

PART I

THE EXTENT OF THE PROBLEM

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Chapter 1

THE PROBLEM OF ALCOHOL-RELATED VIOLENCE: AN EPIDEMIOLOGICAL AND PUBLIC HEALTH PERSPECTIVE

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INTRODUCTION

An Epidemiological and Public Health Perspective

Violence constitutes a significant health problem globally (Krug *et al.*, 2002). It is widely recognized that alcohol consumption is a significant risk factor for violent perpetration and violence victimization (Abbey, 2011; Chermack and Giancola, 1997; Leonard, 2008; Lipsey *et al.*, 1997; Roizen, 1997). We will in this chapter present an overview of research evidence on how and to what extent alcohol consumption is related to violence within an epidemiological and public health perspective. More specifically, we will show that alcohol use is a common ingredient in violent acts, that the risk of being involved in a violent act is higher among those who consume alcohol frequently and in large quantities, that the amount of violent acts in a society varies systematically with the overall alcohol consumption in that population and with the drinking pattern in that population.

Defining the Problem

What do we mean by ‘violence’? While self-inflicted injuries and collective violence (e.g., riots or acts of war) are often included in the term violence (Krug *et al.*, 2002), we have limited the focus here to that of interpersonal violence. According to the World Health Organization, interpersonal violence can be divided into the following subcategories: family and intimate partner violence

(between family members and intimate partners, usually taking place in the home) and community violence (between individuals who are unrelated and who may or may not know each other, generally taking place outside the home) (Krug *et al.*, 2002). These subcategories are again divided by the nature of violent acts: physical, sexual, psychological and involving deprivation or neglect. We will in this review address only the former two (physical and sexual violence) in relation to alcohol use.

This leads us to the question of what we mean by alcohol use in relation violence. The term 'alcohol use' covers a wide range of behaviours and is assessed by different types of measures across studies. Examples of the latter are presence of alcohol at the time of the event as measured by breathalyzer or blood sample analysis; self-report in surveys or clinical interviews; assessment of alcohol intoxication by health personnel, police officers and so on; and aggregate measures of alcohol consumption such as sales figures. The various types of behaviour comprise, for instance, any drinking in the few hours prior to the violent event; annual alcohol consumption; frequency of intoxication; and indicators of alcohol dependence or abuse.

Alcohol-related violence is not only a problem for those who suffer violent injuries in terms of health and economic costs, but it has also a wide range of consequences at the societal level, for instance, in terms of its burden on health services, police forces and economic costs to society, and by generating fear and insecurity in the family, neighbourhood and community. While these consequences of alcohol-related violence are indeed part of the problem, a societal analysis is beyond the scope of this review.

THE EVIDENCE OF AN ASSOCIATION BETWEEN ALCOHOL CONSUMPTION AND INTERPERSONAL VIOLENCE

The scientific literature on the alcohol–violence association is overwhelming. A quick search in various literature databases reveals thousands of publications that – based on the title only – address this topic. We will therefore provide a review partly drawing on previous, preferably recent, review studies but also refer to primary studies, when no fairly recent reviews are available or when primary studies add to previous reviews. Given the epidemiological and public health perspective, the literature review mainly covers studies that refer to the general population and that are of relevance to public health strategies.

Numerous studies have demonstrated some kind of statistical association between alcohol consumption and interpersonal violence. These studies have addressed the association between alcohol consumption and interpersonal violence in various ways by examining different aspects of the association and by applying different types of research designs and methods and different types of data. For instance, Roizen (1997) distinguished between event-based research, that is, samples of people to whom a serious event has occurred, and studies of the general population. We have in the following sections briefly summarized broad categories of studies that have demonstrated some kind of association between alcohol consumption and violence.

