Alberta Health Services

Neighbourhood Deprivation, Alcohol Consumption and Health and Social Outcomes

A Review of Recent Literature

October, 2017

Project Information

Requested by:

Alberta Health Services' Provincial Addiction Prevention

Prepared by:

Panteha Khalili, Senior Research Officer, Knowledge Exchange, Provincial Addiction and Mental Health

Reviewed by:

Heather Scarlett-Ferguson, Manager, Knowledge Exchange, Provincial Addiction and Mental Health

Alberta Health Services

Table of Contents

Introduction and Background

Alcohol is the most widely used psychoactive drug in Canada. In 2013, about 80% of Canadians, 15 years of age and older, reported having consumed alcohol in the previous year (Public health Agency of Canada, 2016). In 2012, 75% of Albertans aged 15 or older reported drinking alcohol in the previous year. Of this total, 10% indicated harmful or hazardous use, 12% indicated exceeding Canada's Low Risk Alcohol Drinking Guidelines, and 20% indicated heavy monthly use (Health Canada, 2014).

Although alcohol is a legal commodity with economic (Institute of Alcohol Studies, 2013) and some social benefits (Dunbar et al., 2017), a wide range of adverse health and social outcomes have been associated with excessive alcohol consumption. Globally, alcohol causes all deaths and disability resulting from alcohol use disorder and fetal alcohol spectrum disorder and contributes to 50% of deaths and disability due to liver disease. Alcohol also contributes to deaths and disability resulting from heart disease, hemorrhagic stroke, unintentional injuries, falls, traffic injuries, lower respiratory infections and HIV (WHO, 2014).

Regarding alcohol contribution to cancer related mortality and morbidity, Praud and colleagues recently reviewed international data on the incidence of certain cancers and compared alcohol consumption habits. They found that globally 5.5% of all cancer cases and 5.8% of all cancer deaths in 2012 could be attributed to consumption of alcohol (Praud et al., 2016). Based on the existing epidemiological evidence, Connor

(2016) reported a causal association of alcohol consumption with cancers at seven sites: oropharynx, larynx, oesophagus, liver, colon, rectum and female breast. For all these cancer types, there appears to be a dose–response relationship; that is, cancer risk increases with increased average consumption either linearly or exponentially, with no apparent threshold (Connor, 2016). Alcohol also appears to casually contribute to development of cancer at other sites such as pancreas, prostate and skin (melanoma) (Bagnardi et al., 2015; Zhao, Stockwell, Roemer, & Chirkritzhs, 2016).

According to the Canadian Institute for Health Information (CIHI), there were more hospitalizations due to conditions entirely caused by alcohol in 2015-2016 than there were for heart attacks. Approximately 77,000 hospitalizations were entirely caused by alcohol compared with approximately 75,000 for heart attacks (CIHI, 2017).

Heavy drinking is closely associated with violent crimes, including murder, rape, assault, and child and spousal abuse (World Health Organization, 2010 & 2014). Cotter's 2014 study (as cited in Public Health Agency of Canada, 2016, p. 16) estimated that 40% of those accused of homicide and 32% of victims involved in a homicide in Canada in 2013 had consumed alcohol at the time of the crime. Alcohol was a factor in approximately 28% of violent crimes in Canada according to data from early 2000s (Pernanen, Cousineau, Brochu, & Sun, 2002).

Although most Canadians drink moderately, alcohol-related harm is a growing concern both in Canada and across the globe. Alcohol-related harm, however, can be prevented

or reduced by developing a culture of moderation. In 2007, the pan-Canadian National Alcohol Strategy Working Group released a number of recommendations for a National Alcohol Strategy aimed at reducing alcohol related harm in Canada (National Alcohol Strategy Working Group, 2007).

These recommendations emphasized the importance of responsibility and moderation in reducing alcohol-related harm and had a significant impact on the development of the Alberta Alcohol Strategy, which similarly aims to promote a culture of moderation (Alberta Health Services, 2008).

Canada's National Alcohol Strategy recommends that provincial governments and municipalities partner with community groups to develop local municipal alcohol policies (MAPs).

Development of context-specific alcohol policies is also one of the strategic priorities of Alberta Alcohol Strategy. To address these recommendations, Alberta Health Services' Provincial Addiction Prevention team has embarked on an initiative called *Alberta Municipal Alcohol Policy Project (AMAPP)*. This initiative intends to raise awareness about the importance of MAPs in reducing alcohol-related harm. AMAAP project team is developing an Alberta specific guide to provide municipalities with policy options to address liquor control at the municipal level. The present literature review has been developed at the request of AMAAP project leads and will complement a spatial analysis that will examine the spatial context of alcohol related health disparities.

Methods

A comprehensive search of the academic and grey literature was conducted using the MEDLINE, HealthStar, CINAHL, PsycINFO, Google Scholar and PubMed databases, as well as a general search of the internet using Google. Documents included scholarly journal articles, grey literature reports from organizations, government bodies, research bodies, etc., and organizational information available online. Hand searching of articles and the internet was also used as a supplementary search methodology. Journal literature was for the most part limited to articles published since 2007; however, in some cases articles published prior to 2007 were also considered if they contained important and relevant background information. Grey literature was not limited by publication date. In the scholarly journal databases, a combination of subject heading and keyword searching was employed, which included terms such as alcohol outlets, alcohol outlet density, alcohol availability, alcohol consumption, alcohol related harms, alcohol attributable disease, alcohol related social harms, neighbourhood deprivation, socioeconomic status, spatial context, and health inequalities. The main focus was on finding articles about the general population rather than specific sub-populations such as specific ethnicity, youth, or older adults. Literature was screened for relevance based on their title and abstract or introduction. Full text copies of relevant items were retrieved and evaluated, the results of which are presented here. In total, the findings of 128 documents were considered in this review. Levels of evidence or grades of the research used to prepare this document were not included in this review.

Purpose of the Literature Review

This literature review explores two overarching questions:

- Is there a relationship between availability of alcohol and adverse alcohol related health and social outcomes?
- What is the association between alcohol consumption, adverse alcohol related health and social outcomes and neighbourhood deprivation?

Alcohol Availability, Alcohol Consumption and Alcohol-Related Harms

Alcohol Availability— Historical Background

First described in 1975, availability theory states that alcohol-related harm is closely associated with degree of alcohol availability (cited in Stockwell & Gruenewald, 2004). Single (1988) described the three inter-related propositions of availability theory as follows:

> 1. As the availability of alcohol in a community increases, the overall average consumption by its population also increases;
> 2. As the mean alcohol consumption in a population increases, the number of heavy drinkers increases; and,
> 3. Heavy drinking is associated with adverse health and social outcomes and as the number of heavy drinkers in a population increases, so too does the level of alcohol-related health and social problems. (p. 333)

Stockwell and Gruenewald (2004) described alcohol availability in terms of economic and physical availability. Economic availability focuses on the price of alcoholic drinks relative to the potential consumers' disposable income. Physical availability refers to the availability of alcohol in one's environment. Stockwell and Gruenewald (2004) expanded the basic propositions of availability theory to better reflect more recent findings from the availability research and proposed the following:

1. Greater availability of alcohol in a society will increase the average consumption of its population when such changes reduce the 'full price' of alcohol, i.e. the real price of beverages at retail markets plus the convenience cost of obtaining them.
2. Greater availability of alcohol in a society will directly affect alcohol-related harm when such changes affect the distribution of 'routine drinking activities'; i.e., behaviors drinkers engage in when consuming alcohol (e.g. drinking at bars vs. at home; drinking socially vs. alone).
3. Greater average consumption in a population will be related to increases in drinking among some segments of the population along one or more of the several basic dimensions of drinking – rates of abstention, frequencies of use, quantities consumed and variances in drinking levels.
4. Greater adverse health and social problems stemming from alcohol use will appear across the drinking population, focused in those subpopulations most exposed to risk. These risks will be distributed differently across population

> subgroups, depending upon differences in routine drinking activities (2, above) and drinking patterns (3, above). (p. 217)

The expanded propositions imply that greater availability by itself does not necessarily lead to increased levels of consumption. A range of factors influence the so-called 'full price' of alcohol, which reflects both its real price and convenience costs of obtaining it. If increased availability changes the 'full price' of alcohol, it could lead to increased consumption. Accordingly, in order to decrease alcohol consumption, attempts to decrease availability should have an impact on the range of factors that influence the 'full price' of alcohol (Stockwell & Gruenewald, 2004).

Measures of Alcohol Availability and Alcohol Outlet Types

In their recent critical review of availability research, Holmes et al. (2014) reviewed a large body of evidence related to alcohol availability; they identified 136 measures of spatial availability and three measures of temporal availability. Measures of spatial availability were primarily measures of outlet density (e.g., simple outlet counts, outlets weighted by area or population, etc.) followed by proximity-based measures (e.g., distance to nearest alcohol outlet) (Holmes et al., 2014). Studies that have focused on temporal availability of alcohol have usually examined the impact of later trading hours on alcohol related harms such as impaired driving and violence (Schofield & Denson, 2013; Chikritzhs & Stockwell, 2002, 2006 & 2007).

The number of outlets within a given area, outlet density, has typically been measured in large or densely populated areas containing several thousand households (e.g., U.S. zip codes or census tracts) (Holmes et al., 2014; Schonlau et al., 2008). It is important to note that aggregate measures of alcohol availability exposure and alcohol consumption at the ZIP code or census tract level do not control for individual demographic differences and as such can lead to misleading inferences, referred to as ecological biases (Schonlau et al., 2008). Using smallest geographic units available would theoretically reduce the magnitude of ecological bias but not eliminate it (Bryere et al., 2017). To improve the relevance of study findings, some recent studies of the relationship between alcohol availability and either consumption or alcohol-related health outcomes have used multilevel or hierarchical analyses in which they have combined characteristics at the individual and aggregate level (Schonlau et al., 2008).

Recently, more sophisticated spatial access-based measures such as outlet clustering (Grubesic & Pridemore, 2011) and gravity potential measure (Grubesic, Wei, Murray, & Pridemore, 2016) have been reported in the access and availability literature. For example, Grubesic and Pridemore (2011) used a combination of proximity analysis, spatial cluster detection approaches and a geographic information system to identify localized clusters of alcohol outlets and the distribution of violence around them. Also, Grubesic, Wei, Murray, and Pridemore (2016) recently introduced the gravity potential measure of availability. According to these authors, the gravity potential measure is superior to standard measures of availability as it is more geographically sensitive and it

captures local context and the effects of spatial interaction for estimating alcohol availability in a given region (Grubesic et al., 2016). A detailed discussion of various measures of alcohol outlet density, their strengths and limitations, and ways to calculate them can be found in the Guide for Measuring Alcohol Outlet Density, recently published by the Centers for Disease Control and Prevention (CDC, 2017).

Another important aspect of alcohol availability is the type of outlet serving alcohol. Outlet types are typically divided into two groups: outlets that are licensed to sell alcohol for consumption on the premises (e.g., bars, clubs, producers such as wineries or breweries, and restaurants) and off- premise outlets, which sell alcohol for consumption elsewhere (e.g., liquor stores and supermarkets) (CDC, 2017). There are, however, alcohol outlets that are considered ‘combined alcohol outlets’; these outlets consist of on-premise outlets, that in addition to selling alcohol for consumption on the premise, also sell alcohol for consumption elsewhere, as well as, off-premises outlets that allow alcohol consumption on premises. Consequently, the distinction between on- and off-premise alcohol outlets is not always clear and this can complicate assessments of alcohol outlet density by the type of retail outlet (CDC, 2017).

In studies of alcohol-related harm, on-premise outlets such as bars and restaurants have historically received more attention due to their perceived greater health risks resulting from public drunkenness, disorderly conduct, and drunk driving. Unlike bars and restaurants, however, off-premise outlets are able to sell large quantities of alcohol that can be consumed in uncontrolled environments (e.g., consumed in the home,

motor vehicles, parks) (Badland, Mavoa, Livingston, David, & Giles-Corti, 2016). Consequently, there has been a growing recognition of the impact of off-premise outlets on alcohol consumption and related harms.

Significance of Measuring Alcohol Availability

Overall, existing evidence to-date suggests that regulating the spatial and temporal availability of alcohol is a key strategy to reduce alcohol consumption and alcohol-related harms (Holmes et al., 2014). Alcohol outlet density has generally been considered a proxy for the physical availability of alcohol. Outlet type and other important characteristics of individual alcohol retailers can influence drinking behaviors and alcohol-related harms in various ways. However, the number and concentration of alcohol outlets in a community are likely to exert an even greater effect on excessive alcohol consumption and alcohol related harms than differences in characteristics of individual retailers. From a public health perspective, therefore, it is important to assess alcohol outlet density even when specific characteristics of individual alcohol retailers cannot be fully elucidated (CDC, 2017).

