organization 2004; Spanagel and Heilg 2005).

3.6. CARDIOVASCULAR DISEASES

Stroke

There are two main types of stroke: ischaemic stroke which follows a blockage of an artery supplying blood to the brain; and haemorrhagic stroke (also including sub-arachnoid haemorrhage) which follows bleeding from a blood vessel within the brain. Alcohol increases the risk of haemorrhagic stroke (Corrao *et al.* 1999; Reynolds *et al.* 2003). There is a J-shaped relationship between alcohol consumption and risk of ischaemic stroke, with consumption levels of up to 24g a day reducing the risk, whereas consumption levels of 60 or more grams per day increased the risk (Reynolds *et al.* 2003). Episodic heavy drinking is an important risk factor for both ischaemic and haemorrhagic stroke, and is particularly important as a cause of stroke in adolescents and young people. Up to 1 in 5 of ischaemic strokes in persons less

than 40 years of age are alcohol-related, with a particularly strong association among adolescents (Hillbom and Kaste 1982).

Coronary heart disease
Whereas low doses of alcohol may protect against heart disease, high doses increase the risk, and high volume drinking occasions may precipitate myocardial ischaemia or infarction and coronary death (Trevisan *et al.* 2001a; Trevisan *et al.* 2001b; Murray *et al.* 2002; Gmel *et al.* 2003 Britton and Marmot 2004; Trevisan *et al.* 2004).

Irregularities in heart rhythms
Episodic heavy drinking increases the risk of heart arrthymias and sudden coronary death, even in people without any evidence of pre-existing heart disease (Robinette *et al.* 1979; Suhonen *et al.* 1987; Wannamethee and Shaper 1992; Mukamal *et al.* 2005). Atrial fibrillation appears the most common form of arrhythmia induced by both consistent heavy alcohol consumption and high volume drinking occasions. It has been estimated that in 15%-30% of patients with atrial fibrillation, the arrhythmia may be alcohol-related, with possibly 5%-10% of all new episodes of atrial fibrillation explained by excess alcohol use (Rich *et al.* 1985).

3.7. RISKY SEXUAL BEHAVIOUR

Risky sexual behaviour
A review of the relationship between alcohol use and risky sexual behaviour amongst young people found that that drinking alcohol was strongly related to the decision to have sex and to indiscriminate forms of risky sex (e.g., having multiple or casual sex partners), but was inconsistently related to protective behaviours (e.g., condom use) (Cooper 2002). The links among alcohol use, the decision to have sex and indiscriminate behaviours were found in both between-persons and within-persons analyses, suggesting that these relationships cannot be adequately explained by stable individual differences between people who do and do not drink. Analysis of event characteristics showed that drinking was more strongly associated with decreased protective behaviours among younger individuals, and on first intercourse experiences.

Sexually transmitted diseases
A systematic review of the relationship between alcohol consumption and sexually transmitted diseases (STD) identified 42 eligible studies, of which only 11 included a measure of alcohol consumption that could be used to identify problem drinking and thereby be sufficiently informative to make a reasonable conclusion about the relationship of problem drinking to STD (Cook & Clark 2005). Eight of these 11 studies found an increased risk of STD, and the other three found no significant association. Of these three, one had a very small sample size, another used a very insensitive measure of STD, and the third just missed achieving statistical significance. Taken together, these results suggest that problem drinking is clearly associated with an increased risk of STDs across a wide variety of populations. The results from the studies with general measures of alcohol consumption were similar, with the majority finding a significant association with at least one STD. The 42 articles included over 30 different types of alcohol measurement descriptions, making it difficult to come up with clear conclusions about which particular pattern of alcohol consumption is associated with the greatest risk.

Although alcohol consumption does not by itself cause an STD, it can directly affect risk either by increasing the risk that one is exposed to an STD through risky sexual

behaviour or selection of high-risk partners (Leigh & Stall 1993; Leigh 2002). Another plausible mechanism is that alcohol consumption might increase the biologic susceptibility to an STD if exposed, through adverse effects on the immune system or other direct biologic changes (Kovacs et al 2002).

One US based study of HIV infected persons found that nearly two thirds of persons reported sexual activity in the past 6 months, with 38% reporting unprotected sex during that period (Stein et al 2005). All measures of alcohol use were significantly associated with any sexual activity and with unsafe sexual behaviour. As an example, controlling for age, HIV transmission risk, marital status, and HIV clinical indicators, hazardous drinkers were 5.64 times more likely to report unprotected sex and have multiple partners ($p < 0.01$) than were those not drinking at hazardous levels.

Pregnancy

There is evidence that women with unintended pregnancies were more likely to have engaged in binge drinking in the preconception period compared with women whose pregnancies were intended, with the strength of the association increasing with the number of binge drinking episodes (Naimi et al 2003). In addition to the increased risk of unintended pregnancy, the preconception binge drinkers were more likely than nonbinge drinkers to expose their foetuses to established risk factors for adverse pregnancy outcomes. For example, binge drinkers may unknowingly expose their foetuses to high concentrations of alcohol during the period after conception but before pregnancy confirmation. In addition, preconception binge drinkers were more likely than nonbinge drinkers to consume alcohol, binge drink, and smoke after their pregnancy was established.

3.8. REPRODUCTIVE CONDITIONS

Alcohol shows reproductive toxicity. Prenatal exposure to alcohol can be associated with a distinctive pattern of intellectual deficits that become apparent later in childhood, including reductions in general intellectual functioning and academic skills as well as deficits in verbal learning, spatial memory and reasoning, reaction time, balance, and other cognitive and motor skills (Mattson *et al.* 2001; Chen *et al.* 2003; Koditowakko *et al.* 2003). Some deficits, like problems with social functioning, appear to worsen as these individuals reach adolescence and adulthood, possibly leading to an increased rate of mental health disorders (Jacobson and Jacobson 2002). Although these deficits are most severe and have been documented most extensively in children with Foetal Alcohol Syndrome (FAS), children pre-natally exposed to lower levels of alcohol can exhibit similar problems (Gunzerath *et al.* 2004) in a dose dependent manner (Sood *et al.* 2001), exacerbated by episodic heavy drinking (Jacobson and Jacobson 1994; Jacobson *et al.* 1998; Streissguth *et al.* 1993 1994).

One detailed series of studies examining the effects of binge exposure on off-spring development has been undertaken by the Seattle Longitudinal Prospective Study on Alcohol and Pregnancy. When the children were studied at age 7.5 years, maternal binge drinking (i.e., consumption of five or more drinks per occasion) in the month prior to pregnancy recognition was the best predictor of neurobehavioral deficits in attention, memory, and cognitive processing as well as inflexibility in problem-solving. Moreover, the children exposed to binge drinking before their mothers realized that they were pregnant were more likely to be rated by their parents as having learning problems, being below average academically, and being hyperactive and impulsive. The children also were more likely to be rated by teachers as expressing behaviours

that were incompatible with learning (Streissguth et al. 1990). Average volume of consumption and frequency of drinking did not predict these neurobehavioral outcomes. When the children were studied again at age 11, children of binge-drinking mothers were still classified as having problems with distractibility, restlessness, and lack of persistence (Olson et al. 1992). Finally, when the children reached age 14 years, binge drinking still significantly predicted some critical neurobehavioral measures (i.e., problems with response inhibition and fluctuating attention span) (Streissguth et al. 1994*b*).

3.9. OVERALL DEATH

A recent meta-analysis of 34 studies, which followed a total 1 million subjects for an average length of 12 years, with 94,000 deaths, showed that compared with an alcohol consumption of about 5g/day, women consuming 60g alcohol a day had an approximately 60% increase in risk of death and men an approximately 30% increase in risk of death, Figure 3.5 (Castelnuovo et al 2006). At 40g alcohol a day, the increased risk for women was a little over 30%.

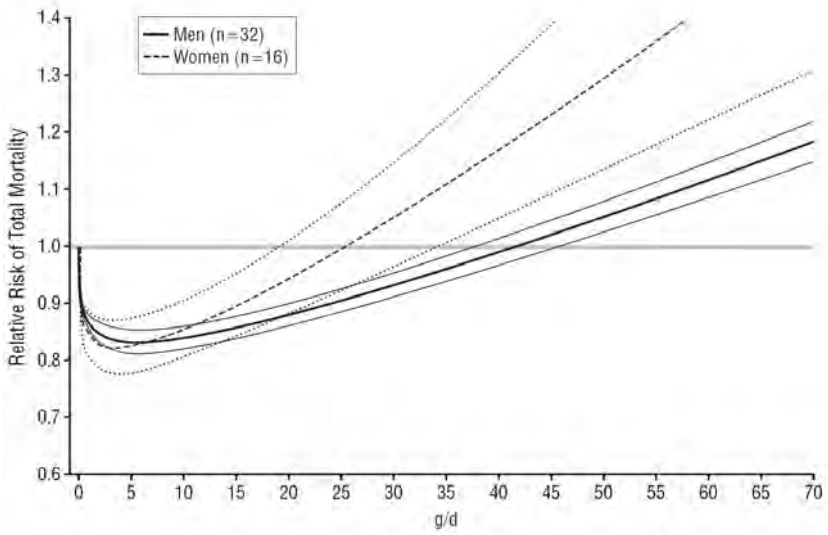


Figure 3.5 Relative risk of total mortality related to alcohol consumption (g/day).

In the British doctor's study, which followed up 12,000 male doctors aged between 48 and 78 years (mean age 64) for 23 years, the age standardized annual death rate at 5g alcohol/day was 3.4%, and at 50g/day just over 4%, a 20% difference (Doll et al 2005). In other words, of the light drinkers, 22% would still be alive after 23 years, but of the heavy drinkers, 7% would still be alive after 23 years.

There is some evidence that at any given volume of drinking, those drinking higher amounts on a given drinking occasion have a higher risk of death (Tolstrup *et al.* 2004).

3.10. CONCLUSIONS

As summarized in the table below, episodic heavy drinking (binge drinking) increases the risk of a wide range of social and health harms for both the individual drinker, and

others than the drinker, including crime and violence, intentional and unintentional injuries, cardiovascular diseases, sexually transmitted diseases, and reproductive conditions. For all of these conditions, with the exception of ischaemic stroke and ischaemic heart disease, it appears that the risk increases in a dose dependent manner with increased frequency of drinking, and increased amount of alcohol consumed on a drinking occasion. For ischaemic heart disease, the relationship is J-shaped, with the risk increasing in a dose depdenent manner after the bottom of the J. What these individual risk functions mean for harm done by episodic heavy drinking to Europe as a whole is discussed in the next chapter.

The harm done by binge drinking		
	Condition	**Summary of findings**
Social well being		
To the individual drinker	**Negative social consequences**	For getting into a fight, harming home life, marriage, work, studies, friendships or social life, the risk of harm increases proportional to the amount of alcohol consumed.
	Reduced work performance	Higher alcohol use results in reduced employment and increased unemployment and reduced productivity.
To people other than the drinker	**Negative social consequences**	Social harms from other people's drinking are more common for less severe consequences (such as being kept awake at night by drunk people) than for more severe ones (such as being afraid of drunk people in public areas). Negative social consequences to others have higher rates in the population than social consequences to the drinker.
	Reduced work performance	When compared to lighter drinking, higher alcohol use results in lowered productivity and increased injury to others.
Intentional and unintentional injuries		
To the individual drinker	**Violence**	There is a relationship between alcohol consumption and the risk of involvement in violence, which is stronger for episodic heavy drinking than for overall consumption. The higher the alcohol consumption, the more severe the violence.
	Drinking and driving	The risk of drinking and driving increases with both the amount of alcohol consumed and the frequency of high volume drinking occasions. There is a 38% increased risk of accidents at a blood alcohol concentration level of 0.5g/L.
	Injuries	There is a relationship between the use of alcohol and the risk of fatal and non-fatal accidents and injuries. People who usually drink alcohol at lower levels, but who engage periodically in drinking large quantities of alcohol, are at particular risk.

To people other than the drinker	**Violence and crime**	There is a relationship between alcohol consumption and the risk of involvement in violence (including homicide), which is stronger for episodic heavy drinking than for overall consumption. There are also relationships between greater alcohol use and sexual violence (particularly violence against strangers) and domestic violence (although this is attenuated when other factors are taken into account). Generally the higher the level of alcohol consumption, the more serious the violence.
	Marital harm	Beyond a strong association between heavy drinking and marital breakdown, a few well-designed studies have demonstrated a significantly increased risk of separation or divorce among married heavy drinkers.
	Child abuse	A large number of studies, not always of good methodology, have reported a variety of childhood adversities to be more prevalent among children of heavy drinkers than others.
	Drinking and driving	The risk of crashes and injuries to others from drinking increases with both the volume of alcohol consumption and the number of heavy drinking occasions.
Neuropsychiatric conditions		
To the individual drinker	**Brain damage**	Heavy drinking during adolescence and young adulthood is associated with poorer neurocognitive functioning during the young adult years.
	Alcohol dependence	The risk of alcohol dependence begins at low levels of drinking and increases directly with both the volume of alcohol consumed and a pattern of drinking larger amounts on an occasion. Young adults are particularly at risk.
	Suicide	There is a direct relationship between alcohol consumption and the risk of suicide and attempted suicide, which is stronger for episodic heavy drinking than for overall consumption.
Cardiovascular diseases		
To the individual drinker	**Stroke**	Episodic heavy drinking is an important risk factor for both ischaemic and haemorrhagic stroke, and is particularly important as a cause of stroke in adolescents and young people.
	Irregularities in heart rhythms	Episodic heavy drinking increases the risk of heart arrthymias and sudden coronary death, even in people without any evidence of pre-existing heart disease
	Coronary heart disease (CHD)	Whereas low doses of alcohol may protect against heart disease, high doses increase the risk, and high volume drinking occasions may precipitate

		myocardial ischaemia or infarction and coronary death.
Sexually transmitted diseases (STD)		
To the individual drinker	**STD, including HIV/AIDS**	Problem drinking is clearly associated with an increased risk of STDs across a wide variety of populations.
To people other than the drinker	**STD, including HIV/AIDS**	HIV infected persons who are hazardous drinkers are more likely to report unprotected sex and have multiple partners than those not drinking at hazardous levels.
Pre-natal conditions		
To people other than the drinker	**Neuro-behavioural deficits**	Maternal binge drinking (i.e., consumption of five or more drinks per occasion) in the month prior to pregnancy is related to neurobehavioural deficits in attention, memory, and cognitive processing as well as inflexibility in problem-solving amongst offspring, at least up to age 14 years.
Total mortality		
To the individual drinker		Compared with an alcohol consumption of about 5g/day, women consuming 40g alcohol a day and men consuming 60g a day have an approximately 30% increase in risk of death over a 12 year period. At any given volume of drinking, those drinking higher amounts on a given drinking occasion have a higher risk of death.

4. CONSEQUENCES OF BINGE DRINKING IN EUROPE

Across different European countries, it has been estimated that some 7% to 80% of crime and some 16% to 71% of domestic or intimate partner violence is linked to intoxication. Each year in the European Union, episodic heavy drinking is related to 2,000 homicides (4 in 10 of all murders), 17,000 deaths from road traffic accidents (1 in 3 of all road traffic fatalities), including 10,000 deaths of people other than the drink-driver, 27,000 accidental deaths, 10,000 suicides (1 in 6 of all suicides), 16% of all child abuse and neglect, with some 5-9 million children living in families adversely affected by alcohol. Alcohol is a cause of 7.4% of the total burden of disability and premature death facing Europe, with a high proportion of this burden due to alcohol-related injuries. Alcohol-related injuries are also an important cause of inequalities in health between and within European countries. Throughout Europe, changes in death rates from accidents, homicides and suicides parallel changes in overall levels of alcohol consumption.

4.1. CONSEQUENCES OF BINGE DRINKING

Alcohol-related crime in Europe

Alcohol use is associated with crime in all European countries, and is particularly involved with violent crimes, Table 4.1 (Anderson & Baumberg 2006). The proportion of violent crimes reported to be committed under the influence of alcohol is highest in the Nordic countries. Other surveys in the Nordic countries have also found 2%-3% of men and 1%-2% of women have been physically harmed by a drunk person in the past year (Mäkelä *et al.* 1999; Rossow and Hauge 2004). In contrast, a survey within the ECAS project found the highest rates of people who report being in a fight when drinking came from Germany, the UK (both >5% of drinking men) and Ireland (>10%), with the lowest rates of around 1% coming from Italy and Sweden (Ramstedt and Hope 2003).

Even within violent crimes as a whole, the involvement of alcohol may vary. In Finland, Germany, Norway, Poland and the UK, assault associations seem higher than those for robbery and sexual crimes, although the range of results is also greater and more spread out between victim and offender drinking. Vandalism also shows a strong association with alcohol where data is available (Belgium, Estonia, Latvia and Norway), as does theft in a number of countries. The alcohol-crime link for all of these is stronger for drinking to intoxication – in the UK, for example, 24% of all violent offences are committed by 18-24 year old binge-drinkers, compared to 16% for other regular drinkers and 5% by occasional- or non-drinkers of the same age (Matthews and Richardson 2005).

Time series analyses suggest that the alcohol-attributable fraction for assaults was moderately larger in Sweden and Norway (50%) than France (33%), with no significant effect found in Denmark (Lenke 1990). In contrast, the effect of a one litre change in consumption was far weaker in France than elsewhere, but the much higher level of consumption in France gave a similar role of alcohol in assaults overall. A similar result can be seen for homicide, where northern European countries show stronger effects per litre (Room and Rossow 2001; Rossow, Pernanen, and Rehm 2001). Yet once more, those countries showing smaller effects per litre are also those with higher levels of consumption, with a net result that the

estimate of the number of alcohol-attributable homicides per capita is similar in northern and southern Europe (see below).

Table 4.1 Selected crimes and their relation to alcohol

	Country	% linked to alcohol	Type of link[2]
All crimes	Belgium	20	Intoxication
	England & Wales	25	Under-the-influence
	Finland	47	Intoxication, prisoners
	Germany	7	Under-the-influence
	Hungary	35	Intoxication
	Latvia	34	Under-the-influence
	Lithuania	21	Under-the-influence
Violent crime	Belgium	40	Intoxication
	England & Wales	48	Under-the-influence
	Estonia	60-70	Alcohol-related
	Finland	66	Intoxication, prisoners (assault)
	France	25	1973 data; Alcohol-related (assault)
	Germany	24	Under-the-influence
	Norway	80	Intoxication
	Spain	42	Under-the-influence, victims in A&E
	Sweden	86	Intoxication
Robbery	England & Wales	19	Under-the-influence
	Finland	53	Intoxication, prisoners
	Norway	40	Intoxication
	Poland	40	Intoxication
Sex offences / Rape	England & Wales	58	Alcohol-related
	Finland	49	Intoxication, prisoners
	Germany	29	Under-the-influence
	Norway	60	Intoxication

The methodology underlying these data is not consistent – any comparisons of these values should, therefore, be done with caution.