Those Involved in Violence Have Often Been Drinking

There is a large research literature from event-based research which has demonstrated that alcohol often has been consumed by one or more of those involved in a violent act. Studies of perpetrators of violent crimes (suspected, arrested or convicted) have revealed that these offenders had often consumed alcohol shortly before the violent act (Chermack and Giancola, 1997; Graham *et al.*, 1998; Pernanen, 1991; Roizen, 1997). Yet, it should be noted that the proportion of offenders with alcohol present at the time of the event varies significantly across studies, from around 15% to some 60–85% of offenders (see Roizen, 1997 for a review). Correspondingly, studies of victims of violence have also shown that these had often been drinking prior to the violent act and, yet again, that the proportion of victims that had been drinking varies across studies, ranging from 5% to 85% (Roizen, 1997). The research literature that addresses domestic violence and intimate partner violence specifically has shown that partner-violent men are often heavy drinkers and heavy drinking often accompanies the violence (Leonard, 2001, 2005; Lipsey *et al.*, 1997). Correspondingly, reviews of the literature on alcohol consumption and sexual violence also show that in about half of all sexual assaults, alcohol had been consumed by the victim, the perpetrator or both (Abbey, 2011; Abbey *et al.*, 2004).

A significant part of the event-based research comprises studies of patients admitted to emergency rooms after injuries from violent acts. These have shown that these patients often have a blood alcohol concentration (BAC) above 0.05%, 0.08% or 0.10% (as measured in blood or breath) and/or they often report that they consumed alcohol within 6 hours prior to the injury (Cherpitel, 1997, 2007). Again, the prevalence of alcohol involvement in violent injuries varies significantly across studies, ranging between 22% and 84% in Cherpitel's recent review (2007). It is also evident from these studies that alcohol involvement occurs more frequently among patients with violence-related injury compared with other injured patients in the emergency room (Cherpitel, 2007).

Whether alcohol involvement varies by type and severity of the violent act has been addressed in some studies. Felson, Burchfield, and Teasdale (2007) noted that, as most research on alcohol and violence focuses on specific types of violence or examines violence generally, there is little evidence on whether alcohol intoxication is a greater risk factor for some types of violence than for others. In their study from a general population survey, perpetrators of physical assaults were just as likely as those of sexual assaults to have been intoxicated (Felson *et al.*, 2007). Correspondingly, in a large population-based survey in New Zealand, self-reported events of physical assaults and sexual assaults were compared with respect to the role of alcohol, and for both types of assaults, a little more than half of the victims reported that the perpetrator was affected by alcohol (Connor, You, and Casswell, 2009).

Several studies have, in various ways, addressed whether alcohol involvement varies with the severity of aggressive behaviour. In his classic study, Pernanen (1991) found no increase in the severity of violence when the assailants had been drinking. However, Leonard and colleagues found that a higher level of alcohol

consumption was associated with more severe aggression among males (Leonard, Collins, and Quigley, 2003), and similarly, Graham and co-workers found that greater intoxication of those involved in aggressive incidents was related to greater severity of aggression (Graham *et al.*, 2006). In a recent study, Wells and co-workers also found that drinking at the time may contribute to severity of aggression (Wells *et al.*, 2011).

Whereas alcohol involvement in the perpetrator and/or the victim is extensively studied, there are also a few studies that have addressed the role of alcohol in the drinking environment and among bystanders. These studies suggest that the overall level of intoxication of patrons in drinking establishments independently contributes to the frequency and severity of aggression by patrons (Graham and Homel, 2008).

Violence Is More Likely at Times and Places with Heavy Drinking

The distribution of violent events over days of the week and hours of the day tends to display a similar pattern to that of drinking occasions, and, in particular, heavy drinking occasions. Thus, violent events are more likely to occur at night-time on weekends (Borges, Cherpitel, and Rosovsky, 1998; Briscoe and Donnell, 2003; Engeland and Kopjar, 2000; Pridemore, 2004) as are heavy drinking occasions (Demers, 1997; Mäkelä, Martikainen, and Nihtilä, 2005; Pridemore, 2004). In a similar vein, it is also shown that bars, pubs and clubs, which are often attended by heavy drinkers, are 'hot spots' for violent events (Graham and Homel, 2008).