Measuring alcohol outlet density at local, provincial, or national levels is important for guiding the development of prevention strategies for excessive alcohol use. Furthermore, alcohol outlet density measures can complement other core public health surveillance measures of excessive alcohol use, as well as measures of alcohol policy (CDC, 2017). There is a vast body of literature on alcohol outlet density, alcohol consumption and alcohol related harms. A snapshot of recent literature discussing the

relationship between alcohol outlet density and consumption, as well as, outlet density and *select* categories of alcohol related harm are presented below.

Alcohol Outlet Density and Alcohol Consumption

A number of social, cultural, political, economic and geographic factors interact in complex ways and affect alcohol consumption. While greater availability of alcohol may not invariably lead to greater consumption, it is one geographic factor that can influence alcohol consumption (Richardson, Hill, Mitchell, Pearce, & Shortt, 2015). Greater local availability of alcohol outlets may enhance access to alcohol, while greater visibility of alcohol retailers' advertising and promotions may result in lower prices of alcohol products due to retailer competition. All these factors can in turn influence local attitudes and norms around drinking behaviors (Livingston, Chikritzhs, & Room, 2007; Pasch, Komro, Perry, Hearst, & Farbakhsh (2007); Pasch, Hearst, Nelson, Forsyth, & Lytle (2009). Accordingly, a number of studies have reported higher population-wide consumption of alcohol in neighbourhoods with higher alcohol outlet densities (Ayuka, Barnett, & Pearce, 2014; Bryden, Roberts, McKee, & Petticrew, 2012). Brenner, Borrell, Barrientos-Gutierreze and Diez Roux (2015) found that higher densities of liquor stores were associated with increases in beer consumption for men and wine consumption for women.

A number of research studies have found an association between alcohol outlet density and increased risk of harmful drinking (Kavanagh et al., 2011). Ahern, Margerison-Zilko, Hubbard, and Galea (2013) found a relationship between outlet density and binge

drinking after examining survey data from New York City neighbourhoods. Specifically, the authors found that binge drinking prevalence was much higher at densities of more than 80 outlets per square mile. Connor, Kypri, Bell, and Cousins (2011) examined the relationship between alcohol outlet density and harmful alcohol consumption throughout New Zealand and found an association between binge drinking and the density of alcohol outlets within 1 km of home, with a 4% increase in the probability of binge drinking for each additional outlet.

Halonen at al. (2013a) studied heavy alcohol use (drinking above the weekly guidelines) and extreme drinking occasions (passing out because of alcohol use) as a function of the distance between study participants' homes to the nearest bar in a large Finnish sample. They found that moving place of residence close to a bar (on-premise outlet) was associated with a small increase in risky alcohol behavior; conversely, a small decrease in risky alcohol behavior was found when place of residence was moved farther away from a bar (Halonen et al., 2013a). Halonen et al. (2013b) also found that moving place of residence closer to off-premise outlets (beer and liquor outlets) affected the risk of heavy alcohol consumption in women.

Harmful drinking is also a leading cause of disease and injury among adolescents and young adults (U.S. Department of Health and Human Services, 2007). Although adolescents under the drinking age are legally prohibited from purchasing alcohol, they commonly obtain alcohol from parents, older siblings and friends (Truong & Sturm, 2009). The bulk of the literature on alcohol availability, as measured by density of

alcohol outlets and underage drinking seems to suggest a positive association between the two; however, results across studies have not been consistent (Bryden et al., 2012).

Many studies of adolescent alcohol use and outlet density have measured the density of off-premise outlets; the results have been mixed with some studies reporting an association (Chen, Grube, & Gruenewald, 2010; Truong & Sturm, 2009), while others reporting no association (Pasch et al., 2009; Paschall, Lipperman-Kreda, & Grube, 2014; Stanley, Henry, & Swaim, 2011).

Although off-premise outlets have been most frequently studied in relation to adolescent alcohol use, off-premise outlets are not the only way for younger adolescents to access alcohol. It has been argued that both on- and off-premise outlet types need to be examined, as on-premise outlets may also sell alcohol products to underage youth (Britt, Toomey, Dunsmuir, & Wagenaar, 2006). The findings with regards to the impact of on-premise outlet density on youth drinking outcomes have also been mixed as demonstrated through following examples.

Young, Macdonald and Ellaway (2013) examined the association between alcohol outlet availability (outlet density and proximity), outlet type (on-premise vs. off-premise) and frequent (weekly) alcohol consumption among a sample of 979 15-year old Glaswegians. They adjusted for social class, family structure and gender. They found no association between proximity and density of on-premises outlets and adolescent alcohol use; however, they found that adolescents who either lived close (within 200 m)

to off-premise outlets or lived in areas with many nearby off-premises outlets were more likely to drink frequently.

Shih et al. (2015) examined the association between alcohol outlet density and adolescent alcohol use among a sample of seventh, eighth, and ninth grade students in California, U.S. They used two indicators of alcohol use: any lifetime use, but not in past month; and any past month heavy use (defined as five or more drinks in one sitting). They classified alcohol outlets as either: (1) off-premise alcohol outlets (including grocery and convenience stores that sell alcohol for off-premise consumption but may also do tastings on-site); (2) on-premise alcohol outlets, including restaurants, pubs, clubs, hotels, clubs, and bars; and (3) on-premise alcohol outlets where minors are not allowed (clubs/bars). Shih and colleagues argued that it is important to distinguish between on-premise outlets where minors are allowed *versus* those where they are not allowed when studying the impact of on-premise outlets. This is because adolescents may also gain access to alcohol through older friends or by using fake IDs at on-premise establishments, where minors are not allowed. Furthermore, increased exposure to alcohol use among adults of legal drinking age in areas with higher density of on-premise outlets may influence beliefs about drinking norms for adolescents living nearby.

Shih et al. (2015) found that both lifetime and heavy alcohol use among these younger adolescents were strongly associated with greater alcohol outlet densities around the adolescent's residence, even after controlling for demographics and census tract-level

socioeconomic status. A higher number of on- and off-premise outlets within 0.1, 0.25, and 0.5 miles around the respondents' homes was associated with higher odds of heavy drinking. In addition, the number of on-premise outlets within the 0.25 mile radius was associated with greater odds of lifetime drinking. Even on-premise outlets where minors are not allowed (clubs/bars) within 0.1 and 0.25 mile radii (of adolescents' home) were associated with higher odds of heavy drinking. Shih and colleagues concluded that it is important to advocate for stricter laws that limit the number of alcohol outlets in neighbourhoods, including clubs/bars where minors are restricted. Their findings also underscore the importance of more stringent enforcement of age identification requirements, as well as, distribution of alcohol to minors at all on-premise outlets, even minor-restricted clubs/bars (Shih et al., 2015).

Azar et al. (2016) examined the impact of four main outlet types on past month alcohol use, risky drinking among current drinkers, as well as among all survey respondents in a large sample of Australian urban and regional adolescents with multiple survey years. The four outlet types were: off-premise (e.g. bottle shops and supermarkets), on-premise (e.g. restaurants, cafes, bars), general (for consumption at the venue and take-away; e.g. hotels) and clubs (sale of alcohol to members and guests of members; e.g. sporting clubs, returned soldiers clubs). They found that regardless of geographic location, higher densities of general, on- and off-premises outlets in an adolescent's immediate neighbourhood were associated with an adolescent's alcohol consumption.

Overall risky drinking was higher in urban neighbourhoods with a higher density of off-premises outlets (Azar et al., 2016).

Rowland et al. (2014) also had examined the association between the above-mentioned four main outlet types and recent alcohol use among adolescents in Australia. They found that increases in the density of each of the four alcohol outlet types was associated positively with recent alcohol use (past 30-day drinking) among 12–14-year-olds; however, they found little effect for adolescents aged 15–17 years. An earlier Australian study (Livingston, 2008) reported that 16–24-year-olds who lived in areas with high densities of off-premises outlets were more likely to engage in very high-risk alcohol consumption.

Alcohol Outlet Density, Hospitalization and Mortality

A series of studies conducted in British Columbia examined the relationship between alcohol outlet density and alcohol-related mortality and hospitalization. Stockwell et al. (2013) found that an increase in private liquor store density was associated with higher levels of all types of alcohol-attributable hospital admissions across 89 geographic areas (local health areas [LHAs]) over 8 years. Stockwell et al. (2011) noted that the significant expansion of private liquor stores in British Columbia following the partial privatization of the government retail alcohol monopoly in 2002 was associated with increased local rates of alcohol-related deaths across 89 local health areas over a 6-year study period (2003 to 2008). Zhao et al. (2013) also found that an increase in the

density of private liquor stores was associated with increases in alcohol-attributable mortality.

In a Scottish study, Richardson et al. (2015) found that alcohol-related health outcomes were associated with alcohol outlet densities. Rates of mortality and hospitalizations from all alcohol related outcomes were significantly higher in areas with higher alcohol outlet densities. This relationship held true for all age groups, except for the youngest legal drinkers (18-25 years). In a Welsh study, Fone et al. (2016) found that change in walking outlet density was generally associated with emergency admissions to hospital, although there was considerable geographic variability. In addition, one study found some support for a moderate relationship between residential exposure to alcohol outlets and hospital visits for anxiety, stress, or depression (Pereira, Wood, Foster, & Haggar, 2013).

Alcohol Outlet Density and Violence

Violent crime is the most frequently investigated alcohol-related harm according to a 2009 systematic review of alcohol outlet density (Popova, Giesbrecht, Bekmuradov, & Patra, 2009). Popova and colleagues concluded that high outlet densities were associated with rates of assault, domestic violence, and child abuse (Popova et al., 2009). A growing body of literature over the last two decades has examined the relationship between rates of violence and alcohol outlets; many of these have been based in United States (U.S.) and have examined the cross-sectional associations between violence and alcohol outlets in small areas such as census tracts, while

adjusting for various demographic and socio-economic confounders (Livingston, 2008). Although study findings have varied for different outlet types, most studies have shown an association between alcohol outlet density and violence (Livingston, 2008). Many studies from outside the U.S. have also reported that alcohol outlet density and violence are associated; furthermore, this association has been demonstrated in both cross-sectional as well as longitudinal studies (Livingston, 2008).

Majority of studies reviewed by Kearns, Reidy, and Valle (2014) reported that higher densities of alcohol outlets were associated with increased rates of violence, especially intimate partner violence (Kearns, Reidy, & Valle, 2014). Jennings, Milam, Greiner, Curriero, and Thornton (2013) found a relationship between alcohol outlets and violent crime during a five-year period (2005-2010) in Baltimore City, U.S. Similarly, Toomey et al. (2012a) found that increasing the density of alcohol establishments can lead to significantly higher levels of some types of violent crime (e.g., assault, robbery).

In a study conducted in Cincinnati, Ohio, Grubesic and Pridemore (2011) found that assaultive violence often clustered near agglomerations of alcohol outlets. Areas with a higher spatial density of outlets were more prone to clusters of assaultive violence when compared to areas with a lower density of outlets (Grubesic & Pridemore, 2011). Furthermore, the association between outlet density and violence is not limited to violent acts committed by adults; for instance, Resko et al. (2010) found alcohol outlet density to be significantly associated with adolescents' violent behaviors, after controlling for demographic characteristics and individual alcohol consumption. They

suggested that violence prevention strategies for urban adolescents should incorporate regulation of alcohol outlet density (Resko et al., 2010).

Several recent studies have shown violence to be more strongly associated with off-premise outlets than on-premise outlets such as bars (Gruenewald, Freisthler, Remer, Lascala, & Treno, 2006; Branas, Elliott, Richmond, Culhane, & Wiebe, 2009; Pridemore & Grubesic, 2013). Grubesic, Pridemore, Williams, and Philip-Tabb (2013) found a strong and positive association between alcohol outlet density and violence even after controlling for alcohol expenditures (as a proxy for alcohol sales), and the density of other retailers (as a measure of general commercial activity). Local alcohol expenditures and the measure of general commercial activity were both positively and significantly associated with assault density. Interestingly, even after controlling for local alcohol expenditures and general commercial activity confounders, the positive and significant association between aggravated assault density and total, as well as, off-premise alcohol outlet density remained. Therefore, neither alcohol itself, nor being in a commercially dense area could have been the main reason for the strong association between outlets and violence. The authors argued that the observed association may have been in part due to factors such as patrons consuming alcohol in private settings (e.g., homes), or coming home drunk where there is little control over their behavior (Grubesic et al., 2013). Additionally, off-premise outlets, especially in urban areas, may serve as social gathering places that could lead to generation of crimes that would have otherwise not occurred (Grubesic et al., 2013). The authors suggested that in addition

to alcohol sales volume and density of other retailers, investigators control for the proximity to public transportation hubs when assessing the association between alcohol outlet density and violence. Public transportation hubs tend to attract heavy foot traffic and at times other illicit activities such as drug sales resulting in an increased risk of violence (Grubesic et al., 2013).

