



# Do Changes to the Alcohol Retail Environment Reduce Interpersonal Violence?

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## Abstract

**Purpose of Review** To summarize recent research on the alcohol retail environment (sales, policies, availability) and interpersonal violence (assault, intimate partner violence, sexual assault), including methods utilized, theoretical frameworks employed, and associations by types of alcohol environmental exposure and violence.

**Recent Findings** Studies continue to demonstrate that reducing alcohol availability directly and indirectly lowers rates of interpersonal violence. Many of the 30 studies used state-of-the-art analytic methods and study designs. Few studies examined heterogeneity by minoritized identities or between alcohol environments and violence by other contextual characteristics. There was a dearth of theoretical frameworks and mechanisms explicated.

**Summary** To increase impacts of alcohol control policies, specific, practical advice is needed about where, when, and for whom changes will reap the biggest effects. Methodological next steps include analyzing natural experiments, incorporating legal epidemiology, designing studies to examine heterogeneities, developing spatiotemporal simulations, and investigating how embodiment of historic injustices contributes to violence.

**Keywords** Interpersonal violence · Intentional injury · Alcohol retail environment · Alcohol control policies · Literature review · Alcohol-related violence

## Introduction

Alcohol-related violence remains a public health concern worldwide [1, 2]. When alcohol consumption increases in a society, violence rates tend to follow; as consumption decreases, so does violence [3]. Given these population-level patterns, preventive interventions focused on reducing access to alcohol are an essential element in reducing community and interpersonal violence. While the alcohol

field has long demonstrated the effectiveness and cost-effectiveness of regulations on alcohol availability through policy and planning guidance [4, 5], they are not consistently implemented. Alcohol control policies continue to be important yet underutilized approaches to prevent and mitigate violence [6•, 7].

Alcohol plays an important role in interpersonal violence, both at the individual and population levels. In aggregate, per capita drinking is associated with violence [8, 9]. The alcohol-attributable fraction of all violence-related injuries has been estimated at close to 40%, with an analysis across 14 countries finding that in 63% of violence-related injuries, the victim, perpetrator, or both had recently consumed alcohol [10]. This holds true across a range of types of interpersonal violence, including intimate partner violence (IPV) [11], homicide [12•], and violent assaults [7, 13]. Importantly, the strength of the relationship between alcohol use and violence is not consistent across gender and racial/ethnic identities, with, for example, Black men and women experiencing a greater number of intentional injuries at an equivalent level of heavy drinking as their White counterparts [14, 15]. The theoretical and practical implications of the

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contributions of the social and alcohol environments to this inequitable relationship between alcohol consumption and interpersonal violence [16] have not been well integrated into much of the alcohol and violence prevention fields.

Typical approaches to reducing alcohol availability within communities include increasing the minimum legal drinking age, excise taxes, privatizing alcohol control systems, and reducing the numbers and hours of sales of outlets that sell alcohol for on- and off-premise consumption [17, 18]. Many of these alcohol environment interventions, such as excise taxes and availability restrictions, are extremely cost-effective ways to increase the number of healthy life years [18]. Despite the fact that we have known for the better part of four decades that these alcohol control policies can lead to reductions in alcohol use and related violence [19], alcohol-related intentional injuries continue to hold steady or increase in many countries and communities.

Alcohol inequities, here defined as differences in the relationships between patterns of alcohol consumption and related harms between groups, are common for those with a range of minoritized identities. Over the past decade, researchers have been calling for the use of novel methods to better understand mechanisms underpinning the relationships between and inequities in population-level patterns of alcohol consumption and various forms of violence and the structural causes of these patterns [7, 20, 21]. This body of research has also traditionally needed to better utilize theoretical frameworks that can tie together population- and individual-level alcohol consumption, alcohol inequities, and the ways through which alcohol retail interventions can reduce or eliminate alcohol-related violence [22]. Moving beyond descriptive epidemiology, we are left with the question of how to best generate evidence that can lead to the successful implementation of alcohol retail control that will benefit those at highest risk for interpersonal violence.

In this article, we summarize the most recent research on alcohol availability (sales, taxes, retail availability) and interpersonal violence (assault, intimate partner violence, homicide, sexual assault, and rape) to identify the latest approaches to this important public health topic. We review the methods utilized, theoretical frameworks employed, and associations observed by the types of alcohol retail environment exposures and violence. We conclude by recommending ways to extend and apply this robust evidence base to reduce alcohol-related interpersonal violence and associated inequities.