Those Who Drink Heavily Are at Higher Risk of Being Involved in Violence

Another type of study is surveys of general population samples in which respondents have been asked about their behaviour (for instance, in the past 12 months) and whether they have been involved in violent behaviour. These studies have generally shown that those who report a relatively high alcohol intake and/or frequent heavy drinking occasions are more likely to have been involved in violent acts (Rossow, 1996, 2000; Wells and Graham, 2003; Wells *et al.*, 2005), and it seems that it is, in particular, heavy drinking occasions that account for this association (Bye and Rossow, 2010; Dawson, 1997; Hope and Mongan, 2011; Leonard, 2008; Room and Rossow, 2001; Rossow, 1996; Rossow, Pape, and Wichstrøm, 1999). Thus, with increasing alcohol consumption, and particularly with increasing frequency of heavy drinking occasions, the risk of committing a violent act increases as does the risk of being a victim of violent assault. This has been shown with respect to physical violence, irrespective of subcategory (Room and Rossow, 2001), and with respect to domestic violence and intimate partner violence (Foran and O'Leary, 2008; Leonard, 2001). In a longitudinal cohort study, Boden and co-workers found that young adults with alcohol abuse/dependence symptoms had 4–12 times higher risk than others to be involved in violence, whether as offender or as victim (Boden, Fergusson, and Horwood, 2012). Also,

studies of clinical population samples have shown that the prevalence of violence perpetration and victimization is elevated among heavy drinkers (Leonard, 2008).

Heaviest Drinkers Account for a Minor Fraction of Alcohol-Related Violence

Although the risk of violence involvement is highest among those with high consumption and heavy drinking frequency, it should also be noted that these drinkers constitute a relatively small fraction of all drinkers at risk. Thus, the heaviest drinkers in a population contribute to a disproportionately larger fraction of the overall amount of violence. Yet, studies have demonstrated that their share of all violent incidents is less than half and – more or less – it is the moderate drinkers, who constitute the vast majority of all drinkers, who also contribute to the majority of all alcohol-related violence (Poikolainen, Paljärvi, and Mäkelä, 2007; Rossow and Romelsjö, 2006). More specifically, Rossow and Romelsjö (2006) found that, of all self-reported events of alcohol-related quarrels and fights, less than half could be attributed to the 10% of the drinkers who drank the most. Moreover, of all hospital admissions for violent injuries (whether alcohol-related or not), 14% could be attributed to the upper 10% of the drinkers. Correspondingly, Poikolainen and co-workers (2007) found that 25% of all self-reported events of quarrels and arguments and 31% of all scuffles and fights could be ascribed to the upper 10% of the drinkers.

This implies that, from a public health perspective, preventive strategies directed at all drinkers (i.e., population strategies) may be more effective in reducing the overall amount of violent events in a population rather than strategies aimed at the small fraction of heavy drinkers (high-risk strategies). This is what is often referred to as the prevention paradox (Kreitman, 1986; Rossow and Romelsjö, 2006; Skog, 1999).

ACTORS, CONTEXT AND CULTURE

While it is clear that a significant proportion of violent events are precipitated by alcohol consumption by one or several parties involved, it is only a tiny fraction of drinking occasions that are accompanied by aggressive behaviour. For example, among teenagers, the numbers of self-reported fights per 1,000 drinking occasions were in the range of 2–10 (Bye and Rossow, 2010). Thus, the relationship between alcohol consumption and violence is conditional: it is drinking *in combination with other factors* that is implicated (Room and Rossow, 2001). These other factors, which we know of so far, are many and include personal factors (e.g., temperament), contextual factors (e.g., provocation) and cultural factors (e.g., drinking pattern) (Chermack and Giancola, 1997; Graham and Homel, 2008; Graham *et al.*, 1998; Pernanen, 1991). Thus, the alcohol–violence association is highly complex and reflects an interaction of the effects of alcohol and these various other factors. The magnitude of the problem, therefore, varies with these factors, such as the

characteristics of the person, the context and the culture. We will briefly address this in the following section with some examples.

Alcohol-Related Violence Occurs More Frequently in Certain Persons

Men are generally heavier drinkers than women and they drink more frequently to intoxication (Babor *et al.*, 2010), and, compared to women, they also account for a larger proportion of alcohol-related violent incidents (Pernanen, 1991). Furthermore, it seems that alcohol consumption increases the likelihood of aggressive behaviour more for men than for women. In experimental studies, alcohol has been shown to increase aggressive behaviour more among men than among women (Giancola *et al.*, 2002), although this is not consistently found (Hoaken and Pihl, 2000). However, in community-based surveys, it is found that alcohol-related violence is more frequently reported by men than by women, even when alcohol consumption and subjective feeling of intoxication is the same (Rossow, 1996). The latter study also demonstrated that, compared to middle-aged and elderly people, young people are at higher risk of being involved in alcohol-related violence, whether as perpetrator or victim, and this was also the case when drinking behaviour was taken into account (Rossow, 1996).