Alcohol outlet density has also been shown to be positively associated with robberies in a number of studies. Robbery involves the taking or attempting to take valuable commodities from a person by force or with a threat of force (United States Department of Justice, 2011), and is considered a serious violent crime. In a study in Milwaukee, Wisconsin, Snowden and Freiburger (2015) found that areas with higher concentrations of various types of alcohol outlets also had higher densities of robberies after controlling for neighbourhood characteristics that are often associated with robberies. They found the concentrations of off-premise alcohol outlets, where alcohol can be purchased and carried out for consumption elsewhere (e.g., liquor stores) to be particularly important in relationship to robbery incidents. Snowden and Freiburger (2015) suggested the following policy mechanisms to help reduce incidents of robbery:

> (1) reducing the number of alcohol outlets that are allowed to operate within a neighbourhood, (2) limiting new licenses for areas that already have outlets too close together, (3) limiting the hours and days of sales of alcoholic beverages, (4) enforcing the current laws that prohibit serving intoxicated patrons, (5) permanently closing outlets that continually violate liquor laws. (pp. 160 - 161)

Other studies have similarly shown positive associations between alcohol outlet density and robbery. Bernasco and Block (2011), for instance, found that city blocks with bars, clubs, and liquor stores within their boundaries had the highest robbery incidents even after controlling for poverty, percentage of African Americans, and ethnic heterogeneity of Chicago census blocks. In another study, Bernasco, Block, and Ruiter (2013) found that city blocks that contained liquor stores (off-premise) were almost twice as likely to be selected for robbery compared to the blocks that contained bars and clubs (on-premise).

Snowden and Pridemore (2014) examined the relationship between various off-premise alcohol outlet characteristics and violence. They found that where the off-premise outlets are located, how well the immediate environment is maintained, what types of beverages the outlets sell, who visits them, and who works there had very little effect on their association with violence. Their findings highlighted the importance of outlet density itself as a primary driver of any association with violence, further substantiating the importance of public policies aimed at reducing alcohol outlet density or clustering for reduction of violence (Snowden & Pridemore, 2014).

The association between outlet density and violence has been shown to be moderated by a number of contextual factors. For example, Pridemore and Grubesic (2012a) found that the strength of the association between outlet density and assault was significantly weaker in more socially organized communities; i.e., community organization moderates the effect of alcohol outlet density on violence. Their measure of social

disorganization comprised of socioeconomic disadvantage, female-headed households and residential instability, which are the most common indicators of social disorganization in modern criminology literature. The authors reverse coded their scale to interpret their results in terms of social organization, rather than disorganization (Pridemore & Grubesic, 2012a).

Pridemore and Grubesic (2012b) also identified land use as another important local characteristic that affects the association between alcohol outlet density and violence. They hypothesized that the strength of the association between outlets and crime would be lower in areas with higher proportion of single-family residence compared to areas with greater proportion of public housing or industry. They based their hypotheses on the observation that areas devoted to single family residential land use tend to have higher levels of social organization and informal social control, as well as, better socioeconomic status than areas with greater proportion of public housing or industry. In support of their hypotheses, Pridemore and Grubesic (2012b) found that the association of alcohol outlet density with both simple and aggravated assault was stronger in public housing areas and weaker in areas with a higher proportion of single-family residences.

Alcohol Outlets, Theft and Vandalism

Fewer studies have examined the relationship between alcohol outlet density and non-violent crime as compared to violent crime. Snowden, Stucky and Pridemore (2016) recently examined the relationship between alcohol outlet density and thefts from

vehicles and vandalism in Milwaukee, Wisconsin using block groups as units of analysis. They found that on-premise alcohol outlet density was associated with thefts from vehicles. They also found that areas with higher densities of both on- and off-premise alcohol outlets had higher densities of vandalism of property.

Similarly, Toomey et al. (2012b) using data from the city of Minneapolis, Minnesota, in 2009 found positive associations between density of on- and off-premise alcohol outlets and vandalism. Other studies with similar conclusions include a study by Cameron et al. (2012), which found the density of bars and clubs to be significantly associated with property damage. In another study, living in proximity to liquor stores was associated with reports of property damage (Wilkinson & Livingston, 2012).

Alcohol Outlet Density and Intimate Partner Violence (IPV)

Many studies conducted to-date suggest that alcohol outlet density appears to be associated with rates of intimate partner violence (IPV). According to Curandi (2010):

> Greater numbers of alcohol outlets within a neighbourhoods may (1) be a sign of loosened normative constraints against violence; (2) promote problem alcohol use among at-risk couples; and (3) provide environments where groups of persons at risk for IPV may form and mutually reinforce IPV-related attitudes, norms, and problem behaviors. (p.799)

Findings on outlet type appear to vary across different studies, with some studies suggesting that higher density of on-premise outlets predicts IPV (Cunradi, Mair,

Ponicki, & Remer, 2012a; McKinney, Caetano, Harris, & Ebama, 2009) and others finding off-premise outlets to be more directly associated with IPV (Cunradi, Mair, Ponicki, & Remer, 2011; Livingston, 2010, Snowden, 2016). Differences in IPV data sources and/or different types of licenses and definitions used for off-premise versus on-premise outlets may have contributed to the observed inconsistencies in findings. Outlined below are examples of recent studies in this area.

In one of the first studies to examine the relationship between alcohol outlet density and IPV *outside a metropolitan setting* in United States, Snowden (2016) found a positive association between alcohol outlet density and IPV; this association remained even after controlling for neighbourhood characteristics that are often found to be associated with IPV (e.g., poverty, population density, proportion of population that is African American, and proportion of female-headed households). Total- and off-premise alcohol outlet density, but not on-premise alcohol outlet density, seemed to be important predictors of IPV in this study (Snowden, 2016).

In Sacramento, California, Cunradi, Mair, Ponicki and Remer (2011) found that after controlling for neighbourhood characteristics (i.e., poverty rate, unemployment rate, racial /ethnic composition) each additional off-premise alcohol outlet increased IPV-related police calls by 4% and increased IPV crime reports by 3%. On the other hand, on-premise outlet density (i.e., bars and restaurants) was not associated with IPV outcomes.

In a cross-sectional ecological study in Melbourne, Australia, Livingston (2010) found that after controlling for sociodemographic factors, outlet density was significantly associated with police-reported domestic violence. The findings varied by outlet type, with general licenses (e.g., pubs that sell alcohol for on- or off-premise consumption) showing a positive association, on-premise license density showing a negative association, and packaged liquor license density showing no relationship (Livingston, 2010). A 10-year longitudinal analysis of ecological data from 1996 to 2005 from Melbourne, Australia found that regardless of outlet type, density of alcohol outlets was positively associated with police-recorded domestic violence over time; when outlet types were analyzed separately, packaged liquor licenses (mostly retail liquor stores) had an especially large effect on rates of police-recorded domestic violence domestic violence (Livingston, 2011a).

In contrast to the aforementioned studies, other studies have found on-premise outlets to be more relevant to IPV. McKinney, Caetano, Harris, and Ebama (2009) examined survey data from couples across 48 states and found that self-reported male-to-female IPV increased by 34% for every increase of 10 alcohol outlets (on- and off-premise) per 10,000 people. An even stronger relationship was found for couples reporting alcohol-related problems. However, when outlet types were analyzed separately, only on-premise outlet density (e.g., bars, restaurants) predicted IPV rates (McKinney et al., 2009).

Cunradi, Mair, Ponicki and Remer (2012) examined the effects of outlet densities on emergency department (ED) visits due to IPV-related injuries in California between July 2005 and December 2008. They found that on-premise outlet density was positively associated with IPV-related ED visits. Density of off-premise outlets, on the other hand, was negatively associated with IPV-related ED visits, however this association was weaker and smaller than that observed for on-premise (bars) density. There was no association between density of restaurants and IPV-related ED visits in this study (Cunradi et al., 2012).

There are also studies that have found no relationship between alcohol outlet density and IPV, regardless of outlet type. An example is a study by Waller et al. (2012), which looked for a direct association between alcohol outlet density in one's neighbourhood and the likelihood of IPV victimization among young women in the U.S. Using a nationally representative sample of young heterosexual females (age 18–26), Waller et al. (2012) found no direct relationship between outlet density and self-reported IPV victimization and no direct relationship with outlet density and drinking behaviors after controlling for individual and neighbourhood characteristics.

Alcohol Outlet Density and Liver Cirrhosis

Cirrhosis is one of the three main types of alcohol-related liver disease. Alcohol is one of several causes of liver cirrhosis; between 10 and 20 percent of heavy drinkers develop cirrhosis, usually after 10 or more years of drinking (Liver Foundation Organization, n.d.). The amount, pattern and duration of alcohol consumption, and

presence of liver inflammation, diet, nutritional status and genetic predisposition can all affect the severity and prognosis of alcohol-induced liver disease (Bruha, Dvorak, & Petrtyl, 2012).

According to Rehm et al. (2010), every review of alcohol-attributable disease has found alcohol to be a risk factor for liver cirrhosis. Rehm and colleagues have found that there is an exponential relationship between average volume of alcohol use (dose) and liver cirrhosis (response) with the curve being more pronounced for mortality than for non-fatal morbidity (Rehm et al. 2010, 2017). They suggest that the greater dose-response relationship for mortality is due to the fact that heavy drinking can significantly worsen existing liver disease of any etiology and increase the chance of death (Rehm et al. 2010, 2017).

A recent U.K. commission report by Williams et al. (2014) that addressed the crisis of liver disease in the U.K., reviewed evidence related to alcohol consumption as a major cause of liver disease mortality in U.K. The authors reported that between 1980 and 2013, deaths due to liver disease increased by four times, with most of these deaths resulting from alcohol-related liver disease. The commission noted that changes in the alcohol market were mainly to blame for the observed increase in alcohol-related liver deaths. Important alcohol market changes included modest increases in the affordability of beer and cider, greater affordability of wine and spirits, and increased alcohol availability due to increasing number of on-premise and off-premise alcohol outlets and extension of opening hours. The authors noted that the rise in deaths from

cirrhosis in U.K. has followed the sharp rise in alcohol consumption over the past half-century. In contrast, countries such as France and Italy that have achieved a sustained decrease in per person alcohol consumption during the same time period, have reported a proportionate decline in deaths from cirrhosis (Williams et al., 2014; Jewell & Sharon, 2010). The U.K. commission continues to support introduction of minimum unit pricing (MUP) as an effective policy that could help reverse the upward trend in alcohol-related liver mortality (Williams et al., 2014).

Richardson, Hill, Mitchell, Pearce and Shortt (2015) recently examined the association between alcohol outlet density and alcohol-related morbidity and mortality in Scottish cities. While they examined various alcohol-related health outcomes, they specifically focused on cirrhosis as an indicator of chronic alcohol-related harm. They found significantly higher rates of alcohol-related hospitalization and mortality due to all alcohol-related outcomes, and cirrhosis in particular, among populations residing in neighbourhoods with higher alcohol outlet densities. Cirrhosis, as well as all alcohol-related health outcomes (chronic and acute harms) in this study, were more strongly associated with the density of off-premise than on-premise outlets (Richardson et al., 2015). Chronic alcohol-related conditions, including cirrhosis, accounted for most alcohol-related deaths in this study. Overall, the finding of this study suggests that alcohol outlet density, in particular off-premise outlet density, plays an important role in enabling the long-term excessive drinking that precedes the development of chronic alcohol-related illnesses such as cirrhosis (Richardson et al., 2015). An earlier

Australian study that examined trends in hospital admissions for alcohol-related chronic diseases over a 14-year period also found strong positive associations between off-premise alcohol outlet density and liver cirrhosis, as well as other chronic alcohol-related diseases (Livingston, 2011b). This study also found a small, but significant relationship between on-premise outlet density and chronic disease (Livingston, 2011b).

Alcohol Outlet Density and Suicide/Homicide

Many studies have shown a close link between alcohol and suicide (Kim et al., 2012, Gonzalez & Hewell, 2012). Alcohol is commonly consumed prior to suicide; for example, a recent study found that 36% of male and 29% of female suicide decedents in a U.S. national sample had positive blood alcohol levels at the time of death (Kaplan et al., 2013). This study also found that 24% of men and 17% of women deceased by suicide were intoxicated at the time of death; that is, their blood alcohol concentration (BAC) levels were equal or greater than 0.08 g/dl (Kaplan et al., 2013). Individuals with alcohol use disorders and alcohol dependence have a very high risk of suicide. For example, individuals with alcohol dependence were found to have approximately nine-fold greater risk for death by suicide compared with the general population (Wilcox, Conner, & Caine, 2004). A meta-analytic study of psychological autopsy studies worldwide conducted by Cavanagh, Carson, Sharpe, and Lawrie (2003) concluded that alcohol use disorders were second only to mood disorders as the most common condition among suicide decedents.