[1] Sources are: Belgium, Estonia, Hungary, Norway, Poland and Sweden (Rehn, Room, and Edwards 2001); Finland (Murdoch, Pihl, and Ross 1990; Salomaa 1995); France (Murdoch, Pihl, and Ross 1990); Germany (Bühringer et al. 2002); Latvia and Lithuania (Alcohol Policy Network 2005); Spain (MacDonald et al. 2005); UK (Leontaridi 2003)

[2] As described by the source of data – Intoxication: either victim of offender's view on whether offender was intoxicated; BAC: Blood Alcohol Concentration from police test; Under-the-influence: described as such in the source; Attribution: either victim or offender attributes harm to drinking; Alcohol-related: either an unspecified link, a self-report of any alcohol use in the 4-6 hrs immediately prior to the event, or a positive but unspecified BAC level.

Source: Anderson & Baumberg (2006).

It has been estimated that the overall total cost to Europe of crime due to alcohol was €33bn in 2003 (Anderson & Baumberg 2006). The greatest cost within this is for spending on police, courts and prisons (€15bn). The remaining amount is made up of

costs in anticipation of crime (crime prevention expenditure such as burglar alarms, together with the administration of insurance) (€12bn), and property damage from crime (€6bn). Beyond these tangible costs, it has been estimated that the value on the physical and psychological effect of violent crime on the victims range between €9bn-€37bn per year (€52bn for the cost of alcohol-*related* crime).

Alcohol and domestic violence in Europe

It has been estimated that some 16%-71% of domestic or intimate partner violence is related to alcohol across Europe (see Table 4.2).

Table 4.2 Selected crimes and their relation to alcohol

	Country	% linked to alcohol	Type of link
Domestic violence	France	30	Alcohol-related
	England & Wales	53	Under-the-influence
	Iceland	71	Attribution
	Ireland	34	Attribution (trigger)
		71	Alcohol-related
	Netherlands	30	Intoxication
	Portugal	*16*	*Alcohol (or other drug) related*
	Spain	25	Alcohol-related
	Switzerland	26	Attribution
		40	Alcohol-related

Most Europeans believe alcohol to be causally linked, with a European survey finding that "alcoholism" – cited by nearly 19 of every 20 citizens of *each* Member State – is regarded as the leading cause of domestic violence (Eurobarometer 1999). Alcohol has similarly been linked to individuals' home lives or marriages, with 4% of men and 2% of women across seven countries saying this has been harmed by their drinking (Ramstedt and Hope 2003). Fewer problems were mentioned in southern Europe than elsewhere, although, it is impossible to know if this is due to cultural biases or a real difference in the level of harm. A similar question has also been asked of 45-64 year-olds in Krakow (Poland) and Karvina-Havirov (Czech Republic), which found a very high level of reported home life problems among men (Bobak *et al.* 2004).

Some 16% of child abuse is estimated to be due to alcohol (English *et al.* 1995). Reports from Denmark, Hungary, the Netherlands, Portugal, Spain and the UK support a figure of this magnitude, with alcohol related in various ways to 10%-50% of cases (McNeill 1998; Sundhedsministeriet [Ministry of Health] 1999; WHO 2004).

Intentional and unintentional injuries in Europe

Over 2,000 homicide deaths per year are attributable to alcohol – a small proportion of the total harm done by alcohol, but 4 of every 10 homicides that occur in the European Union. Studies from Finland, France (1973), Germany, Norway, Poland, Sweden and the UK suggest that 40%-70% of homicides are alcohol-related in some way. Time-series show that although the effect per litre was greater in northern Europe, the higher consumption levels in southern Europe mean that the overall estimated number of alcohol-attributable homicides is similar in northern and southern Europe, Figure 4.1 (Rossow 2001). In actual fact, the estimated share of all

homicides that are due to alcohol is slightly higher in southern (61% of all homicides) than northern Europe (50% of a higher homicide rate).

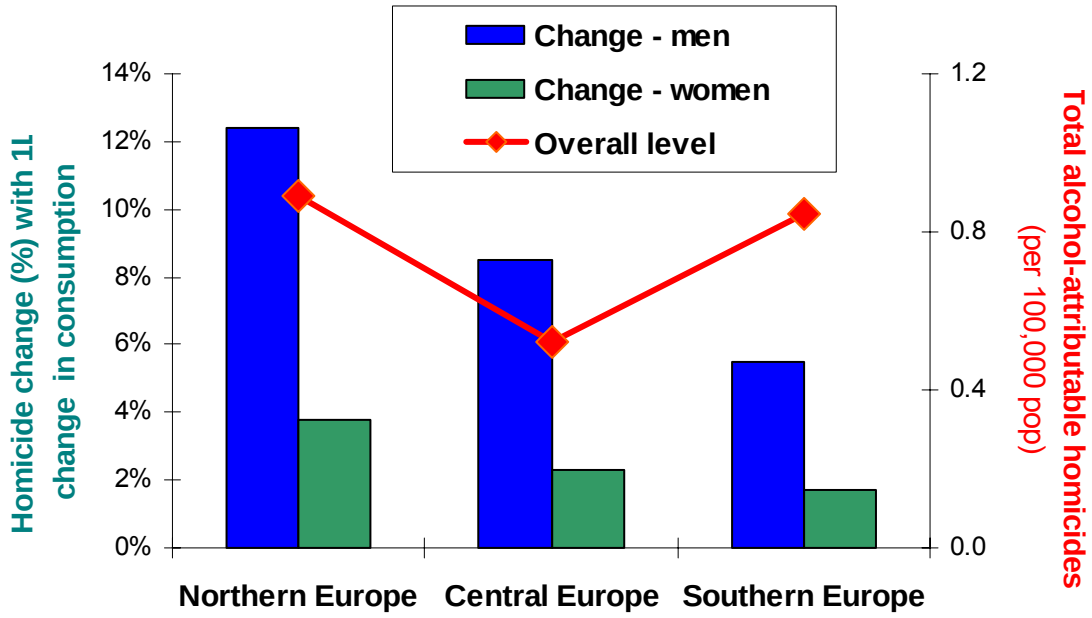


Figure 4.1 Homicides and alcohol in northern, central and southern Europe. Source: Rossow 2001

Deaths by **suicide** account for 7%-8% of the total deaths due to alcohol, a toll that is greater for men. The 10,000 deaths represent more than 1 in every 6 suicides. Stronger alcohol effects on suicide are found in the Nordic countries than in France, Portugal or Hungary (Rossow, Pernanen, and Rehm 2001) or more generally in southern and central Europe (Norström *et al.* 2001).

The best estimate suggests that more than 1 in 3 **road traffic fatalities** are due to alcohol (Anderson & Baumberg 2006). These drink-driving deaths are not equally split between genders, with 15,000 male deaths compared to 2,000 deaths for females. Looking only at damage to property, the cost of traffic accidents in the EU has been estimated to be €10bn in 2003.

The cost due to alcohol in human lives is even higher for other accidents than for drink-driving, with a toll of 27,000 deaths (including alcohol-related drowning, falls, fights, and fires, occupational and recreational injuries). Together with road traffic accidents this accounts for 1.1m DALYs, the majority for men, and accounting for one quarter of the male burden of disease and disability from alcohol.

Overall burden of episodic heavy drinking

One way of assessing the scale of alcohol as a public health problem is to examine the whole burden of illness and disease, looking at years of healthy life. The WHO uses a measure called Disability-Adjusted Life Years (DALYs) to estimate the number of healthy years of life lost due to each risk factor. For example, while a year of perfect health will count as 1 and a year of death will be 0, a year of damaged health that significantly affects Quality of Life will be somewhere in between. DALYs measure a gap in health between the current position and what could be achieved. Alcohol is responsible for the loss of over 4.5 million DALYs every year in the EU, 7.4% of all DALYs, Figure 4.2. This is principally for men, accounting for 12% of all male ill-health and premature death and a smaller but still sizeable 2% of all female

ill-health and premature death. The larger proportion of the burden arises from alcohol-related accidents and neuropsychiatric conditions.

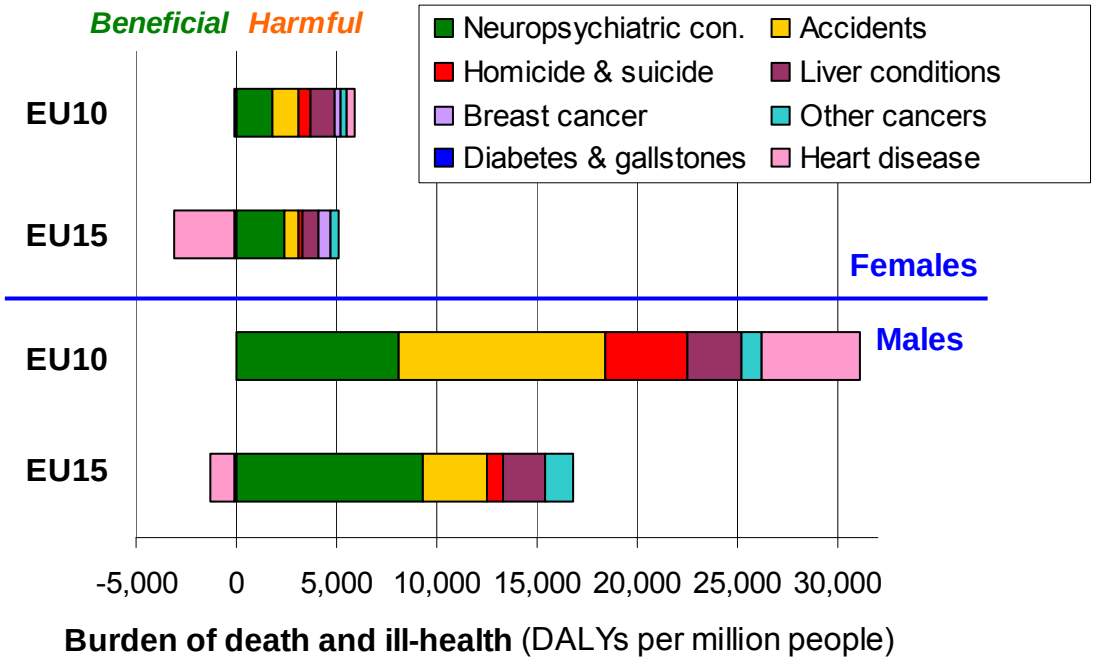


Figure 4.2 Alcohol-attributable burden of death and ill-health in the European Union *Adapted from WHO's Global Burden of Disease study (Rehm et al. 2004)*

Alcohol is the third-leading risk factor for death and disability in the European Union, ahead of obesity/overweight and nearly four times that of illicit drugs, Figure 4.3. Only blood pressure and tobacco account for a greater morbidity toll.

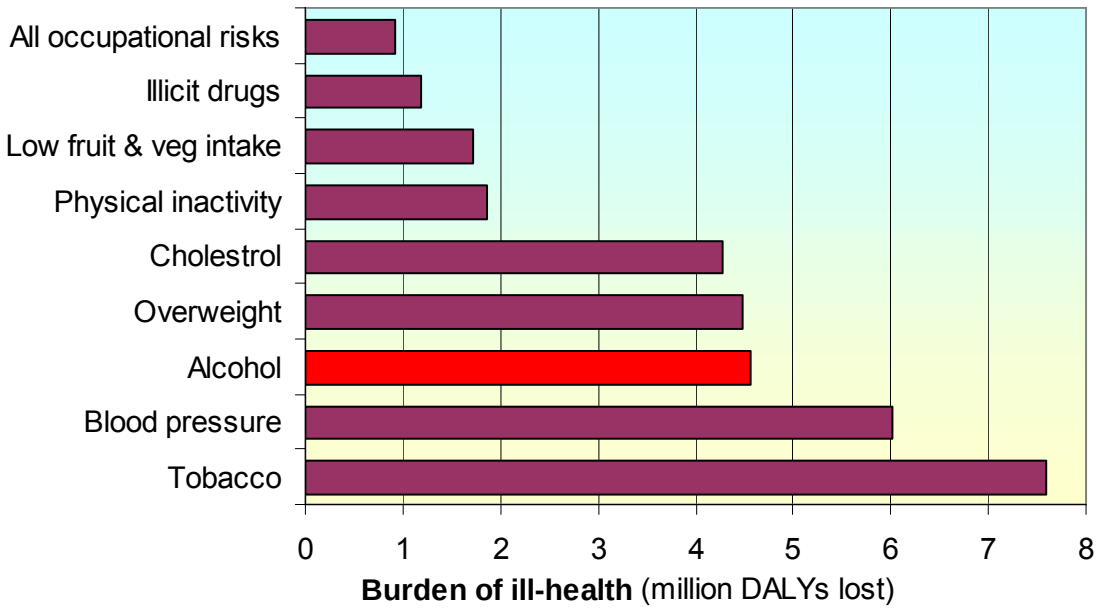


Figure 4.3 Top 9 risk factors for ill-health in the European Union. *Adapted from WHO's Global Burden of Disease study (Rehm et al. 2004)*

Although the absolute numbers of alcohol-related deaths are smaller in the younger rather than the older age groups, a higher proportion of deaths in younger people are due to alcohol, than in older people. At an age of death of between 15 and 29 years, 27% of all deaths occurring in men (13,000 deaths) and 11% (2,000 deaths) of all deaths occurring in women are due to alcohol, Figure 4.4. The high level of harms to young people is due to the importance of intentional and unintentional injury as primary causes of death in young people.

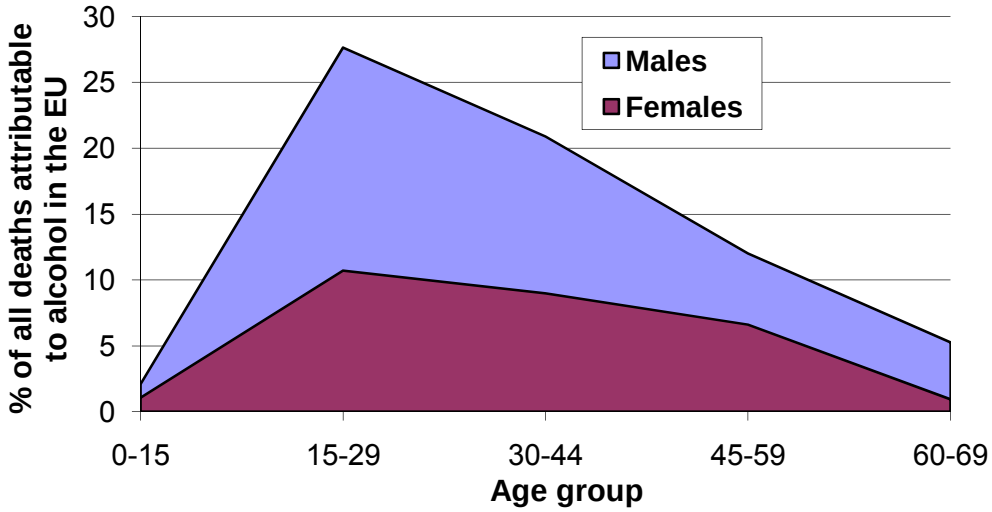


Figure 4.4 The share of deaths attributable to alcohol in EU citizens younger than age 70 years (year 2000). Source: Rehm (2005).

Inequalities between and within European countries

There is a substantial health gap across Europe, with a difference in life expectancy at birth between EU countries of as much as 10 years. Against this background, it is clear that many of the individual conditions that contribute to the health gap are linked to alcohol (McKee, Adany, and MacLehose 2004). Death rates from injuries and violence are consistently high in the EU10, as are cirrhosis rates in several countries. Patterns of drinking also ensure that alcohol exacerbates rather than mitigates the numerous other negative effects of drinking in eastern Europe. The estimates suggest that alcohol is responsible for a difference in the crude death rate of approximately 90 extra deaths per 100,000 people for men and 60 per 100,000 for women (as well as 16,000 DALYs per million people for men and 4,000 DALYs per million for women) in the EU10, compared with the EU15 (Anderson & Baumberg 2006).

For males dying between the ages of 20 and 64 years, injuries are responsible for nearly half (46%) of the difference in life expectancy between the three Baltic states (Estonia, Latvia and Lithuania) and the EU15, and for one fifth (22%) of the difference between central and eastern Europe (Poland, Czech Republic, Slovakia, Hungary, Slovenia, Romania, Bulgaria) and the EU15 (Rehm et al 2006). Whereas in the EU15, alcohol is responsible for 29% of all male injuries and 19% of all female injuries, in the central and eastern European countries, the proportions are 38% and 29%, and in the three Baltic states 48% and 42% respectively, Figure 4.5.

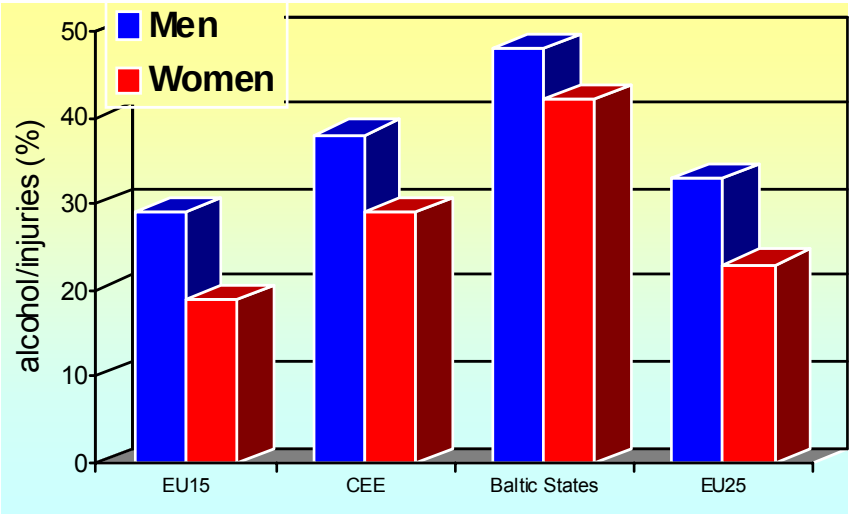


Figure 4.5 Share of fatal alcohol injuries in all fatal injuries. Men and women dying at ages 20-64 years, 2002 data. Source: Zatonski & Manczuk 2007.

Alcohol also contributes to health inequalities *within* countries, a finding that is unsurprising given the concentration of risky alcohol use in lower socioeconomic groups and the greater mortality from directly alcohol-related conditions. For example, alcohol addiction in Sweden is the 2nd most important cause of inequalities in the burden of ill-health for men (7th for women), with several other alcohol-related diseases such as ischaemic heart disease and self-inflicted injuries also prominent (Ljung *et al.* 2005).