The association between alcohol consumption and violence seems also to be contingent on personality traits. In experimental studies, it has been demonstrated that people with high dispositional aggressivity are more likely to react aggressively under the influence of alcohol as compared with those with low dispositional aggressivity (Giancola, 2002). Using self-report data from a longitudinal cohort study, Norström and Pape (2010) have taken the importance of an aggressive predisposition in the alcohol–violence association further by demonstrating that the effect of alcohol consumption on violent behaviour appears to be confined to those with medium or high levels of suppressed anger (Norström and Pape, 2010).

Alcohol-Related Violence Occurs More Frequently in Certain Drinking Contexts

In most countries (with available statistics), only a minor fraction of all alcohol is consumed in licensed drinking venues, like restaurants, taverns, bars, pubs or other drinking establishments (Babor *et al.*, 2010). Nevertheless, a fairly high proportion of violent incidents occur in such venues, and public drinking places like bars, pubs and clubs are often considered as hot spots for alcohol-related violence (Graham and Homel, 2008). In line with this, there are also indications that alcohol that is consumed in public drinking venues is more strongly associated with violence as compared with that consumed in private settings (Norström, 1998b).

The occurrence of violence differs significantly between various types of drinking venues. In two recent excellent reviews (Graham and Homel, 2008; Hughes *et al.*, 2011), a number of contextual factors in the drinking venues are identi-

fied that are particularly important in contributing to alcohol-related aggression. These comprise physical factors, such as crowdedness, noise and low lighting; social factors, such as drunk customers and permissive environment; and staff factors, such as poor staff control (see also Forsyth, Chapter 7).

Alcohol-Related Violence Occurs More Frequently in Certain Drinking Cultures

As noted previously, the proportion of violent perpetrators who have been drinking varies significantly across studies, and it seems likely that much of this variation can be attributed to differences in drinking cultures, that is, differences in drinking patterns and in norms and expectancies about behaviour while drinking (Room and Rossow, 2001). Based on survey data among adolescents in 13 European countries, Bye and Rossow (2010) found that the prevalence of alcohol-related violence varied significantly between countries and was highest in countries where drinking often leads to intoxication. Moreover, there was a clear gradient in the magnitude of the alcohol–violence association; the strongest association was observed for the Nordic countries where drinking often leads to intoxication, whereas the least strong association was observed in the South European countries where intoxication is far less prevalent (Bye and Rossow, 2010).

HOW MUCH VIOLENCE CAN BE ATTRIBUTED TO ALCOHOL?

As we have seen above, it is very clear that there is an *association* between alcohol consumption and violence in the sense that violence is more likely to occur in the event of drinking, at times and places in which heavy drinking occurs, and in persons who drink heavily. However, it is also likely that some of the alcohol-related violent events (i.e., in which alcohol has been consumed by one or several actors) would have occurred also in the absence of any alcohol. Many scholars in the field differ in their views as to whether – or to what extent – alcohol causes violence, yet these differences seem primarily to reflect varying definitions of causation (Room and Rossow, 2001).

From a prevention point of view, a key question is how much of the violence could possibly be prevented by interventions affecting alcohol-related violence. Consequently, assessment of what share of violence that is attributable to drinking is important.

Within the epidemiological literature, we often see that the attributable fraction (the proportion of a problem that can be attributed to one specific risk factor) is estimated from individual-level data by a simple formula comprising an estimate of the relative risk and the fraction of the population exposed to the risk factor (Lilienfeldt and Lilienfeldt, 1980). However, when it comes to alcohol and violence, there are several reasons why the association is not well represented by the traditional attributable fraction estimation. Most importantly, there are three parties or actors for whom alcohol exposure is of importance: the perpetrator(s), the victim(s) and the bystanders, and it seems extremely difficult, if at all possible,

to obtain and model data that would capture this complexity at the individual level.

An alternative approach is therefore to use aggregate-level data, where the complexity of underlying mechanisms and selection effects may constitute less of a problem (Norström and Skog, 2001; Room and Rossow, 2001). Next, we will review aggregate-level studies in some more detail and further address estimates of the alcohol attributable fraction derived from aggregate-level analyses.