Several studies have alluded to a positive association between suicide and alcohol outlet density, it is however unclear whether alcohol consumption is mediating the relationship between alcohol outlets and alcohol-related harms such as suicide. For example, Johnson, Gruenewald and Remer (2009) conducted a longitudinal study, based on a large number of small spatial units (California zip codes), to analyze the relationship between local alcohol access and suicide rates over time. They found that both attempted- and completed suicides occurred at greater rates in rural areas that had greater bar densities. More specifically, they found that local bar and off-premise outlet densities were positively associated with completed suicide rates; whereas, local restaurant densities were negatively related to completed suicide rates. They also found a positive association between local bar densities and suicide attempts; however, local off-premise densities were unrelated to suicide attempt rates. Similar to the findings for completed suicides, local restaurant densities were negatively related to suicide attempt rates (Johnson et al., 2009).

Zalcman and Mann (2007) examined the impact of privatization of alcohol retail sales in Alberta, Canada on suicide mortality rates. Privatization of alcohol retail sales took place over three stages: the opening of privately owned wine stores in 1985, the opening of privately owned cold beer stores and the selling of spirits and wine in hotels in the rural area in 1989-90, and final privatization of all liquor stores in 1994. They found that privatization events were associated with either temporary or permanent increases in suicide mortality rates.

Giesbrecht et al. (2015) recently examined the relationships between alcohol outlet density and socio-demographic characteristics among alcohol positive suicide decedents in several U.S. racial/ethnic groups. They found that county-level on- and off-premise density are associated with alcohol-related suicide, especially among American Indians/Alaska Natives. Research studies have also pointed to a link between drug and alcohol use and an increased risk of becoming a victim of homicide. Adolescents who live in a family or neighbourhood environment where alcohol and drugs are present may be at an increased risk for becoming a victim of homicide regardless of their own alcohol consumption (Hohl et al., 2017). Hohl and colleagues (2017) conducted a population-based case-control study of 13- to 20-year-olds who were victims of firearm homicide in Philadelphia from January 2010 to December 2012. The study focused on firearm homicides as they account for almost all homicide cases in Philadelphia and aimed to examine alcohol and drug-related risk factors for becoming a homicide victim. The authors found that after adjusting for age, race, school suspensions, history of prior arrest and ethnicity, firearm homicides were 3.2 times as likely in locations with high alcohol outlet density as those with low alcohol outlet density (Hohl et al., 2017).

Alcohol Availability, Alcohol Consumption and Alcohol-Related Harm Among Deprived Neighbourhoods

Alcohol Outlet Density and Neighbourhood Socioeconomic Status (SES)

Berke et al. (2010) examined whether the geographic density of alcohol retailers was greater in more deprived geographic areas in U.S. They found that retail alcohol density was associated with poverty, education, and race/ethnicity at the census tract level in urban areas throughout the continental U.S. Higher proportions of families living in poverty, higher proportions of residents of black race and latino ethnicity, and overall lower education attainment among neighbourhood residents were associated with higher density of alcohol retail outlets per 1000 population. An earlier U.S. based study also found that the most deprived neighbourhoods had the highest density of alcohol outlets; however, those living in *less deprived* areas had the highest levels of heavy alcohol consumption, even after controlling for a range of individual sociodemographic characteristics (Pollack, Cubbin, Ahn, & Winkleby, 2005).

Similar to the above-mentioned U.S. studies, a study based in New Zealand also found higher outlet densities in more deprived areas (Huckle, Huakau, Sweetsur, Huisman, & Casswell, 2008). A study in Glasgow, Scotland found that while some deprived areas contained the highest concentration of outlets, others in similar deprivation quintiles had very few. This study suggested that the relationship between deprivation and outlet

density may be different in different locations (Ellaway, Macdonald, Forsyth, & Macintyre, 2010).

Shortt et al. (2015) studied availability of both alcohol and tobacco outlets in Scotland, UK. They found that more socially-deprived neighbourhoods in Scotland had the highest densities of both tobacco and off-premise alcohol outlets. In contrast, the least deprived neighbourhoods had the lowest density of tobacco and both off-premise and on-premise alcohol outlets.

Alcohol Consumption and Neighbourhood Socioeconomic Status (SES)

Alcohol consumption is closely associated with the burden of alcohol-related harms across the globe. A number of factors, such as alcohol availability, age, gender, marital status, rurality, ethnicity, and socioeconomic status (SES) may influence alcohol consumption (Roche, Kostadinov, Fischer, & Nicholas, 2015). There is a close correlation between countries' per capita purchasing power and alcohol consumption; that is, more people afford to purchase alcohol and consume alcohol in countries with greater economic affluence (Schmidt, Mäkelä, Rehm, & Room, 2010).

Studies that have examined the relationship between SES and alcohol consumption have often found that lower SES groups drink more heavily and higher SES groups drink more frequently (Huckle, You, & Casswell, 2010). Recent Canadian Community Health Survey, however, showed that heavy drinking in Canada followed an income gradient; men in higher-income groups reported the highest rates of heavy drinking in

2014 (CIHI, 2017). A similar pattern of increased rates of heavy drinking with higher income was also observed among Canadian women, although the differences were not statistically significant (CIHI, 2017). The relationship between SES and drinking is complex and factors such as education levels, income and gender may influence this relationship (Giskes, Turrell, Bentley, & Kavanagh, 2011; Bloomfield, Grittner, Kramer, & Gmel, 2006). Furthermore, different measures of SES, such as individual-level SES, small-area or neighbourhood deprivation, and country-level SES may influence consumption levels differently (Fone, Farewll, White, Lyons & Dunstan, 2013; Mulia & Karriker-Jaffe, 2012; Grittner, Kuntsche, Gmel, & Bloomfield, 2013). Consequently, level and pattern of alcohol consumption cannot be predicted from SES alone and many other factors must be taken into account (Roche, Kostadinov, Fischer, & Nicholas, 2015).

Grittner, Kuntsche, Gmel, and Bloomfield (2013) examined the relationship of individual socioeconomic status (SES) and country-level characteristics on individual alcohol consumption in 33 countries. Individual SES was measured by highest attained educational level. They used ‘drinking status’ and monthly ‘risky single occasion drinking (RSOD)’ as indicators for alcohol use. Individuals who had drunk any alcohol during the last 12 months were considered current drinkers. They noted that the definition of RSOD varied among different countries but in most countries it was defined as consuming ≥ 60 grams of pure alcohol on a single occasion. Purchasing Power Parity of the gross national income and the Gini coefficient (an indicator of income

disparity) were used to describe the economic development of the countries. Gender Gap Index was chosen as an indicator for gender equality (Grittner et al., 2013). They found that for both genders and in all countries, those with higher education were more likely to be current drinkers. They also noted a higher proportion of drinkers in high-income countries. Men with less education were more likely to engage in risky episodic drinking. They observed two opposing patterns for the likelihood of women engaging in risky episodic drinking: In low income countries, women of higher education were more likely to engage in RSOD; whereas, in higher income countries, women with lower education were more likely to be RSO drinkers (Grittner et al., 2013).

Lewer, Meier, Beard, Boniface and Kaner (2016) examined social distribution of 'extreme alcohol consumption; they looked at two types of drinking behavior: heavy weekly drinking (the total drinking across a week), and heavy episodic drinking (the maximum in any one day in the past week). They found that low SES groups were more likely to report extreme drinking, although they were less likely to exceed recommended limits for weekly and episodic drinking compared to high SES groups. The authors concluded that the higher prevalence of more extreme heavy drinkers among low SES groups may at least in part explain why these individuals are more likely to experience greater alcohol-related harm (Lewer et al., 2016).

In a large U.S. based study, Brenner et al. (2015) examined whether changes in neighbourhood socioeconomic status (SES) and alcohol outlet density over time were associated with current, weekly, and heavy daily alcohol consumption. They also

examined different types of alcohol use. They found that improvements in neighbourhood socioeconomic context were associated with decreases in the prevalence of current alcohol use and weekly beer consumption. Their findings demonstrated that changes in neighbourhood SES have implications for alcohol use.

Collins (2016) synthesized the findings from a large number of studies that have examined the associations between SES, alcohol use and alcohol-related outcomes, using a variety of approaches (e.g., cross-sectional vs. longitudinal studies, meta-analyses vs. summary reviews, population-based vs. individual-level studies). Most studies in this review reported a positive association between SES and alcohol use, that is, individuals with higher SES (or living in areas with higher SES) engage in more frequent and heavier drinking. Since individual-level variables such as drinking status, gender, race, and ethnicity may moderate the relationship association between SES and alcohol use, Collins (2016) recommends that future studies simultaneously examine these variables to identify their potential roles as moderators. Table 1 and Table 2 are Collins' summaries of the findings from meta-analyses and reviews (Table 1), as well as, population-based studies (Table 2) that have examined the association between SES, alcohol use and alcohol outcomes.

Alcohol-Related Harm and Neighbourhood Socioeconomic Status (SES)

Cross-sectional surveys have shown that lower SES groups report drinking the same or less on average than higher SES groups, and are more likely to report abstaining altogether (Robinson & Harris, 2011; Jefferis, Manor, & Power, 2007). Despite their

lower or similar alcohol consumption, people of low SES experience greater alcohol-related morbidity and mortality (Castillo-Carniglia, Kaufman, & Pino, 2014; Connolly, O'Reilly, Rosato, & Cardwell, 2011; Jones, Gates, McCoy, & Bellis, 2015; Lewer, et al., 2016). The phenomenon of experiencing more alcohol-related problems despite consuming less alcohol has been referred to as Alcohol Harm Paradox (Smith & Foster, 2014). It is important to mention that socioeconomic disadvantage increases affected individuals' risk of dying due to all causes; however, risk of dying due to alcohol-attributable causes appears to be especially pronounced (Probst, Roerecke, Behrendt, & Rehm, 2014). Alcohol harm paradox and has been observed in many countries including the UK (Alcohol Research UK, 2015), Australia (Livingston, 2014), the Netherlands (van Oers, Bongers, van de Goor, & Garretsen, 1999), Finland (Paljärvi, Suominen, Car, & Koskenvuo, 2013), and Canada (CIHI, 2017, p.17). As cited in Jones et al. (2015), some of the mechanisms proposed for the association between risk of alcohol-attributable disease and SES include: "(i) differences in drinking behaviors, including quality of the alcohol consumed; (ii) interaction through clustering of risky lifestyle behaviors, such as heavy alcohol use and smoking; and (iii) differential access to healthcare" (p. 12). The authors also cited "differences in the availability of social support; drinking context; i.e., where and with whom drinking occurs; and neighbourhood deprivation, acting both independently of, and in interaction with, individual SES" as other possible mechanisms for greater vulnerability of low SES individuals to the damaging effects of alcohol (Jones et al., 2015, p.12). It has also been hypothesized that rather than alcohol harm paradox being true, low SES groups

may actually drink more than their affluent counterparts but underestimate their consumption due to various reasons (e.g., poor recall of drinks per drinking session, underestimation of drink size, forgetting their drinking occasions). Whether more deprived individuals are more likely to under-report their actual alcohol consumption needs to be further explored as current evidence to support this hypothesis is limited (Bellis et al., 2016).

The literature pertaining to alcohol-harm paradox is voluminous and evolving; in the following section, a snapshot of some of the recent literature that has examined the potential reasons for this observed paradox is provided.

Jones et al (2015) recently conducted a systematic review to identify published studies that have examined the association between socioeconomic factors and development of alcohol-attributable conditions. They investigated the relationship between SES and risk of mortality or morbidity for different alcohol-attributable conditions, they also explored whether alcohol consumption mediated the relationship between SES and alcohol-related harm. They identified different relationships between alcohol-attributable conditions and socioeconomic indicators. For instance, they found that poverty was associated with an increased risk of head and neck cancer and stroke, and in individual studies, with hypertension and liver disease. Risk of female breast cancer, however, tended to be associated with higher socioeconomic status. Although they were able to describe the relationship between SES and a range of alcohol-attributable conditions, they could not fully characterize the association between SES, alcohol consumption,

and alcohol-attributable disease risk due to scarcity of available evidence (Jones et al, 2015).

Katikireddi, Whitley, Lewsey, Gray, and Leyland (2017) recently conducted a study to examine different explanations of the alcohol harm paradox. This study linked self-reported alcohol use in a series of large Scottish population surveys conducted between 1995 and 2012 with health records for alcohol-related death, hospital admissions and treatment. They gathered detailed data for alcohol use, socioeconomic status, and major risk factors for premature death and morbidity. By linking their survey data with health-care records for alcohol-related deaths, hospital admissions, and treatment, they were able to obtain two composite measures of alcohol-related mortality and alcohol-related morbidity. They examined several dimensions of socioeconomic status (e.g., education, social class, deprivation and income) and found consistent results across all SES dimensions. They found that alcohol-attributable harms are far higher in disadvantaged social groups, even when accounting for differences in consumption and binge drinking and irrespective of which measure of socioeconomic status is used. The observed inequalities in alcohol-attributable harms were not due to differences in smoking or BMI, which they controlled for. The authors also assessed the role of ‘downward social mobility’ or ‘reverse causation’; i.e., whether high-risk consumption leads to social disadvantage. To do this, they excluded probable problem drinkers, i.e., those who had been admitted for an alcohol-attributable condition before baseline samples were taken from their initial samples. They used area-based

measures of social disadvantage derived from postal codes of residence to assess the extent of downward social mobility over time. Katikireddi and colleagues found very little evidence for reverse causation as an explanation of inequalities in the whole sample or among drinkers (Katikireddi et al., 2017).