Many of the conditions that are responsible for health inequalities are strongly linked to alcohol, including external causes (e.g. violence, accidents), stroke and liver disease (across the EU15), ischaemic heart diseases (northern Europe) and cancer (southern Europe) (Kunst *et al.* 1998; Dalstra *et al.* 2004). Alcohol's role in these inequalities may be different in different countries, however; for example, the two countries with the largest inequalities in men aged 45-59 are France and Finland, but while the former finds this to be mainly due to liver cirrhosis and alcohol-related cancers, the latter is caused primarily through violent deaths (Kunst *et al.* 1998).

Research from Finland further suggests that socioeconomic variables act on the collective as well as the individual level. Areas with the most manual workers had 20% more mortality directly attributable to alcohol than areas with the least, even after accounting for the *individual* relationship of occupation to mortality (Blomgren *et al.* 2004). Similar effects held for unemployment, urbanisation and social cohesion (measured as both 'family cohesion' and voter turnout), which accounted for around 40% of the alcohol-attributable mortality gap between areas *after taking account of all of these variables on the level of the individual*. This suggests that the drinking behaviour of people living nearby may be important for the behaviour of the individual, although further work is needed to separate this out from psychosocial mechanisms, nutritional variables and other possible area-level effects (Galea, Rudenstine, and Vlahov 2005).

Changes in consumption and harm

The connection between changes in population drinking and mortality has been comprehensively investigated within the ECAS study (Norström *et al.* 2001), using time-series analysis (ARIMA-modelling; see Box and Jenkins 1976) in 14 European countries for the years 1950 to 1995. This technique analyses the relationship between yearly changes in consumption and harm, and estimates the relative change in mortality for a change in per capita consumption of one litre of pure alcohol.

The country-specific results were pooled for three country-groups that were assumed to represent three different drinking cultures: 'high-consuming' countries (France, Italy, Portugal and Spain), 'mid-consuming' countries (Austria, Belgium, Denmark, Ireland, Netherlands, U.K. and West Germany) and 'low-consuming' countries (Finland, Norway and Sweden). The pooling has the advantage of strengthening the statistical associations, and makes cross-cultural comparisons of alcohol effects possible while preserving country-specific results. Results are summarized in Table 4.3 and results for men in mid-consuming countries shown graphically in Figure 4.6.

As can be seen from Table 4.3, nearly all conditions and total mortality showed a stronger effect of a one-litre change in consumption in the low-consuming countries (i.e. northern Europe) than elsewhere. While it has been argued that this stems from the 'explosive' drinking patterns in northern Europe (e.g. Rossow 2001), the stronger effect may also reflect the increased proportional size of a one-litre change in these low-consuming countries. It is important to note that changes in death rates of those conditions that are particularly a result of binge drinking (accidents, suicide and homicide) are strongly related to changes in overall alcohol consumption.

Table 4.3 Change in death rates (%) from a 1 litre increase in alcohol consumption
Changes are per capita and are calculated separately for low, medium and high consuming European countries for men (M) and women (F). **Source:** (Norström *et al.* 2001). **Key:** * = Significant at the 5% level

Country group (alcohol consumption)	**Low**		**Medium**		**High**	
	M	**F**	**M**	**F**	**M**	**F**
Cirrhosis	32*	17*	9*	5*	10*	11*
Alcohol dependence, psychosis and poisoning	35*	75*	18*	27*	3	1
Accidents	9*	10*	3*	3*	2*	2*
Suicide	9*	12*	0	3*	0	1
Homicide	18*	8	11*	7*	7*	2
IHD	-1	1	1	2*	1	0
Total mortality	**3***		**1***		**1***	

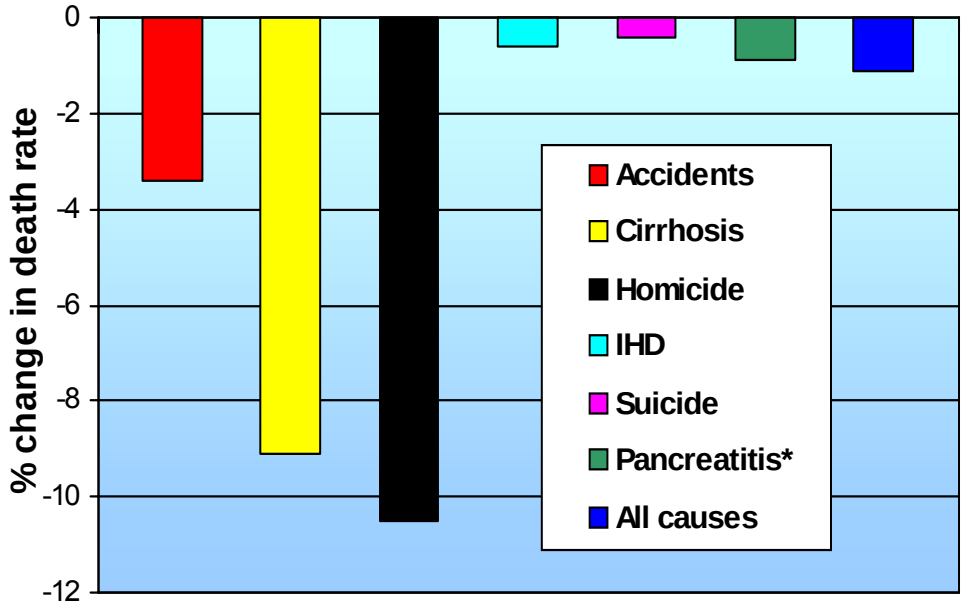


Figure 4.6 Percentage reduction in male death rate when per capita alcohol consumption is reduced by 1L per year. *Medium consuming European countries.* ***Source:*** *(Norström et al. 2001).* ***Key:*** **Both men and women.*

4.2. CONCLUSIONS

As summarized in the table below, binge drinking is a significant contributor to the social and health burden facing Europe, including crime, violence, domestic violence, homicide, suicide and unintentional injuries. It is also a significant contributor to inequalities between and within European countries. The social and health harms done by binge drinking are not fixed and move in parallel with changes in overall levels of alcohol consumption. Binge drinking is a threat to social cohesion and social capital and reduces health and safety in the living environment. It is therefore a threat to productivity and a sustainable economic development in the European Union, as envisaged by the objectives of the Lisbon Strategy. How this can be changed is the subject of the following chapters.

The burden of binge drinking to Europe	
Negative social consequences	One in five people in the Nordic countries have been kept awake by 'drunken noises', while 10% of men and 20% of women have been afraid of drunk people in the street.
Crime	Seven million adults report getting in fights due to their drinking each year, while 40% of all murders result from drinking. Alcohol attributable crime is estimated to cost European police, courts and prisons €15bn per year, as well €12bn in crime prevention expenditure & insurance administration and €6bn of criminal damage. The pain and suffering of crime victims has also been valued at €9bn–€37bn.
The family	5-9 million children are estimated to live in families adversely affected by alcohol at any one time.

Workplace	Based on a review of national costing studies, lost productivity due to alcohol-attributable absenteeism and unemployment has been estimated to cost €9bn-€19bn and €6bn-€23bn respectively.
Intentional injuries	Over 2,000 homicides (4 in 10 of all murders) are attributable to alcohol each year.
Unintentional injuries	17,000 deaths are attributable to drink-driving each year (1 in 3 of the total), as well as 27,000 accidental deaths. Based on UK and US data, it can be estimated that nearly 10,000 pedestrians, passengers or non-drinking drivers are killed each year due to *other people* who drink and drive
Neuropsychiatric conditions	Around 10,000 suicides (1 in 6 of all suicides) are attributable to alcohol each year.
Inequalities	Alcohol is responsible for a difference in the crude death rate of approximately 90 extra deaths per 100,000 people for men and 60 per 100,000 for women (as well as 16,000 DALYs per million people for men and 4,000 DALYs per million for women) in the EU10, compared with the EU15. A large proportion of this difference is due to alcohol-related injuries.
Total health impact	Alcohol is responsible for 12% of male and 2% of female premature death and disability, after accounting for health benefits. The total tangible cost of alcohol in Europe in 2003 was €125bn, and is borne by both drinkers and non-drinkers (Anderson & Baumberg 2006).

5. REGULATING THE AVAILABILITY AND MARKETING OF ALCOHOL

There is a wealth of evidence across different countries that making alcohol more expensive, primarily though taxation, reduces a wide range of harms done by intoxication and binge drinking, including road traffic accidents and fatalities, intentional and unintentional injuries, rapes and robberies, homicides, crime, and violence. Similarly, there is a wealth of evidence that raising the minimum purchasing age reduces alcohol related road traffic accidents, and that reducing the density of alcohol outlets reduces drunkenness, assaults, and road traffic fatalities. Extending the hours and days of sale spreads acute alcohol related problems over a longer period of time at the cost of an increased number of problems. Similarly, reducing hours and days of sale reduces problems of binge drinking. A number of well designed longitudinal studies show that the volume of advertisements and media exposure increase the likelihood of young people starting to drink, the amount they drink, and the amount they drink on any one occasion.

5.1. PRICE AND BINGE DRINKING

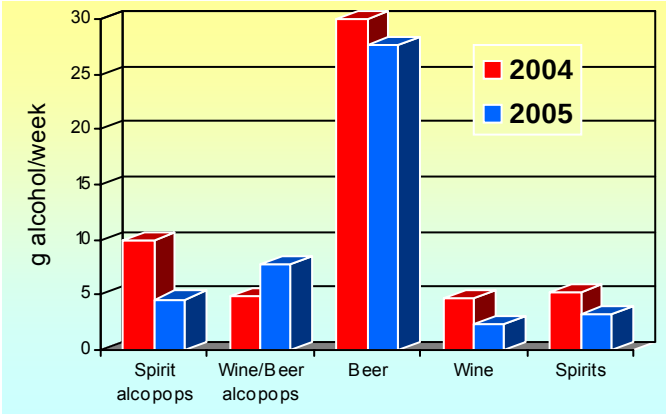
The impact of price changes on alcohol consumption and the harm done by alcohol has been more extensively investigated than any other potential alcohol policy measure (Ornstein 1980; Ornstein and Levy 1983; Godfrey 1988; Leung and Phelps 1991; Österberg 1995; USDHHS 1997; Österberg 2001). Econometric studies are available at least from the following European countries: Austria, Belgium, Denmark, Germany, Finland, France, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, and the United Kingdom (Ahtola *et al.* 1986; Huitfeldt and Jorner 1972; Lau 1975; Ornstein 1980; Ornstein and Levy 1983; Olsson 1991; Edwards *et al.* 1994; Österberg 1995; 2000). The price-elasticities for alcoholic beverages estimated in different studies have shown that when other factors remain unchanged, an increase in price has generally led to a decrease in alcohol-related harm, and that a decrease in price has usually led to an increase in alcohol-related harm, with the size of the elasticities sometimes dependent on the relative presence or absence of other alcohol policy measures (Farrell *et al.* 2003; Trolldal and Ponicki 2005).

Studies have found that increases in the price of alcohol reduce the alcohol consumption of young people, with a greater impact on more frequent and heavier drinkers than on less frequent and lighter drinkers (Grossman *et al.* 1987; Coate and Grossman 1988; Laixuthai and Chaloupka 1993; Chaloupka and Wechsler 1996; Cook and Moore 2002). Beyond levels of drinking, price has also been found to influence drinking to intoxication. One large survey in the US found that a 10% increase in price would decrease the number of intoxication episodes per month by 8% (defined as consuming 5+ drinks on one occasion; Sloan *et al.* 1995). The impact of alcohol taxes differs with age, with the impact of increasing age in youth possibly swamping the impact of price (Gius 2005).

A wide range of studies have found that increasing the price of alcohol and beer reduces road traffic accidents and fatalities particularly for younger drivers (Saffer and Grossman 1987a,b; Kenkel 1993; Ruhm 1996; Dee 1999; Mast *et al.* 1999; Dee and Evans 2001; Chaloupka *et al.* 2002; Evans *et al.* 1991; Chaloupka *et al.* 1993; Sloan *et al.* 1994a; Mullahy and Sindelar 1994a). Increases in alcohol prices reduce intentional and unintentional injuries (Sloan *et al.* 1994; Grossman and Markowitz 1999). Higher beer prices have been shown to lead to reductions in rapes and

robberies (Cook and Moore 1993), homicides (Sloan *et al.* 1994), crime (Saffer 2001), violence at universities (Grossman and Markowitz 2001), and violence-related injuries (Matthews *et al.* 2005).

Further, special taxes for spirit based sweet pre-mixed drinks lead to reductions in sales and consumption of the specific drinks, Figure 5.1.



12-17 year olds weekly alcohol consumption

Figure 5.1 Impact of specific tax introduced in 2004 on spirits based alcopops on 12-17 year olds weekly consumption, Germany. Source: Ministry of Health, Germany (2006).

There has been a considerable trend towards popular drinking venues offering promotional deals and 'happy hours' (temporary price-cuts) on products regularly consumed by young drinkers (see Hastings *et al.* 2005). Examples include: a never ending vodka glass (purchase one glass of vodka and refill it as often as you like); buy-one-drink and get-one-free happy hours, and cheap deals on popular drinks on particular nights of the week. Alcohol price promotions are associated with increased binge drinking (Kuo *et al.* 2003).

5.2. AVAILABILITY AND BINGE DRINKING

Minimum legal purchase age

Although legal restrictions on the age at which young people may purchase alcohol vary widely from country to country, ranging typically from 16 to 21 years of age, almost all countries legally restrict these sales. A review of 132 studies published between 1960 and 1999 found very strong evidence that changes in minimum drinking age laws can have substantial effects on youth drinking and alcohol-related harm, particularly road traffic accidents, often for well after young people reached the legal drinking age (Waagenar and Toomey 2000). Many studies have found that raising the minimum legal drinking age from 18 to 21 years in the United States decreased single vehicle night time crashes involving young drivers by 11% to 16% at all levels of crash severity (Klepp *et al.* 1996; Saffer and Grossman 1987a,b; Wagenaar 1981 1986; Wagenaar and Maybee 1986; O'Malley and Wagenaar 1991; Voas and Tippett 1999). The full benefits of a higher drinking age are only realized if the law is enforced. Despite higher minimum drinking age laws, young people do succeed in purchasing alcohol (e.g., Forster *et al.* 1994 1995; Preusser and Williams 1992; Grube 1997). In most EU countries in the ESPAD study, a majority of 15-16

year old students thought that getting any type of alcoholic beverage was fairly easy or very easy, rising to 70%-95% for beer and wine (Hibell *et al.* 2004). Such sales result from low and inconsistent levels of enforcement, especially when there is little community support for underage alcohol sales enforcement (Wagenaar and Wolfson 1994 1995). Even moderate increases in enforcement can reduce sales to minors by as much as 35% to 40%, especially when combined with media and other community activities (Grube 1997; Wagenaar *et al.* 2000).

A systematic review of minimum legal drinking age (MLDA) laws in the United States found that among 14 studies looking at the effects of raising the MLDA, crash-related outcomes *declined* a median of 16% for the targeted age groups, and that among 9 studies looking at the effects of lowering the MLDA, crash-related outcomes *increased* by a median of 10% within the targeted age groups, Figure 5.2 (Shults et al 2001). The effects were stable over follow-up times ranging from 7 months to 9 years.

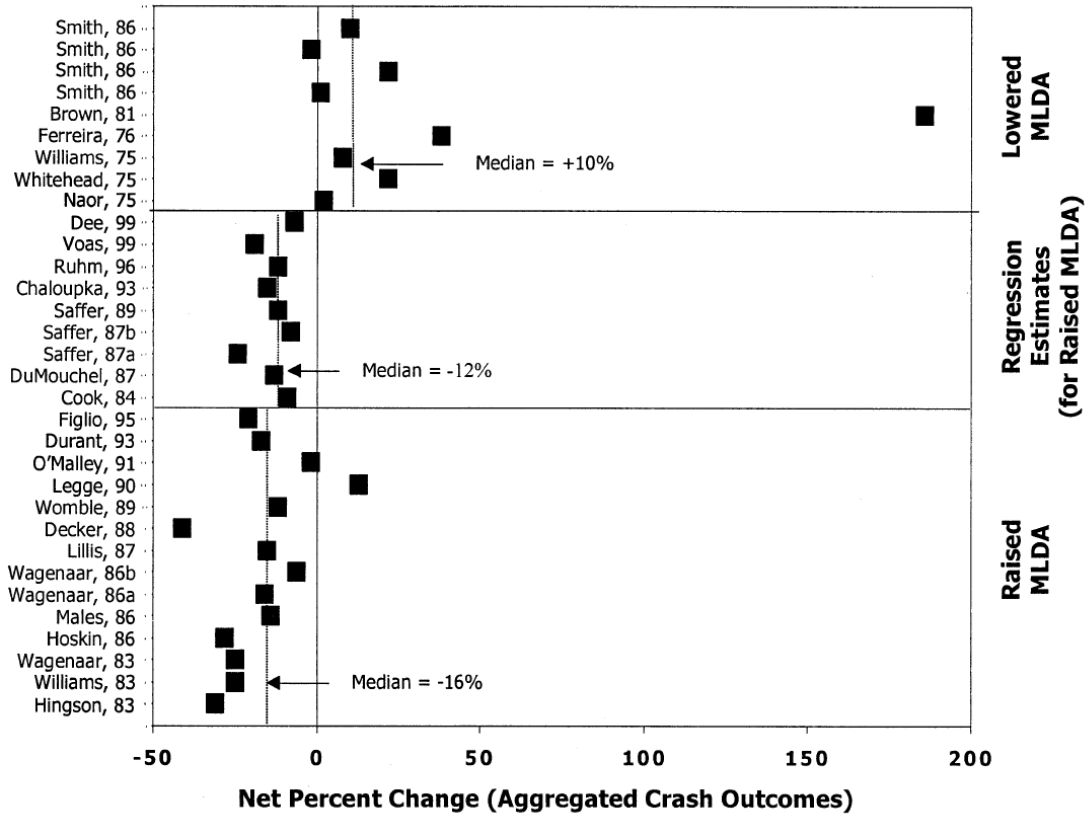


Figure 5.2 Net change in crash related outcomes for studies in which minimum legal drinking age laws were raised and in which minimum legal drinking age laws were lowered in the United States. Source: Shults et al (2001).

Number of retail outlets/outlet density

Outlet density refers to the number of outlets available for the retail purchase of alcohol. The smaller the number of outlets for alcoholic beverages, the greater the difficulty in obtaining alcohol, a situation that is likely to deter alcohol use and problems (Gruenewald *et al.* 1993). This can be seen in practice in Finland, Sweden, Britain and North America.

Finnish studies have found an overall impact on alcohol consumption from changes in the number of outlets (Kuusi 1957; Lehtonen 1978; Mäkinen 1978). The most dramatic change was observed in 1969, when beer up to 4.7% alcohol was allowed to be sold by grocery stores, and it also became easier to get a restaurant license. The number of off-premise sales points increased from 132 to about 17,600, and on-premise sales points grew from 940 to over 4000 (Österberg 1979). In the following year, alcohol consumption increased by 46%. In the following five years, arrests for drunkenness increased by 80% for men and 160% for women (Poikolainen 1980).