The Alcohol–Violence Association in a Public Health Perspective

Over the past two decades, we have witnessed a significant growth in studies addressing the alcohol–violence relationship by applying data at the aggregate level. Such data comprise violence rates – either homicide rates or rates of non-fatal violent assaults – and alcohol consumption per adult inhabitant per year, assessed as recorded alcohol sales. In particular, analyses of time series data applying statistical modeling techniques to minimize spurious effects are of relevance here and will be reviewed. These studies have generally demonstrated that an increase in alcohol consumption is followed by an increase in rates of fatal and non-fatal violence and vice versa (Norström, 2011; Rossow, 2000). In Western European countries, analyses of longer time series of violent crime rates have found significant effects of population drinking (Bye, 2007; Lenke, 1990; Norström, 1998a; Skog and Bjørk, 1988). In the same vein, studies of natural experiments, such as sudden and large changes in alcohol consumption due to rationing or strikes, have also demonstrated a significant impact of alcohol consumption on violent crime rates (Lenke, 1990; Rossow, 2002). There are also several studies from the United States that have shown an association between alcohol consumption and homicide rates in studies based on cross-sectional data, time series data and a combination of the two (Parker, 1995, 1998; Parker and Cartmill, 1998; Parker and Rebhun, 1995). Several studies from the former Soviet Republics have also demonstrated a positive and significant association between alcohol consumption (or alcohol-related mortality data as proxy) and homicide (Pridemore and Chamlin, 2006; Razvodovsky, 2003, 2007, 2010).

As we have noted previously, the drinking pattern, particularly in terms of drinking to intoxication, plays an important role in the alcohol–violence association. This is also demonstrated by comparisons of associations estimated by the same modeling technique applying time series data on population drinking (annual per capita volume) and homicide rates. Table 1.1 summarizes the findings from seven studies that have analyzed data from altogether 20 countries (Bye, 2008; Landberg and Norström, 2011; Norström, 2011; Ramstedt, 2011; Rossow, 2001, 2004). The level of hazardous drinking pattern is presented in the fourth column and based on two sources of information. One is that of Rehm and co-workers' (2003) assessment of country-specific hazardous drinking scores. These are on a four-point scale that reflects the degree of hazardous drinking, ranging from 1 (least harmful) to 4 (most harmful). The other source of information is on regional variation in drinking patterns within countries (Norström, 2011; Rossow, 2004).

Table 1.1 Estimates of association between alcohol consumption and homicide rates, hazardous drinking pattern score and estimated fraction of homicides attributable to alcohol consumption.

Author(s)	Country/Area, Period	Parameter Estimate (SE)	Level of Hazardous Drinking Pattern	Attributable Fraction (AF)
Rossow (2001)	North Europe, 1950–1995	0.124 (0.038)	High	0.50
Rossow (2001)	Central Europe, 1950–1995	0.085 (0.023)	Medium	0.55
Rossow (2001)	South Europe, 1950–1995	0.055 (0.017)	Low	0.61
Rossow (2004)	Canada, Ontario, 1950–1995	0.093 (0.040)	Medium	0.58
Rossow (2004)	Canada, Quebec, 1950–1995	–0.030 (0.077) ^{ns}	Low	na
Bye (2008)	Belarus and Russia, 1959–2004	0.072 (0.016)	Very high	0.57
Bye (2008)	Former Czechoslovakia, 1953–1989	0.117 (0.067)	Medium	0.73
Landberg and Norström (2011)	United States, 1950–2002	0.094 (0.044)	Medium	0.57
Landberg and Norström (2011)	Russia, 1959–1998	0.081 (0.015)	Very high	0.73
Norström (2011)	United States, 1950–2002, ‘dry’	0.035 (0.047) ^{ns}	Low	na
Norström (2011)	United States, 1950–2002, ‘moderate’	0.071 (0.037)	Medium	0.51
Norström (2011)	United States, 1950–2002, ‘wet’	0.174 (0.045)	High	0.80
Ramstedt (2011)	Australia, 1950– 2003	0.075 (0.028)	Medium	0.56

ns, not significant; na, not applicable.