The most recent data from the Canadian Institute for Health Information (CIHI) also demonstrate the existence of inequities in alcohol-related harm across Canada. Compared with Canadians living in the highest-income neighbourhoods, those residing in deprived neighbourhoods in 2015-2016 had higher rates of hospitalizations entirely caused by alcohol (CIHI, 2017). The income-related differences in alcohol-caused hospitalizations was most pronounced in Alberta where poorest neighbourhoods had 3.8-fold greater rates for hospitalizations due to conditions entirely caused by alcohol compared to Alberta's most affluent neighbourhoods (CIHI, 2017). Despite lower prevalence of heavy drinking among lower income Canadians, they had significantly higher rates for hospitalizations entirely caused by alcohol (CIHI, 2017).

To explain the observed alcohol-harm paradox, the authors argued that it is possible that those living in deprived neighbourhoods are more susceptible to the consequences of living with lower income. Individuals with lower income tend to experience higher stress levels while having fewer social support networks and fewer resources to cope, they also have other risk factors such as poorer diet and physical inactivity (CIHI, 2017). Furthermore, those in poorer neighbourhoods may have greater exposure to unsafe

drinking settings, different beverage choices and higher frequency of binge drinking (CIHI, 2017).

Studies reviewed by Collins (2016) also found that overall lower SES groups experience higher levels of alcohol-related harm, including alcohol-related mortality compared to higher SES groups with the same level of alcohol consumption. Studies also point to the importance of economic and social inequalities and their secondary effects in moderating the relationship between alcohol consumption and alcohol-related harm. However, the mechanisms underlying these complex relationships are not fully understood and need to be further explored (Collins, 2016).

Strategies to Reduce Alcohol-Related Harm

A number of individual-level and societal-level strategies can address factors that affect alcohol consumption and alcohol outcomes. Alcohol Screening, Brief Intervention and Referral (SBIR), for example, is an individual-level strategy that has been shown to reduce alcohol-related harm in at-risk individuals; i.e., those who are alcohol-dependent or engage in excessive and hazardous drinking (CIHI, 2017). A recent systematic review found that brief intervention was effective at reducing alcohol-related problems across 56 trials and a wide range of patients in primary healthcare (O' Donnell et al., 2014).

Population-level alcohol policies aim to regulate the availability and accessibility of alcohol, and as such are societal-level strategies that can address alcohol consumption

and outcomes. Alcohol control systems by which governments regulate the sale and distribution of alcohol, physical availability regulations (e.g., setting hours of sale and measures to reduce the number of alcohol outlets, and pricing policies (e.g., minimum pricing, restricting discounts and taxation) are all examples of societal-level strategies (CIHI, 2017).

According to CIHI (2017), alcohol pricing policies, which aim to make alcohol less affordable and screening for heavy drinking are among the most effective strategies for reducing alcohol harm. Effectiveness of minimum unit pricing (MUP) policy in decreasing alcohol-related mortality was recently demonstrated in British Colombia, Canada. Zhao et al. (2013) studied relationships between periodic increases in minimum alcohol prices, changing densities of liquor stores and alcohol-attributable deaths in British Columbia, Canada. They found that increases in the minimum price of alcohol between 2002 and 2009 were associated with immediate and delayed decreases in alcohol-attributable mortality. More specifically, a 10% increase in minimum alcohol price resulted in a 32% fall in deaths directly attributable to alcohol. Increases in the density of private liquor stores, on the other hand, were associated with increases in alcohol-attributable death (Zhao et al., 2013).

In another Canadian study, Stockwell and colleagues (2017) assessed the impacts of changes to Saskatchewan's minimum alcohol-pricing regulations between 2008 and 2012 on selected alcohol-attributable crimes. They found that the increase in minimum alcohol prices was associated with an immediate decrease in night-time alcohol-related

traffic offences for men. There were no significant immediate changes in non-alcohol-related driving offences, disorderly conduct or violence. They also observed delayed but significant reductions in alcohol-related violent crimes.

Concluding Remarks

In this report, we first summarized findings from recent literature regarding associations between alcohol outlet density and alcohol consumption, as well as, alcohol related harms. We then provided an overview of the recent literature that has examined the relationships between socioeconomic status (SES) and alcohol consumption and alcohol-related harms. Alcohol-related harms reviewed in this report included alcohol-related hospitalizations and death, various types of violent and non-violent crimes, suicide and homicide, and liver cirrhosis.

The methodological limitations in the alcohol research literature are extensive and their examination is beyond the scope of this literature review. However, it is important to be mindful of potential limitations when interpreting the findings of different studies. The majority of articles are cross-sectional. This type of study cannot establish causation and does not permit changes in health-related or social measures to be directly attributed to alcohol outlet density, sales concentration, or consumption. Additionally, in the survey-based research studies, self-report issues such as recall bias, underestimation of alcohol consumption and social desirability bias may affect study findings. Other limitations in the alcohol research literature include publication bias,

ambiguities related to outlet type classifications, non-standardized measures for alcohol consumption across studies, etc.

Studies that examine the association between alcohol outlet density and alcohol-related harms can show the impact of changes to alcohol outlet density on health and social outcomes. These studies may help determine whether additional controls on alcohol outlet density are needed to reduce the risk of alcohol-attributable harms in high-density areas. It is of note that the spatial distribution of alcohol outlets and alcohol-attributable harms may vary by the type of harm being studied (e.g., violent crime vs. alcohol-impaired driving), which can complicate the analyses of the relationships between outlet density and harm (CDC, 2017). Despite limitations of alcohol research, some conclusions can be drawn from the reviewed studies. Overall, the studies included in this review point to an association between alcohol outlet density and alcohol consumption, as well as a variety of alcohol related harms. Studies examining the relationship between SES, alcohol consumption and alcohol-related harms, have generally found that for a given level of consumption, lower SES groups tend to experience higher levels of alcohol-attributable harm than higher SES groups. To reduce inequities in alcohol-related harm, WHO (2014) recommends a comprehensive approach that can address both the consequences and the root causes of inequities. We conclude this review with WHO's key policy recommendations for addressing inequities in alcohol-related harm:

- A comprehensive approach to reducing inequities in alcohol-related harm requires addressing the consequences and the root causes of inequities, and acting on both individuals and environments.
- Increasing the price of alcohol is the most promising policy intervention to reduce social inequities in alcohol-related harm.
- Local measures to reduce the availability of alcohol can reduce the excess burden of alcohol related harm in high-risk communities. This includes restricting times, locations and quantities of alcohol purchases. Zoning and licensing measures can be more fully utilized to ensure that disadvantaged areas are not exposed to a higher density of alcohol outlets.
- Income, employment and education are all factors that protect against alcohol-related harm – social protection policies can protect against the adverse impact of economic shocks and unemployment.
- Differential access to and treatment within the health system contribute to inequities in alcohol-related harm. Actions to address this include: reducing financial, geographical and cultural barriers to accessing primary care and alcohol treatment services for groups experiencing disproportionate alcohol-related harm; ensuring that people from groups vulnerable to alcohol-related harm are identified and offered brief advice interventions in primary care settings; boosting social support and post-discharge care for

people engaging in harmful alcohol consumption who are also experiencing other social disadvantages.

- Consequences of harmful alcohol use are more severe for those already experiencing social exclusion. Harm reduction measures, such as safe places to sober up and community patrols can reduce inequitable consequences. (WHO, 2014, p. 19)

Table 1. Summary of Meta-Analyses and Reviews of Cross-National Studies Reporting on the Association between Socioeconomic Status (SES) and Alcohol Outcomes (Collins, 2016)

Authors	Type	Number of Studies Included	Variables Analyzed	Main Findings Regarding the Association Between SES and Alcohol Outcomes
Bryden et al. 2013	Systematic review	48	Association between community-level social factors and alcohol use among adults and adolescents	• Findings were inconclusive for associations between alcohol use and deprivation, poverty, income, unemployment, social disorder, and crime. • Social-capital characteristics (e.g., social support, community cohesion, social participation, supportiveness) may protect against alcohol use.
Fazel et al. 2008	Meta-analysis	29 (*n* = 5,684)	Prevalence of psychiatric disorders among homeless people	• Prevalence of psychiatric disorders varied greatly among studies. • The most common psychiatric disorders were alcohol dependence (prevalence 8.1 to 58.5 percent) and drug dependence (prevalence 4.5 to 54.2 percent).
Grittner et al. 2012	Meta-analysis	Survey data from 42,655 individuals in 25 countries participating in the Gender, Alcohol and Culture: An International Study (GENACIS)	Association of country-level characteristics and individual SES and individual alcohol-related consequences	• Lower gross national income was associated with more social problems in men. • Lower educational attainment was associated with more reported alcohol-related consequences at comparable drinking levels in both men and women.

Karriker-Jaffe 2011	Systematic review	41; 34 studies used for main analysis	Association between area-level disadvantage and substance use	• Strong evidence suggested that substance-use outcomes cluster by geographic area. • There was limited/conflicting support that area-level disadvantage is associated with increased substance use. • The association between area-level disadvantage and substance use seemed to vary according to age, ethnicity, size of area examined, type of SES measure, specific outcome analyzed, and analysis techniques.
Probst et al. 2014	Meta-analysis	15	Association between SES and alcohol-related mortality vs. all-cause mortality	• For both men and women, lower SES was associated with 1.5- to 2-times-higher alcohol-related mortality compared with all-cause mortality. • Alcohol consumption and SES interacted to lead to greater harm in people with lower SES even at comparable levels of alcohol consumption.
Richardson et al. 2013	Meta-analysis	65, including 5 studies (*n* = 26,706) assessing problem drinking	Association between personal, unsecured debt and health outcomes (e.g., various mental disorders, suicide attempt or completion, problem drinking, drug dependence)	• Most studies found that more debt is related to worse health (i.e., increased odds of mental disorders, alcohol and drug dependence, suicide attempt or completion). • A significant relationship existed between debt and problem drinking (odds ratio = 2.68).
Wiles et al. 2007	Systematic review	19 longitudinal studies	Association between childhood SES and alcohol use later in life	• Evidence indicated only weak and inconsistent associations between lower childhood SES and later alcohol use and abuse.

Table 2. Summary of the Design and Main Findings of Population-Based Studies Concerning the Association between Socioeconomic Status (SES) and Alcohol Outcomes (Collins, 2016)

Authors	Type; Country of Study	Number of Participants	Variables Analyzed	Main Findings Regarding the Association Between SES and Alcohol Outcomes
Berg et al. 2013	Longitudinal; Finland	1,334	Association between drinking trajectories and adult health and socioeconomic disadvantage	• Among Finnish men, those with a steady high or increasing drinking trajectory had an increased risk of experiencing health and economic disadvantage. • Among Finnish women, those with a steady high drinking trajectory had an increased risk of almost all health and economic disadvantages.
Blomgren et al. 2004	Cross-sectional; Finland	1.1 million	Association between individual-level and area-level SES characteristics and alcohol-related mortality	• Individual-level socioeconomic and cultural factors were protective against alcohol-related mortality. • Some, but not all, area-level factors were protective against alcohol-related mortality. • Individual-level SES factors had a greater impact than area-level factors.
Centers for Disease Control and Prevention 2012	Cross-sectional; United States	457,677	Prevalence, frequency, and intensity of heavy episodic drinking (HED) and influence of various sociodemographic variables	• Overall prevalence of HED was 17.1 percent; among binge drinkers the average frequency was 4.4 episodes per month and the average intensity was 7.9 drinks per occasion. • With respect to household income, binge-drinking prevalence was highest among those with the highest income (> $75,000), but frequency and intensity were highest among those with the lowest income (< $25,000).