Swedish studies have also found an overall impact on alcohol consumption and alcohol-related harm from changes in the number of outlets (Noval and Nilsson 1984; Hibell 1984). A time-series analysis found that motor vehicle accidents were significantly reduced in three of four age groups when the right to sell 4.5% beer in groceries was retracted; there was a significant fall in hospital admissions for alcohol-specific diagnoses among those aged under 20 years, but no effect on assaults, suicides and falls (Ramstedt 2002).

However, Norwegian studies of the effects of opening wine and spirit outlets in places where beer was already available found a shift away from other beer and home produced spirits, with little effect on overall consumption. This suggests that, where there is already some availability of alcohol, the effects on total consumption of changes in the number of off-sale stores selling one or another type of beverage are minor (Mäkelä *et al.* 2002).

Recent years have seen the transformation of the night-time economy in British cities and towns (Hobbs *et al.* 2003; Chatterton and Hollands 2003), with older pubs being replaced by large branded drinking warehouses run by national or international chains. In Manchester City Centre, for example, the capacity of licensed premises increased by 240% between 1998 and 2001, whilst the number of assaults reported to the police increased by 225% between 1997 and 2001 (Hobbs *et al. 20*03).

North American studies have looked at the association of outlet density with rates of drinking driving collisions (Blose and Holder 1987; Gruenewald *et al.* 1993). Four studies report no impact of outlet density on drinking-driving or collision measures (Gruenewald and Ponicki 1995; Kelleher *et al.* 1996; Meliker *et al.* 2004; Lapham *et al.* 2004). However, a larger number of studies (eight) have reported a significant impact of outlet density on alcohol consumption and drinking driving collision (Scribner, MacKinnon and Dwyer 1994; Gruenewald *et al.* 1996; Gruenewald *et al.* 1999; Gruenewald, Johnson and Treno, Jewell and Brown 1995; 2002; LaScala *et al.* 2001; Treno, Grube and Martin 2003; Escobedo and Ortiz 2002; Cohen, Mason and Scribner 2002), and assaults, particularly in high population density areas (Gruenewald *et al.* 1996). On balance, the research indicates that increasing numbers of outlets will increase alcohol-related collisions and fatalities (see Mann *et al.* 2005 for a more detailed description). Outlet density has also been associated with an increased risk of pedestrian injury collisions (LaScala *et al.* 2000), and violent assaults (Alaniz *et al.* 1998; Stevenson *et al.* 1998; Zhu *et al.* 2004).

The distribution of alcohol-related crashes (single-vehicle night-time crashes) is also related to the distribution of on-premise outlets and rates of these crashes decrease with greater distance from concentrated areas (Gruenewald *et al.* 1996). Further, greater outlet concentrations have a greater impact on alcohol-related crashes in areas with greater amounts of highway traffic (Gruenewald and Johnson 2000), and in lower income areas (LaScala, Gruenewald and Gerber 2000).

Research has examined the associations between outlet density and measures of student and underage drinking. Outlet density has been found to be closely related to heavy drinking and drinking-related problems among college students (Weitzman *et al.* 2003); other associations were found for the number of commercial sources of alcohol and binge drinking and drinking in inappropriate places for students age 16 to 17 years (Dent *et al.* 2005).

The impact of changes in availability will depend on local circumstances (Abbey, Scott and Smith 1993). Thus, whereas changes occurring across a country have an impact (Gruenewald, Ponicki and Holder 1993; Wagenaar and Holder 1996), when changes in availability are more local, there may be no impact (Gruenewald *et al.* 2000b). In the first case, it is difficult to avoid the effects of reduced availability. In the local case, it is possible to travel outside the local geographic area to obtain alcohol. Further, equivalent reductions in local areas can have different effects. A 10% reduction in the number of outlets in high density areas will have negligible effects on the distances between people and outlets. A 10% reduction in the number of outlets in low density areas may result in the elimination of the only outlets easily accessible by drinkers.

Hours and days of retail sale

A number of studies have indicated that although changing either hours or days of alcohol sale can redistribute the times at which many alcohol related crashes and violent events related to alcohol take place (e.g., Smith 1988; Nordlund 1985), it does so at the cost of an overall increase in problems. Around-the-clock opening in Reykjavik, for instance, produced net increases in police work, in emergency room admissions and in drink-driving cases, Figure 5.3. The police work was spread more evenly throughout the night, but this necessitated a change in police shifts to accommodate the new work (Ragnarsdottir *et al.* 2002).

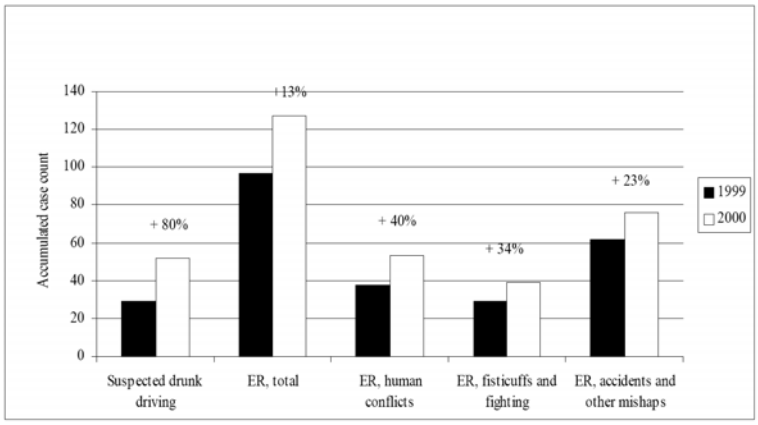


Figure 5.3 Iceland: impact of 24 hour opening of bars and restaurants. Source: Ragnarsdottir *et al.* (2002).

A study in Western Australia showed that extending opening hours from midnight to 1.00am increased violent incidents at the later night venues by 70% (Chikritzhs, Stockwell and Masters 1997; Chikritzhs and Stockwell 2002), Figure 5.4. The increased problems associated with the late trading venues appeared to result from increased alcohol consumption rather than increased opportunity for crime to occur, since there was no apparent difference between the two groups after controls for alcohol sales. The blood alcohol levels (BALs) of drivers in road crashes, who had

been drinking at the extended trading premises, were significantly higher than those drinking at the control premises. Similar studies have also found that assaults at licensed premises are much more likely to occur during extended trading periods, with the most frequent time being midnight to 3am (Briscoe and Donnelly 2003a).

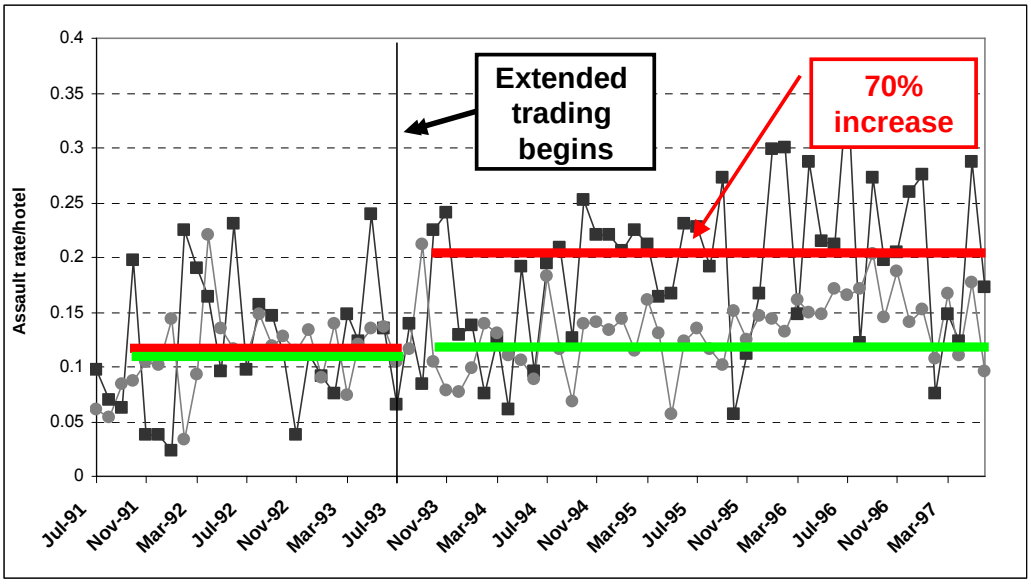


Figure 5.4 Assault rates for hotels that closed at 1 am [■] and those that closed at midnight) [●] Perth, WA. Source: Chikritzhs and Stockwell (2002).

A study in Sweden (Norström and Skog 2001 2002 2005) found a net 3.6% increase in alcohol sales with Saturday opening of government alcohol stores, although the changes in harm were not big enough to be significant. The Saturday opening occurred at a time when alcohol was more readily available from other sources, including restaurants and bars, groceries (up to 3.5% alcohol concentration) and travellers' imports. There is also evidence that restricting days and hours of sale reduces problems. In the 1980s Sweden re-instituted Saturday closing for spirits and wine off-premise sales after studies showed that Saturday sales were associated with increased rates of domestic violence and public drunkenness (Olsson and Wikström 1982). In 1984, Norway reintroduced Saturday closing, with a resultant decrease in domestic violence and disruptive intoxication (Nordlund 1985).

5.3. ADVERTISING AND BINGE DRINKING

There is an enormous wealth of evidence that alcohol advertisements are related to positive attitudes and beliefs about alcohol amongst young people. In addition, the content of advertisements is related to expectancies about the use of alcohol amongst young people and the role of alcohol in their lives. Young people are particularly drawn to elements of music, characters, story and humour. Young people who like advertisements believe that positive consequences of drinking are more likely, their peers drink more frequently, and their peers approve more of drinking. These beliefs interact to produce a greater likelihood of drinking, or of intention to drink in the near future. These results are not surprising, given that increased desires to drink must be one of the main aims of commercial communications.

One relatively large study looked into connections between children's awareness of alcohol advertising and their knowledge and beliefs about drinking (Grube 1995; Grube and Wallack 1994). The students' awareness of alcohol advertising was ascertained through presentations of a series of still photographs taken from television commercials for beer, with all references to the product or brand deleted. The children were asked if they had seen each advertisement and, if so, to identify the product being advertised. Children who were more aware of advertising had increased knowledge of beer brands and slogans as well as more positive beliefs about drinking. Although attempts were made to account for the possibility that prior beliefs and knowledge could affect the children's awareness of the advertising, it is still possible that the relationship is due to children who hold more positive beliefs about drinking being those who are more aware of advertising.

Another study found that young people with more positive affective responses to alcohol advertising held more favourable drinking expectancies, perceived greater social approval for drinking, believed drinking was more common among peers and adults, intended to drink more as adults, and drank with higher frequency and in greater quantities (Chen and Grube 2002). Again, although an attempt was made to control for the reciprocal effects of alcohol consumption, intentions, and beliefs on positive effect toward alcohol advertising, it remains possible that the relationship is due to children who drink alcohol and in larger quantities hold more positive responses to alcohol advertisements.

A number of studies have attempted to find out whether children and adolescents who like alcohol advertisements have different drinking behaviours from those who do not like the advertisements. In one study of 213 children aged 7 to 12 years, the more the children liked alcohol advertisements, the more likely they were to have experimented with alcohol (Austin and Nach-Ferguson 1995).

A study of 500 New Zealand children aged between 10 and 17 years found that the degree to which the children liked a set of beer advertisements influenced how much they expected to drink at age 20 years (Wyllie *et al.* 1998a). Statistical analysis concluded that, while liking alcohol advertising influences current drinking status and intentions, the reverse does not seem to be true. In a similar study of an older age group, stronger results were reported in 1,012 randomly-selected 18- to 29-year-olds (Wyllie *et al.* 1998b). In this case, the more the respondents liked the alcohol advertisements, the more likely they were to drink at greater rates and to agree with positive belief statements such as "Drinking is a good way to escape from the hassles of everyday life." Most important, the more they liked the advertisements, the more they reported drinking problems such as getting into a physical fight because of drinking. Statistical modelling was used to propose that alcohol advertising and responses to alcohol advertising influence drinking beliefs, behaviours, and problems rather than the other way around.

Amongst 15 to 20 year olds, alcohol advertising is influential in shaping young people's attitudes and perceptions about alcohol advertising messages, which are in turn predictive of both positive expectancies and intentions to drink, suggesting that the effects of alcohol advertising on intentions to drink are mediated by cognitive responses to advertising messages and positive expectancies (Fleming *et al.* 2004). Fourteen year olds with greater exposure to advertisements in magazines, at sporting and music events and on television are more advertisement-aware than those with less exposure, as are teens who watch more TV, pay attention to beer advertisements and know adults who drink (Collins *et al.* 2003). Amongst 10-17 year olds, the perceived likeability of beer advertisements is a function of the positive affective responses evoked by the specific elements featured in the advertisements.

Liking of specific elements featured in beer advertisements significantly contributed to the overall likeability of these advertisements and subsequently to advertising effectiveness indicated by purchase intent of product and brand promoted by these advertisements (Chen *et al.* 2005).

Six US-based well designed longitudinal studies and one Belgian well designed longitudinal study show that the volume of advertisements and media exposure increase the likelihood of young people starting to drink, the amount they drink, and the amount they drink on any one occasion (see Table 5.1). There have been no published longitudinal studies that do not find such an effect. These findings are similar to the impact of advertising on smoking and eating behaviour, and are not surprising, given that increased drinking must be the main hoped for outcome of commercial communications.

Table 5.1 Results of longitudinal studies on impact of media and advertising exposure on alcohol use

Study	Country	Age group (years)	Follow-up (months)	Outcome at follow-up
Robinson et al (1998)	US	14-15	18	Each 1-hour increase in television viewing associated with a 9% increased risk for initiating drinking. Each 1-hour increase in watching music videos associated with a 31% increased risk for initiating drinking.
Wingood et al 2003	US	14-18	12	High exposure to rap music leads to 1.5 times greater likelihood to use alcohol over 12 month period compared with low exposure.
Stacy et al. (2004)	US	11-12	12	Those who watched 60% more alcohol advertisements on TV were 44% more likely to have used beer, 34% more likely to have ever used wine/liquor, and 26% more likely to have had 3 or more drinks on one occasion.
Van Den Bluck & Beullens (2005)	Belgium	13 + 16	12	Quantity of alcohol consumed while going out related to overall TV viewing and their music video exposure.
Ellickson et al. (2005)	US	13-15	36	Exposure to in-store beer displays, advertising in magazines and beer concession stands at sports or music events predicted drinking onset for non-drinkers after 2 years.
Snyder et al. (2006)	US	15-26	21	For every 4% more alcohol advertisements seen on TV, radio, billboards and in magazines drank 1% more drinks per month, and for every 15% more exposure in their media market on alcohol advertising, drank 3% more drinks per month.

Sargent et al (2006)	US	10-14	12-24	Significant linear and quadratic relationship between movie alcohol exposure and initiation of drinking, with a higher dose-effect relationship at lower movie alcohol exposure levels compared to higher levels.
McClure et al. (2006) [Same study as Sargent et al (2006)]	US	10-14	12-24	Owners of alcohol branded merchandise had higher rates of alcohol initiation (25%) compared with non-owners (13.1%).

5.1. CONCLUSIONS

Taxes are an effective policy option in reducing the harm done by binge drinking, with a particular impact in reducing the harm done by alcohol to people other than the drinker. Alcohol taxes generate direct revenue for governments, and – due to the relative inelasticity of the demand for alcohol – are generally much more closely related to average tax rates than levels of consumption, thus allowing considerable scope in most countries for raising taxes before the maximum revenue is achieved (see Anderson & Baumberg 2006).

There is an enormous discrepancy in the current tax rates between countries, even when adjusting for purchasing power, and one half of European countries still have no tax on wine. Standardized excise duties are a longstanding goal of the European Union mainly because the combination of a single market, together with wide excise variations, leads to serious market distortions and lost tax revenue. The consequences of differential taxes between countries are compounded by the high and increasingly liberal limits of the amount of alcohol that individuals can transfer between countries.

There is very strong evidence for the effectiveness of policies that manage the physical availability of alcohol (raising the minimum purchase age and managing days and hours of sale) in reducing the harm done by binge drinking. The evidence shows that, if opening hours for the sale of alcohol are extended, then more violent harm is likely to result. Policies that manage the availability of alcohol are largely devolved to the municipal level. They can only be effective if any national and regional legislation is enabling rather than restrictive, and if the policies are adequately enforced.

There is increasing evidence that the volume of advertisements and media exspoure increase the likelihood of young people starting to drink, the amount they drink, and the amount they drink on any one occasion.

The next chapter will show that the impact of policies that regulate the alcohol market can be further strengthened through the implementation of programmes that create safer drinking environments and communities.

6. CREATING SAFER DRINKING ENVIRONMENTS AND COMMUNITIES

There is growing evidence for the impact of strategies that alter the drinking context in reducing the harm done by binge drinking. However, these strategies are primarily applicable to drinking in bars and restaurants, and their effectiveness relies on adequate enforcement. Passing a minimum drinking age law, for instance, will have little effect if it is not backed up with a credible threat to remove the licenses of outlets that repeatedly sell to the under-aged. Such strategies are also more effective when backed up by community-based prevention programmes.

6.1. SAFER DRINKING ENVIRONMENTS

Licensed drinking environments are associated with drunkenness (Snow and Landrum 1986), drink-driving (Fahrenkrug and Rehm 1994; Gruenewald *et al.* 1996; O'Donnell 1985; Single and McKenzie 1992) and problem behaviours such as aggression and violence (Ireland and Thommeny 1993; Rossow 1996; Stockwell *et al.* 1993), with some licensed premises being associated with a disproportionate amount of harm (Sherman 1992; Stockwell 1997; Briscoe and Donnelly 2003a). Aspects of the bar environment that increase the likelihood of alcohol-related problems (Graham and Homel 1997) include serving practices that promote intoxication, an aggressive approach taken to closing time by bar staff and local police (Tomsen 1997), the inability of bar staff to manage problem behaviour (Homel *et al.* 1992; Wells *et al.* 1998), general characteristics of the environment such as crowding and permissiveness of bar staff (Homel and Clark 1994), the general type of bar (Gruenewald *et al.* 1999; Stockwell *et al.* 1992), and physical comfort, the degree of overall 'permissiveness' in the bar, the availability of public transport, and aspects of the ethnic mix of customers (Homel *et al.* 2004).