In Table 1.1, we see that all estimates of the association are positive (i.e., an increase in population drinking is associated with an increase in homicide rates) and most are also statistically significant. The magnitude of the estimate varies considerably, however. This variation reflects at least two significant factors: the variation in hazardous drinking patterns between countries or regions and the variation in the level of homicide rates. Thus, as a rule of thumb, it seems that the association between population drinking and homicide is stronger in populations or cultures with a high level of hazardous drinking pattern as compared to those with a low level. The parameter estimates can roughly be interpreted in the following way: a 1 liter increase in per capita consumption is accompanied by a relative increase in homicide rates corresponding (closely) to the estimate. For instance, the estimate of 0.124 for the Northern European

countries corresponds to an increase in violence rates of (slightly more than) 12.4% with a 1 liter increase in per capita consumption. Finally, Table 1.1 provides estimates of the fraction of homicide rates attributable to alcohol consumption. As can be seen, these fractions are considerable and higher than what is mostly assumed from individual-level data estimates (Room and Rossow, 2001).

IMPLICATIONS FOR POLICY AND RESEARCH

Can Violence Rates Be Affected by Changes in Alcohol Policy?

As noted previously, the level of violence (in particular homicide rates) in a society tends to vary systematically with variations in alcohol consumption in that society; that is, when consumption goes up, so does the violence rate and vice versa. This would suggest that policies that are effective in reducing the total consumption of alcohol in a population may also be successful in curbing violence rates in that population. So far, there is some evidence to support this, and we will address this in some more detail in the following.

Alcohol policy strategies that are shown to be the most effective in reducing overall consumption in a population are those that limit the economic and physical availability of alcohol, mainly taxation, limitations of the number of outlet, limitations of days and hours of sales, and minimum legal age for purchase of alcohol (Babor *et al.*, 2010). More specifically, a large number of studies have demonstrated a significant association between alcohol prices and alcohol consumption; when prices go up, consumption goes down and vice versa (Wagenaar, Salois, and Komro, 2009). There is also an extensive literature on the association between alcohol outlet density and consumption (Babor *et al.*, 2010; Campbell *et al.*, 2009) and between hours and days of sales and consumption (Hahn *et al.*, 2010; Middleton *et al.*, 2010; Popova *et al.*, 2009), which demonstrates that limiting availability by restricting outlet density and days and hours of sales tends to reduce alcohol consumption. Some studies have further demonstrated the potential impact of these strategies on violence.

There are two fairly recent reviews on the impact of alcohol prices on consumption and related consequences, both of which refer to several studies that suggest that increased alcohol prices are associated with a reduction in violence rates (Chaloupka, Grossman, and Saffer, 2002; Wagenaar *et al.*, 2009). Yet, a recent study from Denmark has found no significant effect on violent injuries after a price decrease, mainly due to a large reduction in spirit taxes (Bloomfield, Rossow, and Norström, 2009).

Bars and pubs tend to be hot spots for alcohol-related violence, and much of the literature on restrictions of the physical availability of alcohol and violence relates to strategies concerning on-premise licences. Several studies have shown a positive association between density of on-premise licences and violence rates, both as spatial correlations (Lipton and Gruenewald, 2002; Livingston, 2008) and in time series analyses (Norström, 2000). Three recent literature reviews (Hahn *et al.*, 2010; Popova *et al.*, 2009; Stockwell and Chikritzhs, 2009) that have addressed a possible impact of restricting sales hours for on-premise licences on violence

rates have found that an extension of sales hours was followed by an increase in violence rates, and vice versa, at least when the change in sales hours exceeded 2 hours (Hahn *et al.*, 2010). A couple of examples to illustrate this stem from Iceland and Brazil. In Reykjavik, Iceland, an extension in trading hours for on-premise sales from 2 a.m. to no limits was accompanied by an increase in violent injuries by 34% (Ragnarsdottir, Kjartansdottir, and Davidsdottir, 2002). In Diadema, Brazil, on-premise trading hours were restricted from no limits to 11 p.m., and this restriction led to a decrease in homicide rates by 44% (Duailibi *et al.*, 2007).

Even more recently, a few studies have found that smaller changes in sales hours for bars and pubs had an impact on violence rates. Kypri and co-workers found that restricting on-premise sales hours by 1.5 hours and a lock-out policy reduced violence rates in Newcastle, Australia, by 37% (Kypri *et al.*, 2011), and a recent study from 18 Norwegian cities found that violence rates decreased with restrictions in sales hours and vice versa; on average, a 1-hour restriction in sales hours was accompanied by 16% reduction in violent crimes at nighttime on weekends (Rossow and Norström, 2012).