Collins et al. 2012	Longitudinal; United States	95	Association between project-based Housing First and alcohol-use trajectories among homeless people	• Time spent in low-barrier, non–abstinence-based, permanent, supportive housing (Housing First model) was associated with declining alcohol use. • Greater number of months spent in housing predicted additional decreases in alcohol use.
Compton et al. 2014	Cross-sectional; United States	Ca. 405,000	Association between employment status and alcohol and other drug outcomes	• Unemployment was associated with higher rates of heavy alcohol use, past-year alcohol and other drug abuse/dependence, and past-month tobacco and illicit drug use. • Marked increases in unemployment rates during the recent recession did not moderate these associations.
Fothergill and Ensminger 2006	Longitudinal; United States	1,242	Association between childhood/adolescent antecedents and adult alcohol and drug problems in African Americans	• Educational attainment was associated with reduced risk of substance-use problems.
Galea et al. 2007	Cross-sectional; United States	1,355	Association between neighbourhood income and income distribution and prevalence and frequency of alcohol and other drug use	• Neighbourhoods with both the highest income and the highest income maldistribution had the highest prevalence of alcohol use. • On an individual level, both high neighbourhood income and income maldistribution were associated with greater likelihood of alcohol use as well as with greater frequency of alcohol use.
Karriker-Jaffe et al. 2012	Cross-sectional; United	13,864	Association between neighbourhood disadvantage and	• Neighbourhood disadvantage was significantly associated with increased abstinence among all groups except for African-American and

	States		alcohol outcomes (drinking, heavy drinking, alcohol-related consequences, dependence)	Hispanic/Latino men. • Neighbourhood disadvantage was inversely associated with heavy drinking for White drinkers but positively associated with heavy drinking for African-American drinkers. • Neighbourhood disadvantage was marginally associated with elevated alcohol-related consequences among those who do drink, particularly among African-American men and White women.
Karriker-Jaffe et al. 2013	Cross-sectional; United States	13,997	Association between State-level income inequality (Black–White and Hispanic–White poverty ratios) and alcohol outcomes	• Higher Black–White poverty ratios were associated with higher levels of light and heavy drinking among Whites and Blacks. • Higher Black–White poverty ratios were associated with increased alcohol-related consequences and dependence for Blacks. • Higher Hispanic–White poverty ratios were associated with higher levels of light drinking by Whites and Hispanics. • Higher Hispanic–White poverty ratios were associated with increased alcohol-related consequences and dependence for Hispanics.
Melchior et al. 2006	Longitudinal; France	20,570	Association between socioeconomic trajectory and mortality	• Steadily disadvantaged SES or downward SES trajectory increased risk of premature all-cause mortality. • Alcohol consumption was one of the factors explaining this association.

Mulia and Karriker-Jaffe 2012	Cross-sectional; United States	8,728	Association between neighbourhood and individual SES and alcohol use and alcohol-related problems	• For men with low SES, living in a neighbourhood with a high SES was associated with increased risk drinking, intoxication, and alcohol-related problems. • For women, living in a neighbourhood with low SES was associated with increased risk of alcohol problems, but no interactions existed with individual SES.
Mulia et al. 2008	Cross-sectional; United States	6,631	Association between social disadvantage (poverty level, frequency of unfair treatment, racial/ethnic stigma consciousness) and alcohol outcomes (drinking, at-risk drinking, problem drinking)	• Blacks and Hispanics reported greater exposure to social disadvantage than Whites. • In all groups, exposure to social disadvantage was associated with problem drinking. • Frequent unfair treatment, high racial stigma, and extreme disadvantage was associated with 2 to 6 times greater experience of alcohol problems. • The association can be partially explained by psychological distress.
Mulia et al. 2014	Cross-sectional; United States	5,382	Association between types of economic loss and alcohol outcomes	• Severe economic loss (job, housing) was positively associated with negative drinking consequences, alcohol dependence, and, marginally, with intoxication. • Moderate economic loss (retirement savings, reduced hours/wages, trouble paying bills) was unassociated with alcohol outcomes. • Gender and age moderated these associations.
Murphy et	Cross-sectional;	5,307	Association between housing instability	• Both unstable and lost housing were associated with more alcohol problems and alcohol

al. 2014	United States		and alcohol outcomes (social, legal, work-related, health, injuries/accidents) during the 2007–2009 U.S. recession	dependence symptoms. • Perceived family support moderated the associations. Greater family support was associated with fewer alcohol problems, irrespective of housing instability. • Job loss was not associated with alcohol outcomes if housing instability was included in the analysis.
Nandi et al. 2014	Cross-sectional; United States	8,037	Associations between SES, health behaviors (drinking, smoking, physical inactivity), and all-cause mortality	• Being in the subpopulation with the lowest SES was associated with increased mortality. • Drinking, smoking, and physical inactivity accounted for about two-thirds of the increased mortality risk.
Patrick et al. 2012	Cross-sectional; United States	1,203	Association between family SES (income, wealth, parental education) and substance use (drinking, smoking, marijuana use) in young adults	• Alcohol and marijuana use in young adults were associated with higher family SES. • HED in young adults was most strongly predicted by greater family wealth. • Smoking in young adults was associated with lower family SES.
Platt et al. 2010	Longitudinal; United States	6,787	Association between drinking trajectories and various personal characteristics in older adults	• Alcohol consumption declined for most adults studied, with substantial variation in the rate of decline; in a minority, alcohol consumption increased. • High SES (affluence, high educational attainment) was associated with increasing

				alcohol consumption over time.
Poonawalla et al. 2014	Longitudinal; United States	1,356	Association of changes in family income with adolescent alcohol use and smoking	• Family income trajectory was associated with past-year alcohol use at age 15 and ever-smoking at age 15. • Children of families with declining SES were more likely to drink than were children from the most advantaged and most disadvantaged families.
Popovici and French 2013	Cross-sectional; United States	43,093	Association between employment status and alcohol outcomes	• Job loss during the past year was positively associated with average daily alcohol consumption, frequency of HED, and alcohol abuse or dependence.
Tompsett et al. 2013	Longitudinal; United States	371	Association between substance abuse, affiliation with substance-using peers, and homelessness	• Recent homelessness and affiliation with alcohol-using friends was associated with increased risk of alcohol abuse. • The influence of alcohol-using friends on alcohol abuse decreased over time. • The duration of initial homelessness did not influence substance abuse over time.
Zemore et al. 2013	Cross-sectional; United States	5,382	Associations among race/ethnicity, economic loss, and drinking	• After experiencing severe economic loss, Blacks were more likely to experience alcohol-related problems and alcohol dependence compared with Whites. • The associations between economic loss and alcohol outcomes were weak/ambiguous for Hispanics.

References

Alberta Health Services. (2008). Alberta Alcohol Strategy. Edmonton, AB: Author.

Alcohol Research UK. (2015). Understanding the alcohol harm paradox. United Kingdom: Author.

Ahern, J., Margerison-Zilko, C., Hubbard, A., & Galea, S. (2013). Alcohol outlets and binge drinking in urban neighborhoods: The implications of nonlinearity for intervention and policy. *American Journal of Public Health*, *103*(4), e81-87.

Ayuka F., Barnett R., & Pearce J. (2014). Neighbourhood availability of alcohol outlets and hazardous alcohol consumption in New Zealand. *Health & Place, 29*, 186–199.

Azar, D., White, V., Coomber, K., Faulkner, A., Livingston, M., Chikritzhs, T., ... Wakefield, M. (2016). The association between alcohol outlet density and alcohol use among urban and regional Australian adolescents. *Addiction, 111*(1), 65-72. doi:10.1111/add.13143

Badland, H., Mavoa, S., Livingston, M., David, S., & Giles-Corti, B. (2016). Testing spatial measures of alcohol outlet density with self-rated health in the Australian context: Implications for policy and practice. *Drug and Alcohol Review, 35*, 298-306.

Bagnardi, V., Rota, M., Botteri, E., Tramacere, I., Islami, F., Fedirko, V., … La Vecchia, C. (2015). Alcohol consumption and site-specific cancer risk: a comprehensive dose–response meta-analysis. *British Journal of Cancer, 112*(3), 580–593. doi:10.1038/bjc.2014.579

Bernasco, W., & Block, R. (2011). Robberies in Chicago: a block-level analysis of the influence of crime generators, crime attractors, and offender anchor points. *Journal of Research in Crime and Delinquency, 48*, 33–57.

Bellis, M.A., Hughes, K., Nicholls, J., Sheron, N., Gilmore, I., & Jones, L. (2016). The alcohol harm paradox: using a national survey to explore how alcohol may disproportionately

impact health in deprived individuals. *BMC Public Health, 16*, 111, 1-10. doi:10.1186/s12889-016-2766-x

Bernasco, W., Block, R., & Ruiter, S. (2013). Go where the money is: modeling street robbers' location choices. *Journal of Economic Geography, 13*, 119–143.

Berke, E.M., Tanski, S.E., Demidenko, E., Alford-Teaster, J., Shi, X., & Sargent, J.D. (2010). Alcohol retail density and demographic predictors of health disparities: a geographic analysis. *American Journal of Public Health, 10*,1967–1971. doi:10.2105/AJPH.2009.170464

Bloomfield, K., Grittner, U., Kramer, S., & Gmel, G. (2006). Social inequalities in alcohol consumption and alcohol-related problems in the study countries of the EU concerted action 'Gender, Culture and Alcohol Problems: A Multi-National Study'. *Alcohol and Alcoholism, 41* (1), i26-i36

Branas, C. C., Elliott, M. R., Richmond, T. S., Culhane, D. P., & Wiebe, D. J. (2009). Alcohol Consumption, Alcohol Outlets, and the Risk of Being Assaulted With a Gun. *Alcoholism, Clinical and Experimental Research, 33*(5), 906–915. doi:10.1111/j.1530-0277.2009.00912.x

Brenner, A. B., Borrell, L.N., Barrientos-Gutierreze, T., & Diez Roux, A.V. (2015). Longitudinal associations of neighborhood socioeconomic characteristics and alcohol availability on drinking: Results from the Multi-ethnic Study of Atherosclerosis (MESA). *Social Science & Medicine, 145*, 17–25. doi:10.1016/j.socscimed.2015.09.030.

Britt, H., Toomey, T. L., Dunsmuir, W., & Wagenaar, A. C. (2006). Propensity for and correlates of alcohol sales to underage youth. *Journal of Alcohol and Drug Education, 50*(2), 25-42.

Bruha, R., Dvorak, K., & Petrtyl, J. (2012). Alcoholic liver disease. *World Journal of Hepatology, 4*(3), 81–90. doi:10.4254/wjh.v4.i3.81

Bryden A., Roberts B., McKee M., & Petticrew M. (2012). A systematic review of the influence on alcohol use of community level availability and marketing of alcohol. *Health & Place, 18*, 349–57.

Bryere, J., Pornet, C., Copin, N., Launay, L., Gusto, G., Grosclaude, P., … Launoy, G. (2017). Assessment of the ecological bias of seven aggregate social deprivation indices. *BMC Public Health, 17*, 86. doi:10.1186/s12889-016-4007-8

Cameron, M. P., Cochrane, W., McNeill, K., Melbourne, P., Morrison, S. L., & Robertson, N. (2012). Alcohol outlet density is related to police events and motor vehicle accidents in Manukau City, New Zealand. *Australian and New Zealand Journal of Public Health, 36*, 537–542. doi:10.1111/j.1753-6405.2012.00935.x

Canadian Institute for Health Information. (2017). *Alcohol harm in Canada: Examining hospitalizations entirely caused by alcohol and strategies to reduce alcohol harm*. Ottawa, ON: Author.

Castillo-Carniglia, A., Kaufman, J.S., & Pino, P. (2014). Small area associations between social context and alcohol-attributable mortality in a middle-income country. *Drug and Alcohol Dependence, 137*, 129–36.

Cavanagh, J.T., Carson, A.J., Sharpe, M., & Lawrie, S.M. (2003). Psychological autopsy studies of suicide: a systematic review. *Psychological Medicine, 33*, 395–405

Centre for Disease Control and Prevention. (2017). *Guide for Measuring Alcohol Outlet Density*. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services. Retrieved from: https://www.cdc.gov/alcohol/pdfs/CDC-Guide-for-Measuring-Alcohol-Outlet-Density.pdf

Chen, M. J., Grube, J. W., & Gruenewald, P. J. (2010). Community alcohol outlet density and underage drinking. *Addiction, 105*, 270-278.

Chikritzhs, T & Stockwell, T. (2002). The impact of later trading hours for Australian public houses (hotels) on levels of violence. *Journal of Studies on Alcohol, 63*, 591–599.

Chikritzhs, T & Stockwell, T. (2006). The impact of later trading hours for hotels on levels of impaired driver road crashes and driver breath alcohol levels, *Addiction, 101*(9), 1254-1264.

Chikritzhs, T & Stockwell, T. (2007). The impact of later trading hours for hotels (public houses) on breath alcohol levels of apprehended impaired drivers*, Addiction, 102*(10), 1609-1617.

Collins, S. E. (2016). Associations Between Socioeconomic Factors and Alcohol Outcomes. *Alcohol Research: Current Reviews, 38*(1), 83–94.

Connolly, S., O'Reilly, D., Rosato, M. and Cardwell, C. (2011), Area of residence and alcohol-related mortality risk: a five-year follow-up study. *Addiction, 106*, 84–92. doi:10.1111/j.1360-0443 .2010.03103.x

Connor, J. (2017). Alcohol consumption as a cause of cancer. *Addiction, 112*, 222–228. doi:10.1111 /add.13477.