## Methods

In this literature review, we performed electronic literature searches for articles published between January 1, 2019 and April 30, 2022 using four databases (PubMed, PsycInfo,

Cochrane, and EMBASE). Search terms were intended to capture the constructs of alcohol consumption, alcohol retail or policies, and alcohol-related intentional injuries. See Appendix for a comprehensive list of search terms used. Inclusion criteria were as follows: (1) peer-reviewed journal article; (2) publication date between January 1, 2019 and April 30, 2022; (3) age range of participants predominantly 18 and older; (4) at least one measure of alcohol consumption assessed; (5) alcohol sales, retail, or policy evaluated as the/an exposure; (6) a measure of alcohol-related interpersonal violence as the/an outcome. Duplicate articles, articles not written in English, and studies focusing on non-human participants were excluded.

Abstracts and titles of each manuscript that met the search criteria were compiled into a Microsoft Excel spreadsheet and evaluated by two reviewers. The first criterion that was clearly violated was noted as the exclusion reason by each reviewer and not assessed further. If none of the criteria was clearly violated, the reviewer nominated that article for a full-text review. Articles nominated for full-text consideration by at least one reviewer were assessed for inclusion eligibility. Database searches conducted on May 5, 2022, resulted in 1601 total articles (PubMed,  $n=411$ ; PsycInfo,  $n=260$ ; Cochrane,  $n=237$ ; EMBASE,  $n=693$ ). Of these, 419 duplicates were removed, resulting in 1182 titles and abstracts evaluated using the inclusion and exclusion criteria. Full texts of 51 articles were comprehensively reviewed for eligibility. Finally, 30 articles met criteria to be included in this review.

## Results

Of the 30 articles identified, 18 included populations from the USA and 12 from other countries (including Australia, the UK, and multi-country comparisons) (see Supplemental Table for details). Twelve studies utilized cross-sectional samples, with fifteen using either panel or longitudinal data and two including qualitative design. The distributions of violence and alcohol retail environment measures in articles published between 2019 and 2022 are similar to those investigated in previous decades [4, 21, 23]. Importantly, there were a wide range of alcohol control policies included, with controls on alcohol outlets (e.g., decreasing density or proximity, privatizing alcohol sales systems) [24], the most studied alcohol environmental measure ( $n=9$ ), followed by sales hours ( $n=7$ ), combinations of various policies ( $n=7$ ), and other aspects of the alcohol retail environment including malt liquor sales, alcohol excise taxes, marketing, and advertisements. Types of intentional injuries included intimate partner violence (IPV), assaults, sexual assaults and rape, and homicides, with many studies including more than one type of violence in aggregate or separately.

Theoretical orientations were largely focused on prior evidence of alcohol retail policy effectiveness and the importance of reducing community alcohol availability [25], likely in part due to the existing evidence base demonstrating the general effectiveness of such policies. Many of the studies focused on alcohol outlets utilized conceptual frameworks linking outlet proximity and density to availability, neighborhood conditions, and community stability and crime. Broad mention of the importance of social determinants of health, neighborhood environments, and area deprivation was common, though few studies explicitly discussed mechanisms through which these conditions would impact alcohol environments and violence. Surprisingly, there was little discussion of alcohol inequities and structural determinants of health. A handful of studies utilized systems thinking orientations [26, 27], and several emphasized the importance of heterogeneity by individual- and place-level characteristics [26, 28•, 29]. Still, these recent articles relied more on prior policy evidence and less on existing multilevel theoretical orientations.

The 30 articles employed a range of study designs, with roughly equal numbers of cross sectional vs. longitudinal studies and individual level vs. ecological/spatial panel data. Given that the primary exposures of interest represent

aspects of the alcohol retail environment, it is encouraging to see multilevel, spatial, longitudinal designs employed. The studies, as a whole, utilized gold standard statistical methods, including multilevel models with survey data [30, 31••], descriptive spatial analyses [32], ARIMA time series models [33, 34••], and spatial regression models [35, 36]. Several studies used mathematical simulation models such as agent-based models [37, 38•] or took advantage of natural experiments to investigate the causal impacts of implementing polic(ies) [39•]. Two studies utilized qualitative approaches, such as photovoice [27, 40]. Overall, there were no clear indications that any of these varying study designs were more or less likely to identify specific alcohol retail environment exposures as increasing or decreasing violence. That this mixture of study designs found similar, expected, associations between the alcohol retail environment and violence lends credence to these being causal associations by-and-large.