There are also some examples that various coordinated alcohol policy strategies, in terms of a community prevention project or a national campaign, may have a significant impact on violence rates. Holder and co-workers evaluated a community prevention project in California (Holder *et al.*, 2000). The intervention comprised five components: community mobilization (formation of community coalitions and media advocacy), responsible beverage service (RBS), limiting access of alcohol to the underaged, local enforcement of drinking and driving laws, and closing problem outlets. The authors reported favourable effects of the project in several respects. They found that assault injuries in emergency departments decreased by 46%, whereas a smaller effect (i.e., a 2% decline per month) was observed for assault cases admitted to hospital (Holder *et al.*, 2000). In Stockholm, Sweden, a community project [Stockholm Prevents Alcohol and Drug Problems ('STAD')] aimed at reducing violence and injuries related to alcohol consumption in on-premise licences. The main elements in this prevention project were community mobilization and cooperation between the hospitality industry, the local government and the police; mandatory RBS training; and increased law enforcement and police controls of licensed premises (Wallin, Norström, and Andreasson, 2003). The intervention was implemented in one area in Stockholm and, compared to the control site, police reported violence at nighttime decreased by 29% in the intervention area (Wallin *et al.*, 2003).

A giant natural experiment was that of the anti-alcohol campaign in the Soviet Union from 1985 to 1987. The campaign comprised several elements, including banning drinking at all work places, restriction of sales hours and sales outlets, and increased prices (McKee, 1999). While the campaign resulted in a decline in recorded alcohol sales by 63%, there was also a massive growth in home distilling, and it has been estimated that decline in actual consumption was about 25% (Nemtsov, 2005). Numerous studies have addressed the impact of this campaign on health and mortality in the Soviet Union, and it is clear that mortality rates decreased significantly in the wake of the campaign, and especially so with respect to alcohol-related mortality (Leon *et al.*, 1997; Shkolnikov and Nemtsov,

1997). In line with this, male homicide rates decreased by 40% from 1984 to 1987 (Shkolnikov and Nemtsov, 1997).

Thus, there is ample evidence that implementation of alcohol policies that are effective in reducing alcohol consumption may also have significant effects on violence rates in a society. The observed effects of such policies are highly important in several respects. First, the extent of effectiveness is often impressive and it seems unlikely that individual-level strategies may have such an impact on the population level. Moreover, the observed effectiveness of population strategies is well in line with the prevention paradox (Rose, 2001).

However, these effective strategies, particularly those entailing high prices and limited availability, are rarely popular in the general population, whereas ineffective strategies such as school programs and other education/information strategies are widely supported (Greenfield, Johnson, and Giesbrecht, 2004). This is one reason why effective policies may be politically difficult or even impossible to implement and maintain (Room, 2003). Herein lies a significant challenge in the policy-making arena.

Suggestions for Further Research

A large scientific literature has provided good evidence that alcohol is a significant contributor to violence and an increasingly better understanding of how this may be explained. There is also a growing literature on the effectiveness of various types of interventions to curb alcohol-related violence. The potential of alcohol control policies to prevent alcohol-related violence certainly calls for further studies on the effectiveness and feasibility of such policies. Such studies would evaluate various types of 'natural experiments' as well as designed intervention projects.

However, within the epidemiological and public health perspective, the largest gap in the scientific literature in this area is probably the scarcity of studies from low- and middle-income (LAMI) countries. This is also generally the case in the broader epidemiological and social science research on alcohol consumption and related harms (Babor *et al.*, 2010). An exception to this are the many and excellent studies on alcohol and violence from the former Soviet Republics and eastern European countries. Yet, given the importance of culture for the alcohol-violence association, a culturally and geographically broader empirical basis is needed in order to better obtain a global picture of the problem of alcohol-related violence.

CONCLUSION

In conclusion, a large scientific literature shows that alcohol use is a common ingredient in violent acts, that those who drink heavily are at an increased risk of being involved in violence and that the amount of violence in a society varies systematically with population drinking. In line with the latter, there is significant promise for effective alcohol control policies in the prevention of violence.

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