Connor, J. L., Kypri, K., Bell, M. L., & Cousins, K. (2011). Alcohol outlet density, levels of drinking and alcohol-related harm in New Zealand: A national study. *Journal of Epidemiology and Community Health, 65*(10), 841-846.

Cunradi C. B. (2010). Neighborhoods, alcohol outlets and intimate partner violence: Addressing research gaps in explanatory mechanisms. *International Journal of Environmental Research and Public Health, 7*, 799-813.

Cunradi, C. B., Mair, C., Ponicki, W., & Remer, L. (2011). Alcohol Outlets, Neighborhood Characteristics, and Intimate Partner Violence: Ecological Analysis of a California City. *Journal of Urban Health: Bulletin of the New York Academy of Medicine, 88*(2), 191–200. doi:10.1007/s11524-011-9549-6

Cunradi, C. B., Mair, C., Ponicki, W. and Remer, L. (2012a), Alcohol Outlet Density and Intimate Partner Violence-Related Emergency Department Visits. *Alcoholism: Clinical and Experimental Research, 36*, 847–853. doi:10.1111/j.1530-0277.2011.01683.x

Dunbar, R.I.M., Launay, J., Wlodarski, R., Robertson, C., Pearce, E., Carney, J., & MacCarron, P. (2017). *Adaptive Human Behavior and Physiology, 3*, 118. doi:10.1007/s40750-016-0058-4

Ellaway, A., Macdonald, L., Forsyth, A., & Macintyre, S. (2010). The socio-spatial distribution of alcohol outlets in Glasgow city. *Health & Place, 16*, 167–72. doi:10.1016 /j.healthplace.2009.08.007

Fone, D. L., Farewell, D. M., White, J., Lyons, R. A., & Dunstan, F. D. (2013). Socioeconomic patterning of excess alcohol consumption and binge drinking: a cross-sectional study of multilevel associations with neighbourhood deprivation. *BMJ Open, 3*(e002337), 1-10.

Fone, D., Morgan, J., Fry, R., Rodgers, S., Orford, S., Farewell, D., … Lyons, R. (2016). Change in alcohol outlet density and alcohol-related harm to population health (CHALICE): A comprehensive record-linked database study in Wales. *Public Health Research, 4*(3).

Giesbrecht, N., Huguet, N., Ogden, L., Kaplan, M. S., McFarland, B. H., Caetano, R., … Nolte, K. B. (2015). Acute alcohol use among suicide decedents in 14 U.S. States: Impacts of off-premise and on-premise alcohol outlet density. *Addiction, 110*(2), 300–307. doi:10.1111/add.12762

Giskes, K., Turrell, G., Bentley, R. and Kavanagh, A. (2011), Individual and household-level socioeconomic position is associated with harmful alcohol consumption behaviours among adults. *Australian and New Zealand Journal of Public Health, 35*, 270–277. doi:10.1111/j.1753-6405.2011.00683.x

Gonzalez, V. M., & Hewell, V. M. (2012). Suicidal Ideation and Drinking to Cope Among College Binge Drinkers. *Addictive Behaviors, 37*(8), 994–997. doi:10.1016/j.addbeh.2012.03.027

Grittner, U., Kuntsche, S., Gme,l G., & Bloomfield, K. (2013). Alcohol consumption and social inequality at the individual and country levels – results from an international study. *The European Journal of Public Health, 23*(2), 332–39.

Grubesic, T.H., Wei, R., Murray, A.T., & Pridemore, W.A. (2016). Comparative approaches for assessing access to alcohol outlets: exploring the utility of a gravity potential approach. *Population Health Metrics, 14*(25), 1-17. doi 10.1186/s12963-016-0097-x

Grubesic, T.H., & Pridemore, W.A. (2011). Alcohol outlets and clusters of violence. *International Journal of Health Geographics, 10*(30), 1-12. doi:10.1186/1476-072X-10-30

Grubesic, T. H., Pridemore, W. A., Williams, D. A., & Philip-Tabb, L. (2013). Alcohol Outlet Density And Violence: The Role Of Risky Retailers And Alcohol-Related Expenditures. *Alcohol and Alcoholism, 48*(5), 613-619. doi:10.1093/alcalc/agt055

Gruenewald, P.J., Freisthler, B., Remer, L., Lascala, E.A., & Treno, A. (2006). Ecological models of alcohol outlets and violent assaults: crime potentials and geospatial analysis. *Addiction. 101*(5), 666-677.

Halonen, J. I., Kivimäki, M., Virtanen, M., Pentti, J., Subramanian, S.V., Kawachi, I. and Vahtera, J. (2013a). Living in proximity of a bar and risky alcohol behaviours: a longitudinal study. *Addiction, 108*, 320–328. doi:10.1111/j.1360-0443.2012.04053.x

Halonen, J. I., Kivimäki, M., Virtanen, M., Pentti, J., Subramanian, S., Kawachi, I., & Vahtera, J. (2013b). Proximity of off-premise alcohol outlets and heavy alcohol consumption: A cohort study. *Drug and Alcohol Dependence, 132*(0), 295–300. doi:10.1016 /j.drugalcdep.2013.02.022

Health Canada. (2014). *Canadian alcohol and drug use monitoring survey*. Ottawa, ON: Government of Canada. Retrieved: https://www.canada.ca/en/health-canada/services/health-concerns/drug-prevention-treatment/drug-alcohol-use-statistics/canadian-alcohol-drug-use-monitoring-survey-summary-results-2012.html

Hohl, B.C., Wiley, S., Wiebe, D.J., Culyba, A.J., Drake, R., & Branas, C.C. (2017). Association of Drug and Alcohol Use With Adolescent Firearm Homicide at Individual, Family, and Neighborhood Levels. *JAMA Internal Medicine, 177*(3), 317–324. doi:10.1001/jamainternmed.2016.8180

Holmes, J., Guo, Y., Maheswaran, R., Nicholls, J., Meier, P. S., & Brennan, A. (2014). The impact of spatial and temporal availability of alcohol on its consumption and related harms: A critical review in the context of UK licensing policies. *Drug and Alcohol Review, 33*(5), 515–525. doi:10.1111/dar.12191

Huckle, T., Huakau, J., Sweetsur, P., Huisman, O., & Casswell, S. (2008). Density of alcohol outlets and teenage drinking: living in an alcogenic environment is associated with higher consumption in a metropolitan setting. *Addiction, 103*, 1614–1621. doi:10.1111/j.1360-0443.2008.02318.x

Huckle, T., You, R., & Casswell, S. (2010). Socio-economic status predicts drinking patterns but not alcohol-related consequences independently. *Addiction, 105*(7), 1192–1202.

Institute of Alcohol Studies. (2013). Alcohol consumption factsheet. London, UK: Author.

Jefferis, B. J. M. H., Manor, O., & Power, C. (2007). Social gradients in binge drinking and abstaining: trends in a cohort of British adults. *Journal of Epidemiology and Community Health, 61*(2), 150–153. doi:10.1136/jech.2006.049304

Jennings, J. M., Milam, A. J., Greiner, A., Curriero, F. C., & Thornton, R. J. (2013). Neighborhood alcohol outlets and the association with violent crime in one Mid-Atlantic city: The implications for zoning policy. *Journal of Urban Health: Bulletin of the New York Academy of Medicine, 91*(1), 62-71.

Jewell, J., & Sheron, N. (2010). Trends in European liver death rates: implications for alcohol policy. *Clinical Medicine, 10*, 259–63.

Johnson, F. W., Gruenewald, P. J., & Remer, L. G. (2009). Suicide and Alcohol: Do Outlets Play a Role? *Alcoholism, Clinical and Experimental Research, 33*(12), 2124–2133. doi:10.1111/j.1530-0277.2009.01052.x

Jones, L., Bates, G., McCoy, E., & Bellis, M. A. (2015). Relationship between alcohol-attributable disease and socioeconomic status, and the role of alcohol consumption in

this relationship: a systematic review and meta-analysis. *BMC Public Health, 15*, 400. doi:10.1186/s12889-015-1720-7

Kaplan, M. S., McFarland, B. H., Huguet, N., Conner, K., Caetano, R., Giesbrecht, N., & Nolte, K. B. (2013). Acute alcohol intoxication and suicide: a gender-stratified analysis of the National Violent Death Reporting System. Injury Prevention, 19(1), 38–43. doi:10.1136/injuryprev-2012-040317

Kavanagh, A. M., Kelly, M. T., Krnjacki, L., Thornton, L., Jolley, D., Subramanian, S. V., & Bentley, R. J. (2011). Access to alcohol outlets and harmful alcohol consumption: A multi-level study in Melbourne, Australia. *Addiction, 106*, 1772-1779.

Katikireddi, S. V., Whitley, E., Lewsey, J., Gray, L., & Leyland, A. H. (2017). Socioeconomic status as an effect modifier of alcohol consumption and harm: analysis of linked cohort data. *Lancet Public Health, 2*, 267-276.

Kearns, M. C., Reidy, D. E., & Valle, L. A. (2014). The role of alcohol policies in preventing intimate partner violence: A review of the literature. *Journal of Studies on Alcohol and Drugs, 76*(1), 21-30.

Kim, H. M., Smith, E. G., Stano, C. M., Ganoczy, D., Zivin, K., Walters, H., & Valenstein, M. (2012). Validation of key behaviourally based mental health diagnoses in administrative data: suicide attempt, alcohol abuse, illicit drug abuse and tobacco use. *BMC Health Services Research, 12*, 18. doi:10.1186/1472-6963-12-18

Lewer, D., Meier, P., Beard, E., Boniface, S., & Kaner, E. (2016). Unravelling the alcohol harm paradox: A population-based study of social gradients across very heavy drinking thresholds. *BMC Public Health, 16,* 599-610

Livingston M. (2008). A longitudinal analysis of alcohol outlet density and assault. Alcoholism: *Clinical and Experimental Research, 32*(6), 1074–1079.

Livingston, M. (2010). The ecology of domestic violence: the role of alcohol outlet density. *Geospatial Health, 5*(1), 139-149. doi:10.4081/gh.2010.194

Livingston, M. (2011a). A longitudinal analysis of alcohol outlet density and domestic violence. *Addiction, 106*, 919-925.

Livingston, M. (2011b). Alcohol outlet density and harm: Comparing the impacts on violence and chronic harms. *Drug and Alcohol Review, 30*, 515–523. doi:10.1111/j.1465-3362.2010.00251.x

Livingston. M., (2014). Socioeconomic differences in alcohol-related risk-taking behaviours. *Drug and Alcohol Review, 33*, 588–595. doi:10.1111/dar.12202

Livingston M., Chikritzhs T., & Room R. (2007). Changing the density of alcohol outlets to reduce alcohol-related problems. *Drug and Alcohol Review, 26*, 557–566.

McKinney, C. M., Caetano, R., Harris, T. R. and Ebama, M. S. (2009), Alcohol Availability and Intimate Partner Violence Among US Couples. *Alcoholism: Clinical and Experimental Research, 33*, 169–176. doi:10.1111/j.1530-0277.2008.00825.x

Mulia, N., & Karriker-Jaffe, K. (2012). Interactive influences of neighborhood and individual socioeconomic status on alcohol consumption and problems. *Alcohol and Alcoholism, 47*(2):178–86.

National Alcohol Strategy Working Group. (2007). *Reducing alcohol-related harm in Canada: Toward a culture of moderation: Recommendations for a national alcohol strategy*. Ottawa, ON: Canadian Centre on Substance Abuse.

O'Donnell, A., Anderson, P., Newbury-Birch, D., Schulte, B., Schmidt, C., Reimer, J., & Kaner, E. (2014). The Impact of Brief Alcohol Interventions in Primary Healthcare: A Systematic Review of Reviews. *Alcohol and Alcoholism, 49*(1), 66–78. doi:10.1093/alcalc/agt170

Paljärvi, T., Suominen, S., Car, J., & Koskenvuo, M. (2013). Socioeconomic Disadvantage and Indicators of Risky Alcohol-drinking Patterns. *Alcohol and Alcoholism, 48*(2), 207-214, doi:10.1093/alcalc/ags129

Pasch K.E., Hearst M.O., Nelson M.C., Forsyth A., & Lytle L.A. (2009). Alcohol outlets and youth alcohol use: exposure in suburban areas. *Health & Place, 15*, 642–646.

Pasch K.E., Komro K.A., Perry C.L., Hearst M.O., & Farbakhsh K. (2007). Outdoor alcohol advertising near schools: what does it advertise and how is it related to intentions and use of alcohol among young adolescents? *Journal of Studies on Alcohol and Drugs, 68*, 587–596.

Paschall M. J., Lipperman-Kreda S., & Grube J. W. (2014). Effects of the local alcohol environment on adolescents' drinking behaviors and beliefs. *Addiction, 109*, 407–16.