Responsible beverage service

Nearly all evaluations in training bar staff in responsible beverage service when backed up with enforcement have demonstrated improved knowledge and attitudes among participants (Graham 2000; Graham *et al.* 2002; Hauritz *et al.* 1998a; Homel *et al.* 1997), although this wears off over time (Hauritz *et al.* 1998b). These studies have also shown some effects on serving practices (Johnsson and Berglund 2003), but not always (Donnelly and Briscoe 2003). Whilst servers are usually willing to intervene with customers who are visibly intoxicated (Gliksman *et al.* 1993), they generally will not intervene with individuals solely on the basis of the customer's estimated blood alcohol concentration (BAC) or number of drinks consumed (Howard-Pitney *et al.* 1991; Saltz and Stanghetta 1997; Gliksman *et al.* 1993; McKnight 1991). In addition, training tends to decrease bad serving practices such as "pushing" drinks and increase "soft" interventions such as suggesting food or slowing service. In terms of the effects on customer intoxication, several studies have found that server training results in lower BAC levels of customers generally (Geller *et al.* 1987; Russ and Geller 1987) and fewer customers with high BAC levels (Lang *et al.* 1998; Saltz 1987; Stockwell *et al.* 1993). Moreover, time series analyses of mandatory server training suggest that training is associated with fewer visibly intoxicated customers (Dresser 2000) and fewer single-vehicle night-time injury-producing crashes (Holder and Wagenaar 1994). Studies of the impact of adhering to bar policies for avoiding intoxication (Stockwell 2001) have also found modest effects in reducing heavy consumption and high risk drinking (Howard-Pitney *et al.* 1991; Lang *et al.* 1998; Wallin *et al.* 1999; Toomey *et al.* 2001), but were not as successful as originally expected (Stockwell 2001). Responsible beverage service programs are

frequently included in broad-based interventions (Homel *et al.* 2001) that have shown reductions in violence (Homel *et al.* 1997; Wallin *et al.* 2003; Felson *et al.* 1997; Putnam *et al.* 1993; Maguire *et al.* 2003).

The *Safer Bars* program developed in Canada includes a risk assessment (Graham 1999) and a training component (Braun *et al.* 2000) for owners, managers and all staff. The program was designed to increase early intervention by staff, improve teamwork and staff abilities in managing problem behaviour, and reduce the risk of injury to patrons. The *Safer Bars* training was shown to be highly valued by bar staff and managers and demonstrated a significant impact on knowledge and attitudes (Graham *et al.* 2002). There was also a significant effect in reducing both moderate (e.g. pushing and holding) and severe (e.g. punching and kicking) aggression (Graham *et al.* 2004). The effects were lessened when there was high turnover of managers and door and security staff.

A systematic Cochrane review found no reliable evidence that interventions in the alcohol server setting are effective in reducing injury (Ker & Chinnock 2006). One study investigated server training and estimated a reduction of 23% in single vehicle night-time crashes in the experimental area (controlled for crashes in the control area) (Holder 1994). Another study examined the impact of a drink driving service, and reported a reduction in injury road crashes of 15% in the experimental area, with no change in the control; no difference was found for fatal crashes (Lacey 2000). One study investigating the impact of a policy intervention, reported that pre-intervention the serious assault rate in the experimental area was 52% higher than the rate in the control area. After intervention, the serious assault rate in the experimental area was 37% lower than in the control (Felson 1997). A study investigating the impact of a intervention aiming to reduce crime experienced by drinking premises found a lower rate of all crime in the experimental premises (rate ratio 4.6, 95% CI 1.7 to 12, P = 0.01); no difference was found for injury (rate ratio 1.1. 95% CI 0.1 to 10, P = 0.093) (Casteel 2004). Compliance with interventions appears to be a problem; hence mandated interventions may be more likely to show an effect.

Active enforcement

The impact of responsible beverage service is greatly enhanced when there is active, but ongoing enforcement of laws prohibiting sale of alcohol to intoxicated customers (Jeffs and Saunders 1983; McKnight and Streff 1994; Saltz and Stanghetta 1997; Homel *et al.* 2001). Increasing the perceived risk of apprehension for an offence can deter individuals from future violations of the law (e.g. Homel 1988; Nagin 1998; Sherman *et al.* 1998). This is a cost effective intervention in which the benefits greatly exceed the costs (Levy and Miller 1995). Enforcement also seems to be a necessary component for voluntary codes of responsible beverage service to be successful (Lang and Rumbold 1997; Homel *et al.* 1997). One study found that a programme combining stricter enforcement of alcohol sales laws and training in responsible beverage service had a significant effect in reducing the rate of violent crimes between 10 pm and 6 am (Wallin *et al.* 2003). There is some evidence that enforcement checks prevent alcohol sales to minors (Wagenaar *et al.* 2005), restricted to the specific establishments checked and with limited diffusion to the whole community; most of the enforcement effect decayed within three months, suggesting that a regular schedule of enforcement is necessary to maintain deterrence. Further, there is some evidence that enforcement activity focuses more on breaches committed by patrons or minors, rather than licensees or vendors who are in breach of the intoxication provisions of the liquor laws (Donnelly and Briscoe 2003; Briscoe and Donnelly 2003b).

The goal of the Surfers Paradise project was to reduce violence and disorder associated with the high concentration of licensed establishments in the resort town of Surfers Paradise in Queensland, Australia (Homel *et al.* 1997). The project involved three major strategies: (1) the creation of a Community Forum including the development of task groups and a safety audit; (2) the implementation of risk assessments, Model House Policies, and a Code of Practice; (3) regulation of licensed premises by police and spirits licensing inspectors. This project and its replications in three North Queensland cities (Cairns, Townsville and Mackay) resulted in significant improvements in alcohol policy enforcement, in the bar environment, in bar staff practices, and in the frequency of violence (Hauritz *et al.* 1998a). Following the intervention, the number of incidents per 100 hours of observation dropped from 9.8 at pre-test to 4.7 in Surfers Paradise and from 12.2 at pre-test to 3.0 in the replication sites. However, the initial impact of the project was not sustained. Two years following the intervention in Surfers Paradise, the rate had increased to 8.3, highlighting the need to find ways to maintain gains achieved from community action projects.

Legal liability

Holding servers legally liable for the consequences of providing more alcohol to persons who are already intoxicated or those under age has shown consistent benefits as a policy measure in the US (Holder *et al.* 1993; Sloan *et al.* 2000), with lower rates of traffic fatalities (Chaloupka *et al.* 1993; Ruhm 1996; Sloan *et al.* 1994a; Wagenaar and Holder 1991) and homicide in states with such liability (Sloan *et al.* 1994b), compared to states that do not have the liability. Such use of legal liability is uncommon outside of the United States (with the exception of some cases in Australia and Canada).

Geographical analysis

Geographical analysis (Wilson and Dufour 2000) can be used to identify specific drinking localities and problems related to alcohol, particularly motor vehicle crashes, pedestrian injuries, and violence (Gruenewald *et al.* 2002). This allows targeted public health and law enforcement approaches, as shown in Figure 6.1.

Other harm reduction approaches

The risks of aggression, violence and injury (Stockwell, Lang and Rydon 1993) vary according to the physical bar-room environment (Graham *et al.* 1980; Stockwell *et al.* 1993; Homel and Clark 1994) and the behaviour and communication skills of bar staff (Hauritz *et al.* 1998a; Wells *et al.* 1998). Accordingly, interventions that focus on changing the barroom environment (e.g. changes in rules or policies related to games, management of queues and re-entry to the bar, modifications of the social or physical environment and improvement in staff communication and intervention skills) have been shown to be effective in reducing harms from drinking in these settings, without necessarily altering overall consumption levels (Homel *et al.* 1997; Graham *et al.* 2004; see also review by Graham 2000).

Interventions focused on public transportation

Various studies using a variety of methodologies have identified public transport availability as a key issue (d'Abbs, Forner and Thomsen 1994; Homel *et al.* 1997; Homel *et al.* 1991; Engineer *et al.* 2003) moderating the incidence of alcohol-related violence around licensed premises. Where there is a high concentration of licensed premises, a lack of public transport has the effect of retaining large groups of intoxicated and frustrated people in a small area. No direct evaluations of the impact of strategies to improve transport have been identified, although such interventions have been part of larger multi-component interventions that demonstrated reductions

in violence (Homel *et al.* 1997; Hauritz *et al.* 1998) as well as interventions that did not show a reduction in violence (d'Abbs and Forner 1995).

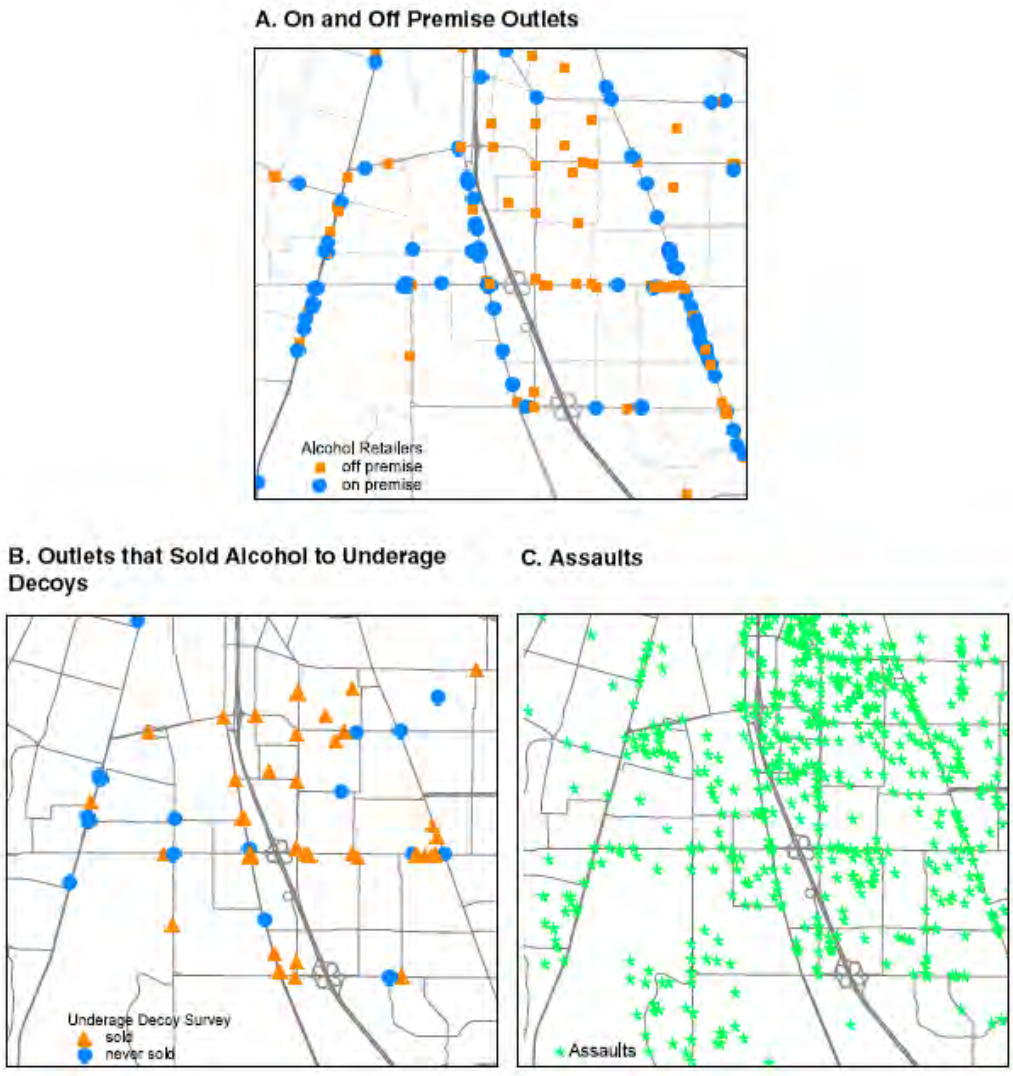


Figure 6.1 Illustration of the use of maps and mapping in alcohol policy. These tools can be used to study the locations of alcohol outlets and alcohol-related problems. Figure A shows all the alcohol outlets in a given geographic area. Outlets that sold alcohol to underage decoys are shown in figure B, and assaults in figure C. Source: Gruenewald *et al.* (2002).

Safer drink containers

It is well-established that intentional and unintentional injuries from broken drinking vessels are relatively common in licensed premises. This relationship led to the logical suggestion that replacing conventional glass vessels with tempered glass should reduce injuries. However, a randomised controlled trial comparing conventional glassware with tempered (toughened) glassware (Warburton and Shepherd 2000) reported increased injuries to staff from accidental breakage of tempered glassware. As yet, there is no research on the impact of tempered glass on intentional injuries to patrons.

6.2. SAFER COMMUNITIES

Community based prevention programmes can be effective in reducing drinking and driving, alcohol related traffic fatalities and assault injuries (Giesbrecht 2003; Stockwell and Gruenewald 2001; Holmila 1997; Holder 1998; Hingson *et al.* 2005; Clapp *et al.* 2005). Community mobilization has been used to raise awareness of problems associated with on-premise drinking, develop specific solutions to problems, and pressure bar owners to recognize that they have a responsibility to the community in terms of such bar-related issues as noise level and customer behaviour (Hauritz *et al.* 1998; Homel *et al.* 1992; Putnam *et al.* 1993). Evaluation results from community mobilization approaches as well as documentation from grassroots projects (Arnold and Laidler 1994; Cusenza 1997) suggest that community mobilization can be successful at reducing aggression and other problems related to drinking in licensed premises.

A review of ten community-based prevention trials which have sought to reduce harm from alcohol (Aguirre-Molina and Gorman 1996; Chou *et al.* 1998; Douglas *et al.* 1990; in press; Gliksman *et al.* 1995 1999; Grube 1997; Hingson *et al.* 1996; Holder *et al.* 1997a 2000; Holder and Treno 1997; Johnson *et al.* 1990; Pentz *et al.* 1989a; Perry *et al.* 1993 1996; Voas 1997; Wagenaar *et al.* 1994; 2000) found that strategies included education and information campaigns, media advocacy, counter-advertising and health promotion, controls on selling and consumption venues and other regulations reducing access to alcohol, enhanced law enforcement and surveillance, and community organization and coalition development (Giesbrecht *et al.* 2003). Interventions which showed promise were those that paid particular attention to controls on access, included the environmental contexts of where the products are sold and distributed, and involved enforcement of public health polices (see also (Holder 1998a; 1998b).

Community and neighbourhood characteristics are important in moderating the pricing and promotion of beer (Harwood *et al.* 2003), as well as reducing binge drinking (Nelson *et al.* 2005). Communities with higher enforcement of minimum purchase ages have lower rates of alcohol use and binge drinking (Dent *et al.* 2005). Community action projects can mobilize awareness and concern about alcohol-related harm (Allamani *et al.* 1997; 2003; Holmila 2003). Social capital as measured by aggregate reports of student volunteerism is associated with a decreased risk of binge drinking, drunkenness and alcohol-related harm (Weitzman and Chen 2005), and as measured by high trust is related to a reduced risk of illegally produced and purchased alcohol (Lindstrom 2005).

Since 1996, a multi-component program based on community mobilization, training in responsible beverage service for servers and stricter enforcement of existing alcohol laws has been conducted in Stockholm, Sweden, leading to a 29% reduction in violent crimes in the intervention area, compared with the control area (Wallin *et al.* 2003), Figure 6.2.

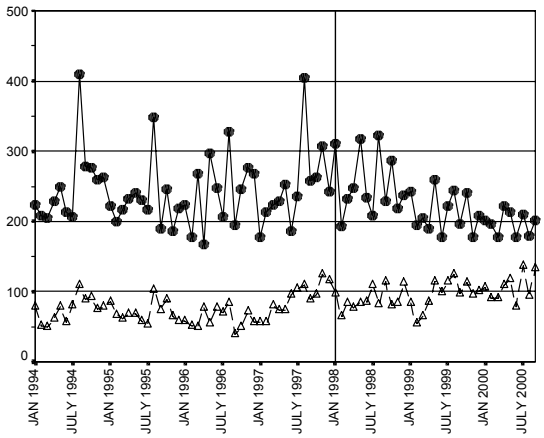


Figure 6.2 Police-reported violence in experimental area (filled circles) and in control area (triangles). Source: Wallin et al (2003).

The Community Trials Project (Holder *et al.* 1997) was a five-component community-level intervention to reduce alcohol-related harm among all residents of three communities. The project included a media and mobilization component, a responsible beverage service component, a sales to youth component to reduce underage access to alcohol, a drinking and driving component, and an access component to reduce the availability of alcohol. The project led to reduction in drink driving accidents, assault injuries, and harmful alcohol use (Holder *et al.* 2000). Finally, cost-benefit analyses estimated that the trial resulted in savings of €2.9 for every €1 spent on program implementation, based upon reductions in automobile crashes alone (Holder *et al.* 1997).

A community intervention project in the Northern Territories in Australia aimed to reduce levels of alcohol consumption and related harm down to national levels by 2002 (d'Abbs 2004) by using a range of strategies including education, increased controls on alcohol availability, and expanded treatment and rehabilitation services (Stockwell *et al.* . 2001; d'Abbs 2004). The Living With Alcohol (LWA) program was originally funded by a specific alcoholic beverage levy on the sale of alcohol products with more than 3% alcohol by volume until 1997, when a federal ruling prohibited states and territories from raising licence fees and additional taxes on alcoholic beverages, tobacco and petrol. As a direct result, the LWA levy was removed in August 1997 which, in turn, resulted in a fall in the real price of alcoholic beverages with more than 3% alcohol by volume (O'Reilly 1998). The Federal government continued to fund the LWA program at the same level until the year 2000. After this time, LWA funds were dispersed directly to the existing programs and services (d'Abbs 2004). The programme was effective in reducing acute alcohol-related deaths by 4.6 per 100,000 adults in the Northern Territories compared with reductions of 1.6 per 100,000 acute alcohol-related deaths in the control area (Chikritzhs *et al.* 2005), Figure 6.3.

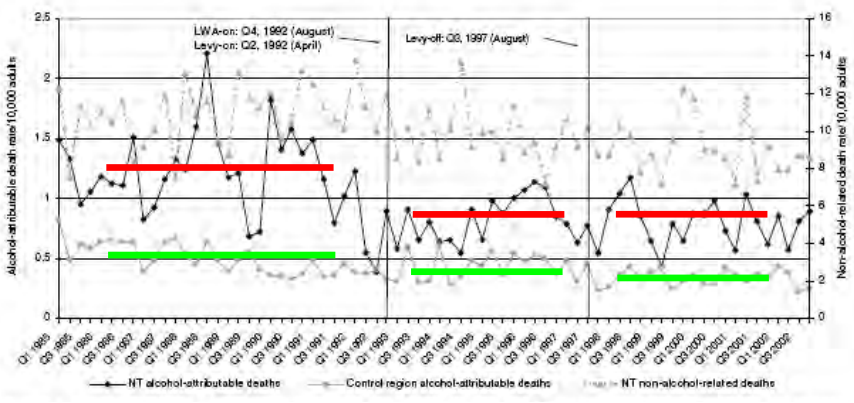


Figure 6.3 Trends in acute death rates per 10,000 adults in NT [●] and Control region [●] 1985-2002. Source: Chikritzhs *et al.* (2005).