Pereira, G., Wood, L., Foster, S., & Haggar, F. (2013). Access to alcohol outlets, alcohol consumption and mental health. *PLoS One, 8*(1), e53461.

Pernanen, K., Cousineau, M. M., Brochu, S., & Sun, F. (2002). *Proportions of crimes associated with alcohol and other drugs in Canada*. Ottawa, ON: Canadian Centre on Substance Abuse.

Pollack, C.E., Cubbin, C., Ahn, D., & Winkleby, M. (2005). Neighbourhood deprivation and alcohol consumption: does the availability of alcohol play a role? *International Journal of Epidemiology, 34*, 772–780. doi:10.1093/ije/dyi026

Popova, S., Giesbrecht, N., Bekmuradov, D., Patra, J. (2009). Hours and days of sale and density of alcohol outlets: Impacts on alcohol consumption and damage: A systematic review. *Alcohol & Alcoholism, 44*(5), 500-516.

Praud, D., Rota, M., Rehm, J., Shield, K., Zatoński, W., Hashibe, M., La Vecchia, C. and Boffetta, P. (2016), Cancer incidence and mortality attributable to alcohol consumption. *International Journal of Cancer, 138*, 1380–1387. doi:10.1002/ijc.29890

Pridemore, W. A., & Grubesic, T. H. (2012a), Community organization moderates the effect of alcohol outlet density on violence. *The British Journal of Sociology, 63*, 680–703. doi:10.1111/j.1468-4446.2012.01432.x

Pridemore, W. A., & Grubesic, T. H. (2012b). A spatial analysis of the moderating effects of land use on the association between alcohol outlet density and violence in urban areas. *Drug and Alcohol Review, 31*, 385-393. doi:10.1111/j.1465-3362.2011.00329.x

Pridemore, W. A., & Grubesic, T. H. (2013). Alcohol Outlets and Community Levels of Interpersonal Violence: Spatial Density, Outlet Type, and Seriousness of Assault. *Journal of Research in Crime and Delinquency, 50*(1), 132-159. doi:10.1177/0022427810397952

Probst, C., Roerecke, M., Behrendt, S., & Rehm, J. (2014). Socioeconomic differences in alcohol-attributable mortality compared with all-cause mortality: a systematic review and meta-analysis. *International Journal of Epidemiology, 43*(4), 1314–1327. doi:10.1093/ije/dyu043

Public Health Agency of Canada. (2016). *The Chief Public Health Officer's report on the state of public health in Canada: Alcohol consumption in Canada*. Ottawa, ON: Author.

Rehm J, Taylor B, Mohapatra S, Irving H, Baliunas D, Patra J, & Roerecke M. (2010). Alcohol as a risk factor for liver cirrhosis: a systematic review and meta-analysis. *Drug and Alcohol Review, 29*(4), 437-45.

Rehm, J., Gmel, G. E., Gmel, G., Hasan, O. S. M., Imtiaz, S., Popova, S., … Shuper, P. A. (2017). The relationship between different dimensions of alcohol use and the burden of disease—an update. *Addiction, 112*(6), 968–1001. doi:10.1111/add.13757

Resko, S. M., Walton, M. A., Bingham, C. R., Shope, J. T., Zimmerman, M., Chermack, S. T., … Cunningham, R. M. (2010). Alcohol availability and violence among inner-city adolescents: A multi-level analysis of the role of alcohol outlet density. *American Journal of Community Psychology, 46*(3-4), 253–262. doi:10.1007/s10464-010-9353-6

Richardson, E. A., Hill, S. E., Mitchell, R., Pearce, J., & Shortt, N. K. (2015). Is local alcohol outlet density related to alcohol-related morbidity and mortality in Scottish cities? *Health & Place, 33*, 172–180. doi:10.1016/j.healthplace.2015.02.014

Richardson, E. A., Shortt, N. K., Pearce, J. (2014). *Alcohol-related illness and death in Scottish neighbourhoods: Is there a relationship with the number of alcohol outlets?* Scotland: Centre for Research on Environment, Society and Health.

Robinson, S, & Harris H. (2011). Smoking and drinking among adults, 2009. In: Dunstan, S., editor. Office for National Statistics. A report on the 2009 General Lifestyle Survey. Retrieved from: https://sp.ukdataservice.ac.uk/doc/6716/mrdoc/pdf/2009_report.pdf

Roche, A., Kostadinov, V., Fischer, J., & Nicholas, R. (2015). Evidence review: The social determinants of inequities in alcohol consumption and alcohol-related health outcomes. Victoria, Australia: Victorian Health Promotion Foundation. Retrieved from: https://www. vichealth.vic.gov.au /search/the-vichealth-framework-for-health-equity

Roche, A., Kostadinov, V., Fischer, J., Nicholas, R., O'Rourke, K., Pidd, K., Trifonoff, A. (2015). Addressing inequities in alcohol consumption and related harms. *Health Promotion International, 30*(S2), ii20-ii35.

Rowland B., Toumbourou J. W., Satyen L., Tooley G., Hall J., Livingston M., & Williams J. (2014). Associations between alcohol outlet densities and adolescent alcohol consumption: A study in Australian students. *Addictive Behaviors, 39*, 282-288

Schmidt, L., Mäkelä, P., Rehm, J., & Room, R. (2010). Alcohol: equity and social determinants. Equity, social determinants and public health programmes, 11.

Schonlau, M., Scribner, R., Farley, T.A., Theall, K.P., Bluthenthal, R.N., Scott, M., & Cohen, D.A. (2008). Alcohol outlet density and alcohol consumption in Los Angeles County and Southern Louisiana. *Geospatial Health, 3*, 91–101.

Shih, R. A., Mullins, L., Ewing, B. A., Miyashiro, L., Tucker, J. S., Pedersen, E. R., . . . D'Amico, E. J. (2015). Associations between neighborhood alcohol availability and young adolescent alcohol use. *Psychology of Addictive Behaviors, 29*(4), 950-959. doi:10.1037/adb0000081

Shortt, N.K., Tisch, C., Pearce, J., Mitchell, R., Richardson, E.A., Hill, S.E., & Collin, J. (2015). A cross-sectional analysis of the relationship between tobacco and alcohol outlet density and neighbourhood deprivation. *BMC Public Health, 15*, 1014, doi:10.1186/s12889-015-2321-1

Single, E.W. (1988). The availability theory of alcohol related problems. In: Chaudron, C.D., and Wilkinson, D.A., eds. Theories on Alcoholism. Toronto, Canada: Addiction Research Foundation

Smith, K., & Foster, J. (2014). *Alcohol, Health Inequalities and the Harm Paradox: Why Some Groups Face Greater Problems despite Consuming Less Alcohol*. *A Summary of the Available Evidence*. London: Institute of Alcohol Studies. Retrieved from: http://www.ias.org.uk/uploads/pdf/IAS%20reports/IAS%20report%20Alcohol%20and%20health%20inequalities%20FULL.pdf

Snowden A. J., & Freiburger T. (2015). Alcohol outlets, social disorganization, and robberies: Accounting for neighborhood characteristics and alcohol outlet types. *Social Science Research, 51*, 145-162

Snowden A. J. (2016). Alcohol outlet density and intimate partner violence in a non-metropolitan college town: Accounting for neighborhood characteristics and alcohol outlet types. *Violence and Victims, 37*, 111-123.

Snowden, A. J., & Pridemore, W. A. (2014). Off-premise alcohol outlet characteristics and violence. *American Journal of Drug and Alcohol Abuse, 40*(4), 327-35.

Snowden, A. J., Stucky, T. D., & Pridemore, W. A. (2016). Alcohol outlets, social disorganization, and non-violent crimes in urban neighborhoods. Journal of Crime and Justice, 0(0), 1–16. doi:10.1080/0735648X.2016.1176949

Stanley L. R., Henry K. L., & Swaim R. C. (2011). Physical, social, and perceived availabilities of alcohol and last month alcohol use in rural and small urban communities. *Journal of Youth and Adolescence, 40*, 1203–14.

Stockwell, T., & Gruenewald, P. (2004). Controls on the Physical Availability of Alcohol. In Heather, N & Stockwell, T (Eds.), The Essential Handbook of Treatment and Prevention of Alcohol Problems (213-234). Chichester: John Wiley.

Stockwell, T., Zhao, J., Macdonald, S., Vallance, K., Gruenewald, P., Ponicki, W., Holder, H., & Treno, A. (2011). Impact on alcohol-related mortality of a rapid rise in the density of private liquor outlets in British Columbia: A local area multi-level analysis. *Addiction, 106*, 768-776.

Stockwell, T., Zhao, J., Martin, G., Macdonald, S., Vallance, K., Treno, A … Buxton, J. (2013). Minimum alcohol prices and outlet densities in British Columbia, Canada: Estimated impacts on alcohol-attributable hospital admissions. *American Journal of Public Health, 103*(11), 2014-2020.

Stockwell, T., Zhao, J., Sherk, A., Callaghan, R.C., Macdonald, S., & Gatley, J. (2017). Assessing the impacts of Saskatchewan's minimum alcohol pricing regulations on alcohol-related crime. *Drug and Alcohol Review, 36*, 492-501

Toomey, T. L., Erickson, D. J., Carline, B. P., Lenk, K. M., Quick, H. S., Jones, A. M., & Harwood, E. M. (2012a). The association between density of alcohol establishments and violent crime within urban neighborhoods. *Alcoholism, Clinical and Experimental Research, 36*(8), 1468-1473.

Toomey, T. L., Erickson, D. J., Carlin, B. P., Quick, H. S., Harwood, E. M., Lenk, K. M., & Ecklund, A. M. (2012b). Is the Density of Alcohol Establishments Related to Nonviolent Crime? *Journal of Studies on Alcohol and Drugs, 73*(1), 21–25.

Truong K. D., & Sturm R. (2009). Alcohol environments and disparities in exposure associated with adolescent drinking in California. *American Journal of Public Health, 99*, 264–270.

United States Department of Justice, Federal Bureau of Investigation. (2011). Crime in the United States, 2010. Retrieved from: https://ucr.fbi.gov/crime-in-the-u.s/2010/crime-in-the-u.s.-2010/violent-crime/robberymain

US Department of Health and Human Services. The Surgeon General's Call to Action To Prevent and Reduce Underage Drinking. Rockville, MD: US Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2007.

van Oers, J.A., Bongers, I.M., van de Goor, L.A., & Garretsen, H.F. (1999). Alcohol consumption, alcohol-related problems, problem drinking, and socioeconomic status. *Alcohol and Alcoholism, 34*(1), 78-88, doi:10.1093/alcalc/34.1.78

Waller, M. W., Iritani, B. J., Christ, S. L., Clark, H. K., Moracco, K. E., Halpern, C. T., & Flewelling, R. L. (2012). Relationships Among Alcohol Outlet Density, Alcohol use, and Intimate Partner Violence Victimization Among Young Women in the United States. *Journal of Interpersonal Violence, 27*(10), 2062–2086. doi:10.1177/0886260511431435

Wilcox, H.C., Conner, K.R., & Caine, E.D. (2004). Association of alcohol and drug use disorders and completed suicide: an empirical review of cohort studies. *Drug and Alcohol Dependence, 76*, S11-S19

Wilkinson, C., & Livingston, M. (2012). Distances to on- and off-premise alcohol outlets and experiences of alcohol-related amenity problems. *Drug and Alcohol Review, 31*, 394–401. doi:10.1111/j.1465-3362.2011.00346.

Williams, R., Aspinall, R., Bellis, M., Camps-Walsh, G., Cramp, M., Dhawan, A.,...Smith, T. (2014). Addressing the crisis of liver disease in the UK: A blueprint for attaining excellence in healthcare for liver disease and reducing premature mortality from the major lifestyle issues of excess alcohol consumption, obesity and viral hepatitis. *Lancet, 384*, 1953–97. 2

World Health Organization. (2010). Preventing violence by reducing the availability and harmful use of alcohol. Geneva: Author.

World Health Organization. (2014). Global status report on alcohol and health. Luxembourg: Author.

Young R., Macdonald L., & Ellaway A. (2013). Associations between proximity and density of

local alcohol outlets and alcohol use among Scottish adolescents. *Health & Place, 19*, 124–30.

Zalcman R, & Mann R. (2007). The effects of privatization of alcohol sales in Alberta on suicide mortality rates. *Contemporary Drug Problems, 34*, 589–609.

Zhao, J., Stockwell, T., Martin, G., Macdonald, S., Vallance, K., Treno, A., … Buxton, J. (2013). The relationship between minimum alcohol prices, outlet densities and alcohol-attributable deaths in British Columbia, 2002–09. *Addiction, 108*, 1059-1069.

Zhao, J., Stockwell, T., Roemer, A., & Chikritzhs, T. (2016). Is alcohol consumption a risk factor for prostate cancer? A systematic review and meta–analysis. *BMC Cancer, 16*, 845. doi:10.1186/s12885-016-2891-z