6.3. CONCLUSIONS

Although, increasingly, programmes focusing on reducing the harm done by binge drinking in drinking environments are being developed and implemented, many of the programmes currently being implemented have not been adequately evaluated. The most effective options involve enhanced enforcement of regulations around serving. Training programs for bar staff and managers have demonstrated reductions in high risk drinking and drinking problems, although these effects tend to be limited, and are not found in all evaluations. In addition, there is some limited evidence to show that programmes that result in the adoption and enforcement of policies to make licensed premises safer can also been associated with lower levels of intoxication and problems. Comprehensive community programmes can, when appropriately designed and implemented, have substantial effects on the occurrence of problems related to binge drinking. However, some of these programmes require substantial resources to implement, and are unlikely to be as cost-effective as those measures that regulate the alcohol market discussed in Chapter 5. Further, given the limited current evidence of effectiveness of these approaches, they should not be considered as substitutes for other alcohol policy strategies that have well documented evidence of effectiveness. The next chapter considers the extent to which educational approaches can reduce binge drinking.

7. EDUCATING TO REDUCE BINGE DRINKING

Although there are individual examples of the beneficial impact of school-based education in reducing binge drinking, systematic reviews and meta-analyses find that the majority of well-evaluated studies show no impact even in the short-term. A policy that fails more often than not cannot be considered an effective policy option. There is considerable experience of what might be best practice in school-based education programmes, but currently unconvincing evidence for their effectiveness. This is not to imply that education programmes should not be delivered, since all people do need to be informed about the consequences of binge drinking, but school based education should not be seen as an effective measure to reduce the harm done by binge drinking. Public service announcements, public education campaigns, and those that focus on low risk drinking guidelines also have limited evidence for effectiveness, although media advocacy approaches are important to gain public support for policy changes.

7.1. SCHOOL BASED EDUCATION

The goal of most school-based alcohol education programs is to change the adolescent's drinking beliefs, attitudes, and drinking behaviours, or to modify factors such as general social skills and self-esteem that are assumed to underlie adolescent drinking.

Informational approaches

Earlier school-based interventions relied solely on informational approaches and taught students about the effects and the dangers of alcohol use. Such programs have not been found to be effective (Botvin *et al.* 1995a 1995b; Hansen 1994; Tobler 1992). Although they can increase knowledge and change attitudes toward alcohol use, actual use remained largely unaffected. In addition, there is some evidence that simply providing information about the dangers of different substances may, in some cases, actually increase use (Hansen 1980 1982).

Resistance and normative education approaches

Scientific evaluations of school and university based resistance and normative education interventions have produced mixed results with regard to alcohol, with some evidence for effectiveness (Dielman 1995; Botvin and Botvin 1992; Hansen 1992 1993 1994), including those aimed at reducing harmful alcohol consumption in university students (Baer *et al.* 1992, Marlatt *et al.* 1995, Marlatt *et al. 20*02), some of which are screening and intervention programs (Marlatt *et al.* 1998, Baer *et al. 20*01) (see below), and educational programmes based on the social norm concept (e.g. the need to conform to what is acceptable to their peers) (Mattern and Neighbors 2004; Kypri and Langley 2003, Perkins 2002); but also criticisms of the methodology and discounting of the effectiveness (Brown and Kreft 1998; Foxcroft *et al.* 1997; Gorman 1996 1998).

Project Northland, was a school and community intervention designed to prevent or delay the onset of drinking among young adolescents in 10 communities in north-eastern Minnesota (Perry *et al.* 1993, 1996). The primary intervention was a series of school-based resistance-skills, media literacy, and normative education sessions. The program also provided parents with information on adolescent alcohol use. Task forces in some communities were involved in local policy actions such as the

passage of local laws requiring responsible beverage service training. Evaluation of the project found that although it had a positive influence on alcohol knowledge and family communication about alcohol, it had no sustained impact on alcohol use (Williams *et al.* 1995; Perry *et al.* 1996; Perry *et al.* 1998).

The Midwestern Prevention Project was implemented in 50 public schools in 15 communities in the State of Kansas (USA). A replication was conducted in 57 schools and 11 communities in another state. The intervention consisted of five components: (a) a 10-13-session school-based program with 5 booster sessions, (b) a mass media program, (c) a parent education and organization program, (d) training of community leaders, and (e) local policy changes initiated by the community organization. Differences between program and comparison schools in self-reported prevalence of monthly drinking were significant after one year (MacKinnon *et al.* 1991; Pentz *et al.* 1989) but they did not differ after 3 years (Johnson *et al.* 1990).

The Alcohol Misuse and Prevention Study (AMPS) is typical of school-based education programs that focus on pressures to use alcohol, risks of alcohol use, and ways to resist pressures to drink (Shope *et al.* 1996a 1996b). The AMPS program had positive effects on alcohol knowledge (Shope *et al.* 1992), but few effects on drinking behaviour (Shope *et al.* 1996a). Other school-based alcohol resistance skills programs have produced similar results (Botvin *et al.* 1995a; Klepp *et al.* 1995).

A good example of a well-designed study is the School Health and Alcohol Harm Reduction Project (SHAHRP study) from Australia, which aimed to reduce alcohol-related harm in secondary school students (McBride *et al.* 2004). The study found that the intervention group (which received eight to ten 40 to 60 minute lessons on skill-based activities to minimize harm at age 13 years, and twelve further skills based activities delivered over 5-7 weeks at age 14 years) consumed significantly less alcohol at 8-month follow-up, after the first phase of the intervention (31% difference). However, at final follow-up, 17 months after the intervention, the total amount of alcohol consumed by intervention and comparison had lessened to a 9% difference. After the first phase of the programme at 8-month follow-up, intervention students were less likely to consume to risky levels (26% difference), but by seventeen months after programme completion, the difference was only 4%, Figure 7.1. There was a significant difference between the study groups in the harm they reported associated with their own use of alcohol after both phases of the intervention, which was maintained 17 months after the intervention (23% difference).

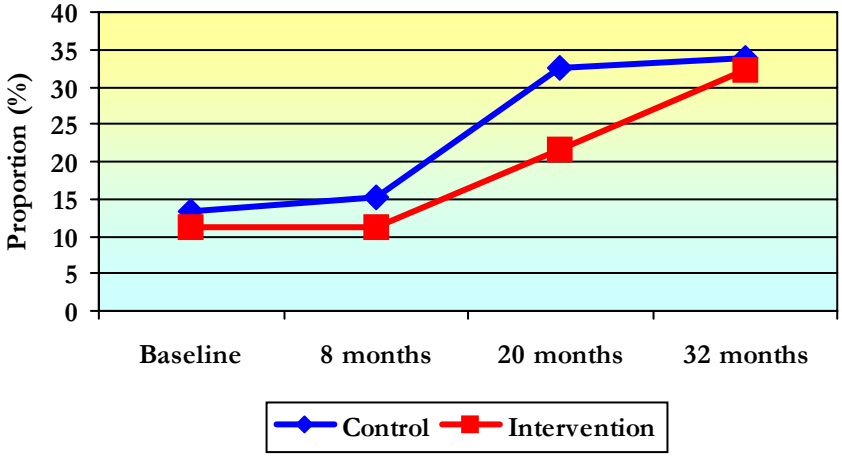


Figure 7.1 The impact of 2 education sessions (after baseline and one year later) in the intervention group compared to the control group (no education sessions) on binge drinking in 13-15 year olds. Source: McBride *et al.* (2004).

Family and community interventions

Some programs include both individual-level education and family or community-level interventions (Werck *et al.* 2003; Bauman *et al.* 2002; Turrisi *et al.* 2001). Well-designed evaluations suggest that even comprehensive school-based prevention programs may not be sufficient to delay the initiation of drinking, or to sustain a small reduction in drinking beyond the operation of the program. (Perry *et al.* 1993 1996 1998; Williams *et al.* 1995; MacKinnon *et al.* 1991; Pentz *et al.* 1989; Johnson *et al.* 1990).

Over the longer term (more than 3 years), the Strengthening Families Programme (SFP), showed promise as an effective prevention intervention, with a number needed to treat (NNT) for three alcohol initiation behaviours (alcohol use, alcohol use without permission and first drunkenness) of 9 (Spoth *et al.* 2001a; 2001b), Figure 7.2. This means that nine students have to receive the programme for one to benefit. One other study also highlighted the potential value of culturally focused skills training over the longer-term (NNT = 17 over 3.5 years for 4 + drinks in the last week) (Schinke *et al.* 2000). This means that 17 students have to receive the programme for one to benefit.

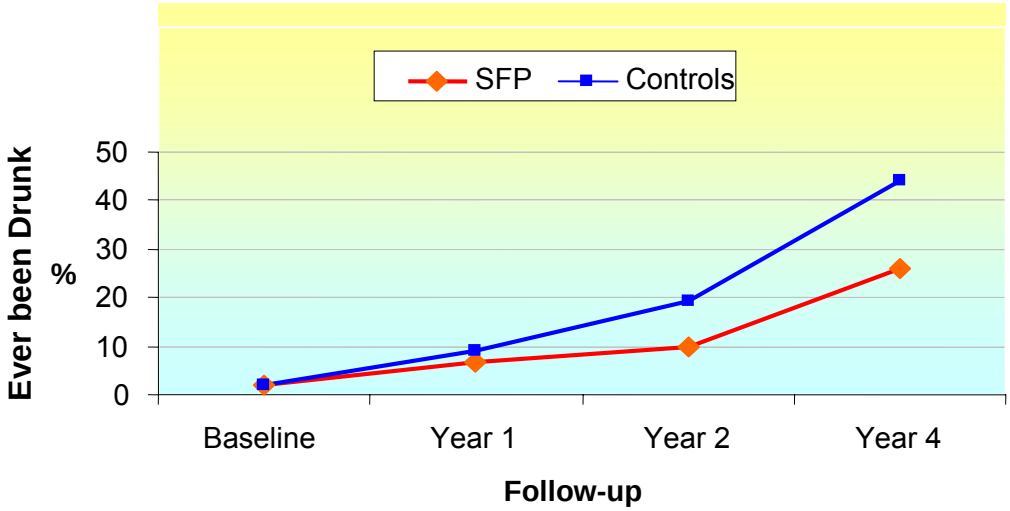


Figure 7.2 The impact of the Strengthening Families Programme on ever having been drunk. Source: Spoth *et al.* (2001a 2001b).

A Cochrane review of long term prevention for the primary prevention in young people found that 23 of 56 studies reviewed were ineffective in the short term, Table 7.1 (Foxcroft *et al.* 2003). The review was unable to make any firm conclusions about the effectiveness of prevention interventions in the short- and medium term.

Table 7.1 Effectiveness of primary prevention programmes for young people in the short, medium and long term. Source: Foxcroft *et al.* 2004.

Follow-up:	Partially effective	Ineffective	"Negative" effect
Short-term (1 year or less)	14	23	3
Medium-term (1-3 years)	13	19	2
Long-term (over 3 years)	3	6	0

A more recent review has sought to determine which interventions delivered in primary and secondary schools are effective and cost-effective for preventing or reducing alcohol use in young people under the age of 18 years (Jones et al 2007). The reviewed analyzed the results of fourteen systematic reviews. Based on these reviews, 19 classroom-based programmes led by teachers were identified, three only of which demonstrated evidence of reducing alcohol use in the short-term, and one only of which demonstrated evidence of long-term effects on alcohol use. Nine classroom-based programmes were identified that were taught by external contributors, only one of which (a culturally tailored programme for Native American students) demonstrated evidence of medium- to long-term effects. Nineteen school-based programmes that were delivered outside of the lesson format were identified including brief intervention programmes, counselling programmes, peer support and teacher training, none of which demonstrated medium to longer term effects.

Twelve multicomponent programmes were identified that combined school-based intervention with family, community and/or media components. Three long-term programmes that combined school-based intervention with family and community components showed no consistent effects. Two programmes that combined classroom-based intervention with components targeting parental participation, and focusing on wider problem behaviours, appeared to have more consistent long-term effects.

Overall, the review concluded that there is a lack of clear evidence on which types of programmes are effective. In addition, long-term follow-up data was not available for the majority of programmes so it was difficult to determine the value of school-based intervention in the longer term. This review also demonstrated the lack of economic evaluation studies in the field of prevention. Of the 52 programmes identified for inclusion in the review, only two had been evaluated in terms of their cost-effectiveness, both of which had methodological shortcomings.

7.2. INFORMATION CAMPAIGNS

Although most media portrayals of alcohol are in the form of commercial advertisements, public health and safety perspectives are also portrayed in the mass media. Public service announcements on television or radio, paid counter-advertisements, billboards, magazine articles, newspaper pieces, and news or feature stories on television and radio all attempt to provide information about the risks and complications associated with drinking.

Public service announcements

Public service announcements (PSAs) are messages prepared by nongovernmental organizations, health agencies or by media organizations for the purposes of providing important information for the benefit of a particular audience. In contrast to paid advertising, PSAs depend upon donated time or space for distribution to the public. When applied to alcohol, PSAs usually deal with "responsible drinking," the hazards of driving under the influence of alcohol, and related topics. Despite their good intentions, PSAs are considered an ineffective antidote to the high-quality pro-drinking messages that appear much more frequently as paid advertisements in the mass media (see Ludwig 1994; Murray *et al.* 1996).

In many cases the messages in PSAs are intended to be particularly relevant to drinking by youth (Connolly *et al.* 1994; Holder 1994). Reviews point to the limited impact on alcohol use and alcohol-related problems from mass media interventions that use a universal strategy (Gorman 1995). Nevertheless, a Canadian study (Casiro *et al.* 1994) found that after a T.V. campaign on the dangers of alcohol consumption during pregnancy, more women concluded that drinking would put their baby at risk, and attributed this information to television. In general, there is a need for more research to find out what audiences perceive and understand from mass media campaigns (Martin 1995). Looking at how media set the public policy agenda is potentially more fruitful (Casswell 1997). For example, portrayal of alcohol issues in the news media (print, T.V. and radio) tends to be simplistic, sensational and dramatic (Gusfield 1995), and focuses on stories about individual people rather than alcohol in its social perspective. These portrayals raise interesting questions about the way news reporting may shape public attitudes and policy about alcohol, but this area has not been extensively researched.

Counter-advertising

Counter-advertising involves disseminating information about a product, its effects, or the industry that promotes it, in order to decrease its appeal and use. It is distinct from other types of informational campaigns in that it directly addresses the fact that the particular commodity is promoted through advertising (Stewart 1997). Tactics include health warning labels on product packaging and media literacy efforts to raise public awareness of the advertising tactics of an industry, as well as prevention messages in magazines and on television. Counter-advertising may also be a module in community or school prevention programs (e.g., Giesbrecht *et al.* 1990; Greenfield and Zimmerman 1993), and be used as part of the multiple agenda of government spirits board retail systems (Goodstadt and Flynn 1993).

In most countries, the number of public service announcements and counter-advertisements on alcohol issues are at best a small fraction of the volume of alcohol advertisements (see Fedler *et al.* 1994; Wyllie *et al.* 1996) and are rarely seen on television. Moreover, the quality of counter-advertising is often poor. A study of high school students in the Moselle region in France (Pissochet *et al.* 1999) found that respondents considered alcohol risk prevention advertising to be less effective than alcohol advertising, and daily drinkers were more critical than intermittent and non-drinkers.

Low risk drinking guidelines

Epidemiological research on the effects of moderate drinking on cardiovascular problems has created political pressures in some countries to provide the public with promotional and educational material about the benefits of moderate alcohol use. Surveys in several countries have noted an increase in the number of adults who are aware of these health benefits. For example, in New South Wales, Australia, the proportion identifying health benefits increased from 28% in 1990 to 46% in 1994,

with relaxation (54%) and cardiovascular benefits of moderate drinking (39%) most often mentioned (Hall 1995). In this context, official or semi-official guidelines have been adopted in a number of countries on "moderate" drinking or "low-risk drinking" (e.g., Bondy *et al.* 1999). Given the complex considerations that underlie any such guidelines, it is not surprising that the guidelines vary considerably from one country to another (Stockwell 2001). There is, at present, little research on the impact of these messages (Walsh *et al.* 1998). Furthermore, it is unclear whether such messages should be expected to lead to decreases or increases in alcohol consumption and problems (Casswell 1993). In both Denmark (Strunge 1998) and England (Cabinet Office 2003), sensible drinking messages based on the concept of unit drinks, whilst having an impact on knowledge, have had a very limited impact on behaviour.

Alcohol warning labels

A systematic review of the evidence of the impact of alcohol warning labels (Stockwell 2006) introduced in the United States found significant increases in the likelihood of respondents reporting having taken part in conversations about risks of alcohol consumption from before the introduction of the labels to the year afterwards (Kaskutas and Greenfield, 1992). Reporting having discussed the risks of alcohol consumption was especially marked among respondents who recalled seeing the label, suggesting a direct link. In later years, this finding was still apparent in relation to discussing the dangers of drinking during pregnancy though not for risks relevant to the other health messages. A later analysis reported that pregnant women who saw the labels were more likely to discuss the issue (Kaskutas et al, 1998). In addition, a "dose-response" effect was found such that the more types of warnings the respondents had seen (on adverts, at point-of-sale, in magazines and on containers), the more likely they were to have discussed the issue. No direct impacts of warning labels on consumption or alcohol-related problems have been reported (Grube and Nygaard 2001; Agostinali and Grube 2002).

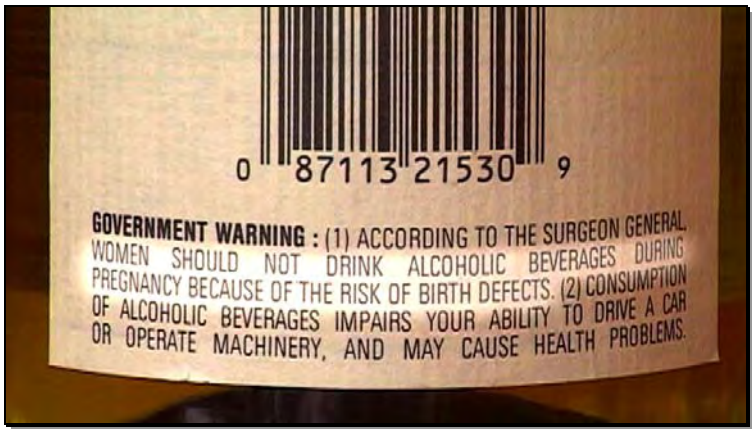


Figure 7.3 US Warning label

A study of the impact of the US alcohol warning labels on adolescents found clear and significant increases in the children's awareness of the labels and recall of their messages (MacKinnon et al, 2000). However, there were no beneficial changes that could be attributed to the warning labels concerning the level of belief in the

messages (which was very high to begin with) in drinking behaviour or in relation to drinking and driving.

Another study evaluating the US warning labels examined impacts on perceived risks and drinking behaviour of the messages on 4,397 black, pregnant, consecutive attendees at an antenatal clinic in Detroit (Hankin et al, 1993), sampled from May 1989 (before the introduction of the labels) and up to September 1991. Again, evidence of awareness and recall of the messages was found. No evidence was found of a change in drinking behaviour among the more at-risk heavy consumers of alcohol attending a clinic. Only the low-risk group of light drinkers appeared to respond to the message by changing their behaviour.

These findings contrasts to evidence from tobacco where there is evidence of impact but this may reflect the nature of the warning labels. Recent research suggests that the introduction of more graphic and larger warnings for cigarettes has impacted on behaviour (Hammond et al., 2004) and is a source of information for consumers (Hammond et al., 2006).

Media advocacy

Mass media marketing can be used to reinforce community awareness of the problems created by alcohol use and to prepare the ground for specific interventions (Casswell *et al.* 1990; Holder and Treno 1997). Education and public information approaches can be used not just to seek to persuade the individual drinker to change his or her behaviour, but also to mobilise public support for prevention approaches that have demonstrated effectiveness (Casswell and Gilmore 1989), including limiting the availability of alcohol, drinking and driving countermeasures, and regulation and harm reduction in and around drinking environments. Media advocacy can also be used to support a shift in public opinion for policy changes (Wallack *et al.* 1993), for example, the introduction of standard drinks labelling on all Australian alcohol containers (Stockwell and Single 1997).

7.3. CONCLUSIONS

Public service announcements, public education campaigns, and particularly those that focus on low risk drinking guidelines have limited evidence for effectiveness in reducing binge drinking, although media advocacy approaches are important to gain public support for policy changes. Although there are individual examples of the beneficial impact of school-based education, systematic reviews and meta-analyses find that the majority of well-evaluated studies show no impact on binge drinking of young people, even in the short-term. This is not to imply that education programmes should not be delivered, since all people do need to be informed about the harm done by binge drinking, but school-based education should not be seen as the answer to reduce the harm done by binge drinking, and is not an alternative to more effective alcohol policy measures. Instead, educational strategies should be used to support effective alcohol policy (Giesbrecht 2007).

8. HEALTH CARE INTERVENTIONS AND BINGE DRINKING

There is a considerable evidence base that brief advice delivered in primary health care settings and in accident and emergency departments is effective in reducing hazardous and harmful alcohol consumption and alcohol related harm, including an overall risk of death. However, although a number of studies have found an effect in reducing the consequences of binge drinking, such as alcohol-related injuries, a meta-analysis of the small number of studies that have measured binge drinking itself find no evidence of an effect of brief advice.

8.1. BRIEF ADVICE PROGRAMMES

Brief advice heads the list of evidence-based treatment methods for reducing harmful alcohol consumption (Miller & Wilbourne 2002). There is a very large body of research evidence on alcohol brief advice, including at least 56 controlled trials of effectiveness (Moyer *et al.* 2002). There have been at least 14 meta-analyses and/or systematic reviews, using somewhat different aims and methods, of research on effectiveness of brief advice (Bien, Tonigan and Miller 1993; Freemantle *et al.* 1993; Kahan, Wilson and Becker 1995; Wilk, Jensen and Havighurst 1997; Poikolainen 1999; Irvin, Wyer and Gerson 2000; Moyer *et al.* 2002; D'Onofrio and Degutis 2002; Berglund, Thelander and Jonsson 2003; Emmen *et al.* 2004; Ballesteros *et al.* 2004a 2004b; Whitlock *et al.* 2004; Cuijpers, Riper and Lemmens 2004; Bertholet *et al.*, in press). All these have reached conclusions, in one form or another, favouring the effectiveness of brief advice in reducing alcohol consumption to low-risk levels among hazardous and harmful drinkers. The number needed to treat is about 8 for both hazardous and harmful alcohol consumption and for alcohol-related harm (Anderson 2003). This means that 8 patients at risk need to be offered advice for one to benefit.

There is mixed evidence of longer-term effects of brief advice. A trial based in family medicine in Wisconsin, USA reported continuing benefits for alcohol use, binge drinking episodes and frequency of excessive drinking among recipients of brief intervention compared with controls 4 years after intervention (Fleming *et al.* 2002). An Australian study reported that the benefits of receiving brief advice had disappeared after 10 years (Wutzke *et al.* 2002) and it was suggested that booster sessions would be necessary to maintain the effect over this period of time.

There is some evidence that brief advice reduces alcohol-related mortality (Cuijpers, Riper and Lemmens 2004), albeit from a small number of studies. Moyer *et al.* (2002) also reported that brief advice was effective on a composite of various drinking-related outcomes, including measures of alcohol-related problems. There is also direct evidence from an Australian study in general practice that brief advice is effective in reducing alcohol-related problems among those who receive them (Richmond *et al.* 1995). In a controlled study of mass screening and brief intervention with follow-up, for men in Malmo, Sweden, there was a significant decline in hospital admissions and mortality in the treated group over a four year follow-up period, an 80% reduction in absenteeism in the four years following the study, a 60% reduction in total hospital days over five years, and a 50% reduction in all cause mortality over six years, which was maintained at 10-16 years follow-up (Kristenson *et al.* 2002).

A systematic review of individual-focused strategies to reduce problematic alcohol consumption by college students (Larimer & Cronce 2002) identified eight studies (Aubrey, 1998; Baer et al., 1992; Borsari and Carey, 2000; D'Amico and Fromme, 2000; Dimeff, 1997; Larimer et al., 2001; Marlatt et al., 1998; Monti et al., 1999) that evaluated the efficacy of brief (one or two session) individual or group motivational enhancement approaches, typically incorporating alcohol information, skills-training information and personalized feedback designed to increase motivation to change drinking. All of the studies demonstrated significant effects on drinking behavior, consequences or both, including reductions in episodic heavy drinking.

A meta-analysis of the effectiveness of brief interventions in primary care populations (Kaner et al 2007) identified 21 trials with 7,286 participants. Meta-analysis showed that participants receiving brief intervention drank less alcohol per week than those receiving a control intervention (mean difference = -41, 95%CI: -57 to -25 grams/week). Three trials reported the frequency of binge drinking and, overall, these trials showed no significant reduction in frequency of binge drinking consequent to brief intervention (mean difference = -0.3, 95%CI: -0.6 to 0.0 binges/week (Fleming et al 1997; Fleming et al 1999; Fleming et al 2004). Two other studies reported the number of drinking days per week and, overall, these showed no significant effect of brief intervention compared to control (mean difference = 0.1, 95%CI: -0.6 to 0.4 drinking days/week) (Senft et al 1997; Aalto et al 2000). Four trials reported the amount of alcohol consumed per drinking day and, overall, these showed no significant reduction in intensity of drinking consequent to brief intervention (mean difference = -3.3, 95%CI: -12.9 to 6.2 grams/drinking day) (Aalto et al. 2000; Crawford et al. 2004; Maisto et al. 2001; Senft et al. 1997).

In one US study, the average per subject benefit of intervention was estimated as US$1,151, comprised of savings in emergency department and hospital use (US$531) and savings in crime and motor vehicle accidents (US$620) (Fleming et al. 2000). The average cost of the intervention was US$205 per subject, representing a benefit cost ratio of 5.6:1. The benefit-cost analysis of the 48 month follow-up suggested a $43,000 reduction in future health care cost for every $10,000 invested in the early intervention (Fleming et al. 2002). The benefit-cost ratio increased when including the societal benefits of fewer motor vehicle events and crimes.

Brief advice delivered in emergency departments and trauma centres has been shown to be effective in reducing alcohol consumption (D'Onofrio and Degutis 2002; Longabaugh *et al.* 2001; Gentilello *et al.* 1999; Spirito *et al.* 2004; Mello *et al.* 2005) and alcohol-related harm (Monti *et al.* 1999; Gentilello *et al.* 1999; Longabaugh *et al.* 2001; Mello *et al.* 2005). A systematic review of 23 studies found evidence for reduced motor-vehicle crashes and related injuries, falls, suicide attempts, domestic violence, assaults and child abuse, alcohol-related injuries and injury emergency visits, hospitalizations and deaths, with reductions ranging from 27% to 65% (Dinh-Zarr *et al.* 2004).

8.2. CONCLUSIONS

Although there is a considerable evidence base that brief advice delivered in primary health care settings and in accident and emergency departments is effective in reducing hazardous and harmful alcohol consumption and the consequences of binge drinking, but, in the limited number of studies that have measured it, not specifically on binge drinking itself, the population impact of brief advice programmes can only be achieved if there is widespread delivery of such programmes. The

comparative cost effectiveness of a range of alcohol policy options is taken up in the next chapter.

9. COST EFFECTIVE APPROACHES TO REDUCE BINGE DRINKING

There have been no analyses of the cost effectiveness of different alcohol policy measures in reducing alcohol-related harm specifically from binge drinking, although the World Health Organization's CHOICE project modelled five policy options to reduce the disability adjusted life years that were due to alcohol consumption of more than 20g alcohol a day for women and more than 40g alcohol a day for men. The model found that the most cost-effective policy options in reducing alcohol-related DALYs in the European Union were taxation, restricted access, and advertising bans. According to a Eurobarometer survey undertaken at the end of 2006, two thirds of the European Union population (68%) believe that higher prices for alcohol would not discourage young people and heavy drinkers from alcohol consumption. On the other hand, 87% of EU citizens stated that they agree with the banning of selling and serving alcohol to people under the age of 18 years, and three quarters would approve the banning of alcohol advertising targeting young people.

9.1. COST EFFECTIVENESS OF DIFFERENT ALCOHOL POLICY MEASURES

There have been no analyses of the cost effectiveness of different alcohol policy measures in reducing alcohol-related harm specifically from binge drinking, although the World Health Organization's CHOICE project modelled five policy options to reduce the disability adjusted life years (DALYs[10]) that were due to hazardous and harmful alcohol consumption defined as more than 20g alcohol a day for women and more than 40g alcohol a day for men. The CHOICE model determines intervention effectiveness via a state transition population model (Lauer *et al.* 2003), taking into account births, deaths and the impact of alcohol. Two scenarios are modelled over a lifetime (100 years): 1) no interventions available to reduce hazardous and harmful alcohol use; and 2) the population-level impact of each specified intervention, implemented for a period of 10 years. The difference represents the population-level health gain due to the implementation of the intervention, discounted at 3% and age-weighted.

Costs covered in the CHOICE model are costs to governments and include *programme-level costs* associated with running the intervention, such as administration, training and media (Adam *et al.* 2003; Johns *et al.* 2003), and *patient-level costs* such as primary care visits (Fleming *et al.* 2000). The costs were calculated in international dollars (Adam *et al.* 2003; Johns *et al.* 2003) and converted into Euros, such that one euro buys the same quantity of health care resources in England as it does in Hungary. The model does not capture potential increases in workforce and household productivity among heavy drinkers following intervention, nor does it incorporate the economic consequences of alcohol-related

[10] A DALY (Disability-Adjusted Life Year) is a measure of the number of healthy years of life lost due to a specific risk factor (in this case alcohol). While a year of perfect health will count as 1 and a year of death will be 0, a year of damaged health that significantly affects Quality of Life will be somewhere in between. DALYs measure a gap in health between the current position and what could be achieved. Each DALY can be considered as one year of ill-health or premature death.

crime, violence and harm reduction. Government's receipts from taxes are not counted.

CHOICE modelled five policy options: drink-driving laws, adjusted for the current level of implementation and enforcement via random breath testing; the impact of a tax on alcohol set at the current level increased by 25%, compared with no tax at all, and adjusted for the observed or expected level of unrecorded use; reduced access to and availability of alcohol through estimating what would happen if alcohol could not be purchased for a 24-hour period at the week-end; brief interventions such as physician advice provided in primary health care to 25% of the at risk population; and the impact of advertising controls based on a 2%-4% reduction in the incidence of hazardous alcohol use, derived from international time-series analyses of the impact of an advertising ban (Grube and Agostinelli 2000; Saffer 2000; Saffer and Dave 2002).

A summary of the estimated impact of the five different interventions, (DALYs prevented per million people per year) compared to a Europe with none of these policies is shown in Figure 9.1, and the estimated costs (Euro per 100 people per year) in Figure 9.2, for the three regions of the European Union, based on the WHO classification, Table 9.1.

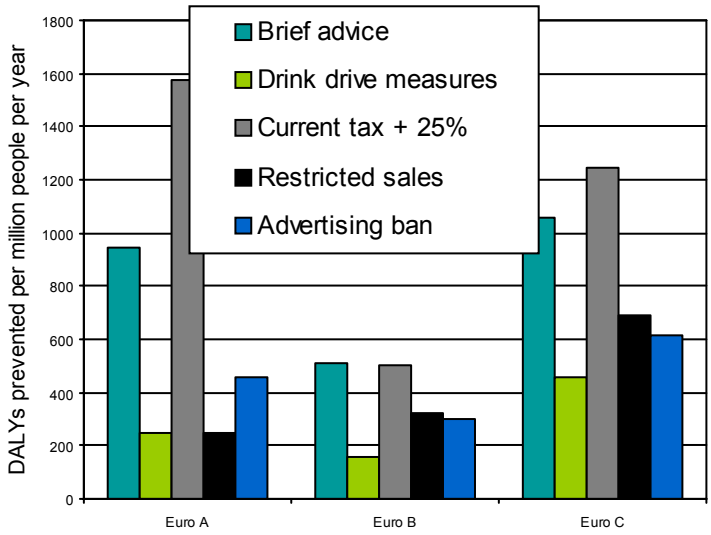


Figure 9.1 The impact of different policy options (DALYs prevented per million people per year) in the three sub-regions of EU25. Source: Anderson & Baumberg (2006).

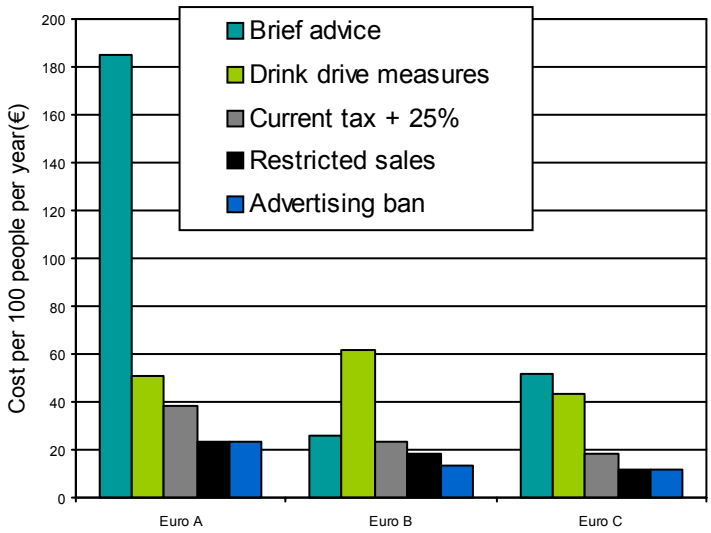


Figure 9.1 The cost of different policy options (per 100 people per year (€)) in the three sub-regions of EU25. Source: Anderson & Baumberg (2006).

Table 9.1 WHO classification of European Union countries based on mortality rates.

Europe A Very low child and very low adult mortality		**Europe B** Low child and low adult mortality	**Europe C** Low child and high adult mortality
Austria	Italy	Cyprus	Estonia
Belgium	Luxembourg	Poland	Hungary
Czech Republic	Malta	Slovakia	Latvia
Denmark	Netherlands		Lithuania
Finland	Portugal		
France	Slovenia		
Germany	Spain		
Greece	Sweden		
Ireland	United Kingdom		

In all three regions of the European Union, taxation (current tax levels with a 25% increase in tax, compared to no tax) was estimated to have the greatest impact in reducing the harm done by alcohol, followed by brief interventions delivered by primary health care providers to 25% of the at risk population. The three regulatory measures, (taxation, restricted sales and advertising controls) were estimated to be the cheapest in terms of cost to implement, with drink driving measures and brief interventions being the most expensive. Thus, in all three sub-regions of the European Union, taxation, restricted access, and advertising bans were estimated as the most cost-effective policy options in reducing DALYs due to hazardous and harmful alcohol consumption.

9.2 Public Opinion and Alcohol Policy

Price

According to a Eurobarometer survey undertaken at the end of 2006, two thirds of the European Union population (68%) believe that higher prices for alcohol would not discourage young people and heavy drinkers from alcohol consumption. Eighty five

per cent of people from the Netherlands doubted that price would have a dissuasive effect, whereas 60% of people from Finland thought that higher alcohol prices would restrain younger people and heavy drinkers from consumption, Figure 9.3; the higher support in Finland could be due to the enormous increases in alcohol consumption and related harm that have followed reductions in tax. Over half of the people in Romania also considered that higher prices would restrain young peoples' and heavy drinkers' alcohol consumption; this view might be explained by a lower level of income in Romania compared to other European Union countries.

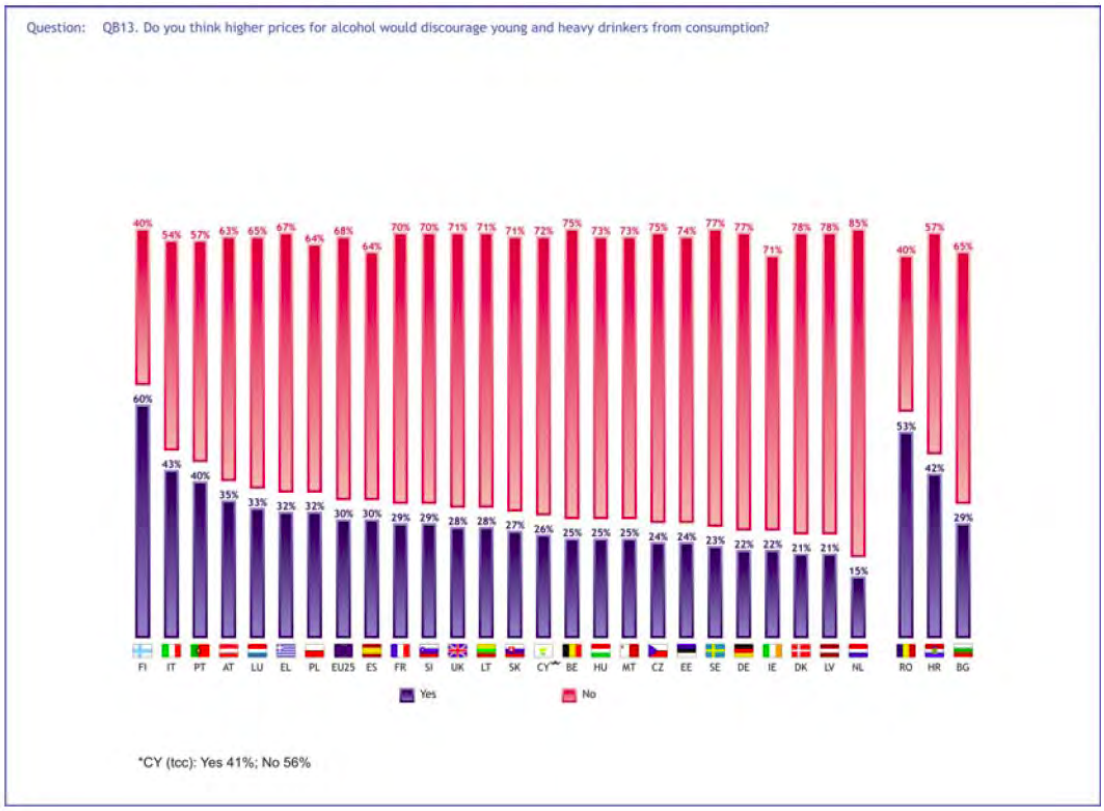


Figure 9.3 Proportion of EU25 population that believes that higher prices would discourage young and heavy drinkers from consumption by country. Source: Eurobarometer (2007).

Availability

In contrast to price, 87% of EU citizens stated in the Eurobarometer survey that they agree with the banning of selling and serving alcohol to people under the age of 18 years, with two thirds of the population (65%) saying that they "totally agree" with such restrictions. Public opinion in all countries was in favour of the concept of prohibiting the selling and serving of alcohol to young people less than 18 years of age. Even in the least favourable Member States, the majority of the population - the Netherlands (61%), Denmark (72%) and Belgium (72%) – responded with a considerable degree of support, Figure 9.4. As many as three quarters of respondents aged between 15 and 24 years agreed with the statement.

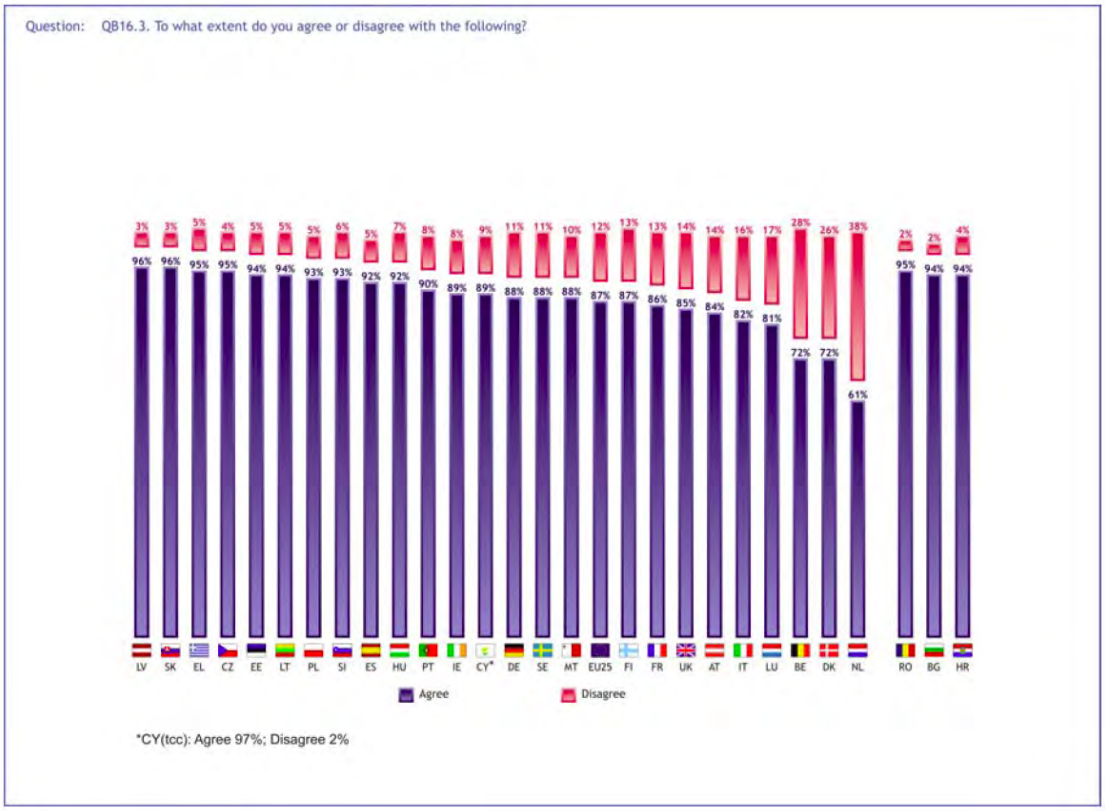


Figure 9.4 Proportion of EU25 population agreeing with the banning of selling and serving alcohol to people under the age of 18 by country. Source: Eurobarometer (2007).

Advertising

According to the Eurobarometer survey, three quarters of the European Union population (76%) would approve the banning of alcohol advertising targeting young people in all Member States, with every second respondent (50%) responding that they "agree totally" with this idea. A country-by–country analysis shows that in all countries the majority of respondents would favour such a ban, Figure 9.5, with people from Slovakia being the strongest supporters (93% ("totally agree" 68%)), and people from Luxembourg (58% ("totally agree" 41%)) and Denmark (59% ("totally agree" 37%)) being less supportive, Figure 9.5.

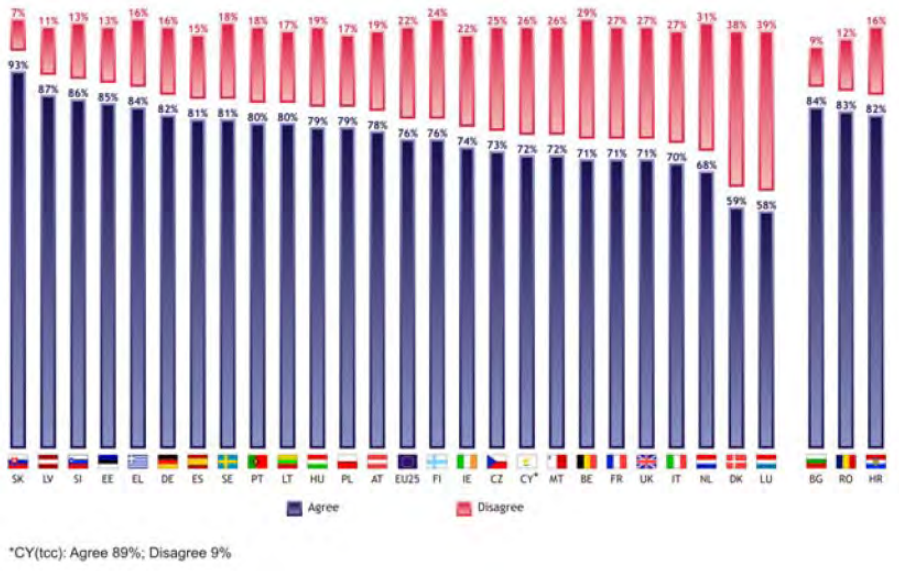


Figure 9.5 The extent to which European citizens agree with the statement that alcohol advertising targeting young people should be banned in all Member States by country. Source: Eurobarometer (2007).

9.3 CONCLUSIONS

There is strong evidence that drink-driving laws, tax, reduced access to and availability of alcohol, brief interventions such as physician advice provided in primary health care and advertising controls are effective in reducing disability adjusted life years due to alcohol consumption of more than 20g alcohol a day for women and more than 40g alcohol a day for men, with the most cost-effective policies being taxation, restricted access, and advertising bans. Considerable investment needs to be made in public education campaigns to inform the public that alcohol taxes are an effective policy option to reduce binge drinking and heavy drinking, including amongst younger people. Currently, there is widespread public support for the banning of selling and serving alcohol to people under the age of 18 years, and the banning of alcohol advertising targeting young people throughout Europe.

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 CONCLUSIONS

Binge drinking in Europe

Binge drinking, defined as five or more drinks on a single occasion, seems to be a very common European phenomenon. Some 80 million European adults (over 1 in 5) reported binge drinking at least once a week in 2006, and as many as 25 million (1 in 15) reported that binge drinking was their usual pattern of consumption during the previous month (in other words they were also regular heavy drinkers). Binge drinking is not the prerogative of the young. Eighteen per cent of those aged 55 years of age and over reported binge drinking at least once a week in 2006, compared with 24% of those aged between 15 and 24 years. Nor is binge drinking a prerogative of northern Europeans. One third (33%) of respondents from Spain and 20% of respondents from Italy reported binge drinking at least once a week in 2006, compared with 11% of respondents from Sweden and 17% of respondents from Finland. Binge drinking is also relatively common amongst 15-16 year olds, with over 1 in 6 (18%) having binged (5+ drinks on a single occasion, 50g alcohol) three times or more in the last month (2003 data). Binge drinking has increased across Europe amongst 15-16 years olds since 1995, although less so in recent years.

The harm done by binge drinking

Binge drinking increases the risk of a wide range of social and health harms for both the individual drinker, and others than the drinker, including crime and violence, intentional and unintentional injuries, cardiovascular diseases, sexually transmitted diseases, and reproductive conditions. For all of these conditions, with the exception of ischaemic stroke and ischaemic heart disease, it appears that the risk increases in a dose dependent manner with increased frequency of drinking, and increased amount of alcohol consumed on a drinking occasion. For ischaemic heart disease, the relationship is J-shaped, with the risk increasing in a dose depdenent manner after the bottom of the J.

Consequences of binge drinking to Europe

Binge drinking is a significant contributor to the social and health burden facing Europe, including crime, violence, domestic violence, homicide, suicide and unintentional injuries. It is also a significant contributor to inequalities between and within European countries. The social and health harms done by binge drinking are not fixed and move in parallel with changes in overall levels of alcohol consumption. Binge drinking is a threat to social cohesion and social capital and reduces health and safety in the living environment. It is therefore a threat to productivity and a sustainable economic development in the European Union, as envisaged by the objectives of the Lisbon Strategy.

Regulating the availability and marketing of alcohol

Taxes are an effective policy option in reducing the harm done by binge drinking, with a particular impact in reducing the harm done by alcohol to people other than the drinker. Alcohol taxes generate direct revenue for governments, and – due to the relative inelasticity of the demand for alcohol – are generally much more closely related to average tax rates than levels of consumption, thus allowing considerable scope in most countries for raising taxes before the maximum revenue is achieved.

There is an enormous discrepancy in the current tax rates between countries, even when adjusting for purchasing power, and one half of EU countries still have no tax on wine. Standardized excise duties are a longstanding goal of the European Union mainly because the combination of a single market, together with wide excise variations, leads to serious market distortions and lost tax revenue. The consequences of differential taxes between countries are compounded by the high and increasingly liberal limits of the amount of alcohol that individuals can transfer between countries.

There is very strong evidence for the effectiveness of policies that manage the physical availability of alcohol (raising the minimum purchase age and managing days and hours of sale) in reducing the harm done by binge drinking. The evidence shows that, if opening hours for the sale of alcohol are extended, then more violent harm is likely to result. Policies that manage the availability of alcohol are largely devolved to the municipal level. They can only be effective if any national and regional legislation is enabling rather than restrictive, and if the policies are adequately enforced.

There is increasing evidence that the volume of advertisements and media exposure increase the likelihood of young people starting to drink, the amount they drink, and the amount they drink on any one occasion.

Creating safer drinking environments and communities

Although, increasingly, programmes focusing on reducing the harm done by binge drinking in drinking environments are being developed and implemented, many of the programmes currently being implemented have not been adequately evaluated. The most effective options involve enhanced enforcement of regulations around serving. Training programs for bar staff and managers have demonstrated reductions in high risk drinking and drinking problems, although these effects tend to be limited, and are been found in all evaluations. In addition, there is some limited evidence to show that programmes that result in the adoption and enforcement of policies to make licensed premises safer can also been associated with lower levels of intoxication and problems. Comprehensive community programmes can, when appropriately designed and implemented, have substantial effects on the occurrence of problems related to binge drinking. However, some of these programmes require substantial resources to implement, and are unlikely to be as cost-effective as those measures that regulate the alcohol market. Further, given the limited current evidence of effectiveness of these approaches, they should not be considered as substitutes for other alcohol policy strategies that have well documented evidence of effectiveness.

Educating to reduce binge drinking

Public service announcements, public education campaigns, and particularly those that focus on low risk drinking guidelines have limited evidence for effectiveness in reducing binge drinking, although media advocacy approaches are important to gain public support for policy changes. Although there are individual examples of the beneficial impact of school-based education, systematic reviews and meta-analyses find that the majority of well-evaluated studies show no impact on binge drinking of young people, even in the short-term. This is not to imply that education programmes should not be delivered, since all people do need to be informed about the harm done by binge drinking, but school-based education should not be seen as the answer to reduce the harm done by binge drinking, and is not an alternative to more effective alcohol policy measures.

Health care interventions and binge drinking

Although there is a considerable evidence base that brief advice delivered in primary health care settings and in accident and emergency departments is effective in reducing hazardous and harmful alcohol consumption and the consequences of binge drinking, but, in the limited number of studies that have measured it, not specifically on binge drinking itself, the population impact of brief advice programmes can only be achieved if there is widespread delivery of such programmes.

Cost effective approaches to reducing binge drinking

There is strong evidence that drink-driving laws, tax, reduced access to and availability of alcohol, brief interventions such as physician advice provided in primary health care and advertising controls are effective in reducing disability adjusted life years due to alcohol consumption of more than 20g alcohol a day for women and more than 40g alcohol a day for men, with the most cost-effective policy being taxation, restricted access, and advertising bans. Considerable investment needs to be made in public education campaigns to inform the public that alcohol taxes are an effective policy option to reduce binge drinking and heavy drinking, including amongst younger people. Currently, there is widespread public support for the banning of selling and serving alcohol to people under the age of 18 years, and the banning of alcohol advertising targeting young people throughout Europe.

10.2 RECOMMENDATIONS

I. DEFINING AND MEASURING BINGE DRINKING

I.1. A set of flexible but standardised definitions for binge-drinking and episodic heavy drinking needs to be prepared.
I.2. Measures of binge-drinking and drunkenness and their link to outcomes should be investigated further to determine their cross-cultural validity within Europe.
I.3. Further repeated and comparative surveys are required across Europe for binge-drinking and episodic heavy drinking.

II. REGULATING THE AVAILABILITY AND MARKETING OF ALCOHOL

Price and binge drinking

II.1. Minimum tax rates for all alcoholic beverages should be increased in line with inflation; should be at least proportional to the alcoholic content of all beverages that contain alcohol; and should at least cover the external costs of alcohol as determined by an agreed and standardized methodology.
II.2. Member States should retain the flexibility to use taxes to deal with specific problems that may arise with specific alcoholic beverages, such as those that prove to be appealing to young people.

Availability and binge drinking

II.3. A minimum system of licensing for the sale of alcoholic products should be implemented throughout Europe, respecting existing licensing systems, where these are stronger.
II.4. The sales of alcoholic products to persons under the age set by domestic law, national law or eighteen years, whichever is the higher, should be prohibited and enforced.
II.5. Jurisdictions that manage outlets through number and density, location and hours and days of sale should consider not relaxing their regulations;

jurisdictions without such regulations or with very limited regulations should analyze the impact of introducing or strengthening them.

II.6. A range of increasingly severe penalties against sellers and distributors, such as withdrawal of license or temporary and permanent closures, should be implemented in order to ensure compliance with relevant measures.

Advertising and binge drinking

II.7. Agreements and mechanisms should be explored to restrict or ban the marketing of alcoholic beverages at the European level, ensuring a level playing field across Europe.

II.8. Standards should be developed to reduce exposure to alcohol marketing and to ensure that marketing content does not influence the drinking expectancies and behaviour of young people.

II.9. Technologies and other means necessary to regulate cross-border marketing, including the internet and mobile phone use should be developed.

II.10. Countries which have a ban on certain forms of alcohol marketing should have the right to maintain such a ban.

III CREATING SAFER DRINKING ENVIRONMENTS AND COMMUNITIES

III.1. Urban planning, community strategies, licensing regulations and restrictions, transport policies and management of the drinking and surrounding environments should work to minimize the negative effects that result from alcohol intoxication, particularly for local residents.

III.2. Effective and appropriate training should be implemented for the hospitality industry and servers of alcohol to reduce the harmful consequences of intoxication and harmful patterns of drinking, particularly for local residents and local communities.

III.3. Adequate policing and enforcement of alcohol sales and licensing laws should be implemented, targeted at premises associated with a higher level of harm.

III.4. Well-resourced community mobilization and intervention projects, involving different sectors and partners should be implemented to create safer drinking environments and to reduce binge drinking.

IV. EDUCATING TO REDUCE BINGE DRINKING

IV.1. Educational programmes should not be implemented in isolation as an alcohol policy measure, or with the sole purpose of reducing binge drinking, but rather as a measure to reinforce awareness of the problems created by binge drinking and to prepare the ground for specific interventions and policy changes.

IV.2. Educational type programmes to reduce binge drinking imported from another country or culture should first be evaluated in the new setting before being widely implemented.

V. HEALTH CARE INTERVENTIONS AND BINGE DRINKING

V.1. Integrated evidence-based guidelines for brief advice to reduce binge drinking should be developed and implemented in different settings upwardly to harmonize the quality and accessibility of care.

V.2. Training and support programmes to deliver brief advice to reduce binge drinking should be developed and implemented in different settings upwardly to harmonize the skills of health care providers.

V.3. Resources should be made available to ensure the widespread availability and accessibility of identification and advice programmes to reduce binge drinking.

VI. CREATING THE EVIDENCE BASE TO REDUCE BINGE DRINKING

VI.1. European infrastructures should be established and financed to undertake collaborative cross country research to reduce binge drinking.

VI.2. European infrastructures should be created and financed to review and disseminate all major research outcomes to reduce binge drinking, for example, registries and databases; the evidence base should be translated into easily understood policies and practices through practical toolkits and guidelines.

VI.3. A European database of laws and regulations and of effective policies and programmes to reduce binge drinking at European, Member State and municipal level should be established and maintained.

VII. DEVELOPING A COMPREHENSIVE STRATEGY TO REDUCE BINGE DRINKING

VII.1. Action plans on alcohol with clear objectives, strategies and targets should be formulated and implemented.

VII.2. Support for alcohol policy measures amongst civil and political society should be promoted through awareness-raising campaigns and initiatives.

VII.3. Regular reports on alcohol should be prepared and made accessible to a wide public audience.

VII.4. Different alcohol policy strategies should be combined into an integrated overall policy, since alcohol policy is likely to be most effective in reducing binge drinking, when a variety of complementary strategies, such as those that impact on price and availability, supported by comprehensive community programmes are used.

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