As expected, the majority of alcohol retail policies were associated with reductions in intentional injuries (see Table 1 for a summary of quantitative study results). Decreased off- and on-premise alcohol outlet densities or farther proximity to the nearest outlet were consistently associated with reductions in assaults, IPV, and sexual assault, though no

**Table 1** Summary of results, by alcohol retail environment intervention/exposure and violence type, 28 quantitative studies

Intervention or exposure	Homicide	Assault, physical aggression	IPV	Sexual assault or rape	Overall violence
Increased alcohol taxes	Decreased [38•, 52]				Decreased [38•]
Reduced malt liquor sales		Decreased [33]; increased, decreased, or NS, depending on area [34••]			Decreased or NS, depending on area [34••]
Banned alcohol sales (COVID-19-related)					Decreased [49]
Reduced or banned sales hours	NS [32, 47]	Decreased [45••, 46]			NS [48]
Decreased off-premise alcohol outlet density or proximity	NS [37, 41]	Decreased [28•, 29, 41, 42]		Decreased [29]	Decreased toward females [43]; NS [37, 41]
Decreased on-premise alcohol outlet density or proximity	NS [37]	Decreased [29]		Decreased [29]	NS [6•, 37]
Decreased overall alcohol outlet density		Decreased [42]			Decreased [35, 36, 44]
Imposing risk-based fees on alcohol outlets		Decreased [39•]			
Absence of visible alcohol advertisements	Decreased [41]	Decreased [41]		Decreased [41]	Decreased [41]
More stringent combination of alcohol policies (e.g., increased APIS score)	Decreased [12•, 50]	Decreased [30, 51, 53]; Decreased for those < 40; NS for 40+ [31••]	Decreased [50]	Decreased [51]	Decreased [54]

NS no significant or well-supported association observed

study found an association with homicides [6•, 29, 30, 35–37, 41–44]. Evidence for the effectiveness of reduced or banned alcohol sales hours was more mixed, with two articles finding reductions in assaults [45••, 46] but none for homicides or overall violence [32, 47, 48]. One study found that COVID-19-related total alcohol sales bans reduced total violence while in effect, though rates reverted one the ban was lifted [49]. Seven articles used a combined policy score such as the Alcohol Policy Score (APS), meant to capture the presence of 29 distinct alcohol policies [50], or aggregate measures of campus-level alcohol policies implemented during a period of policy reform [51]. These combined policy measures were associated with reductions in all types of violence, indicating that groupings of alcohol policy and retail environment changes potentially have greater impacts than singular policies. Alcohol taxes were associated with fewer homicides and overall violence [38•, 52], while one study found greater levels of all violent crime types near outlets with visible exterior alcohol advertising [41].

Examining results by violence type, assaults, IPV, and sexual assault or rape were associated with almost every single alcohol environment policy investigated across studies (see Table 1). Homicide, as well as aggregate measures (e.g., combinations of violent crimes), had more mixed results, with decreases observed for increased alcohol taxes, absence of visible alcohol advertisement, and combination alcohol retail environment scores but not for other alcohol environment exposures.

Very few studies explored heterogeneity in results by minoritized identities. One study found state-level alcohol policy scores to have a stronger association with experiencing harms (including assaults) due to others' drinking for American Indian participants vs. White, but no differences between other racial identities [31••]. In New Zealand, living in close proximity to an alcohol outlet did not have a stronger association with assaults for participants with Maori ethnicity vs. all other ethnicities [29]. Otherwise, besides describing differences in violence risk by minoritized identity, there was no exploration of this important topic.

## Conclusions

The recent literature on alcohol retail environments and violence continues to demonstrate that reducing alcohol availability through direct and indirect means is an effective way to lower rates of interpersonal violence. The 30 studies we identified were uniformly well designed, with many using state-of-the-art analytic methods and study designs. While this is encouraging, there remain nuances that, if integrated into this body of literature, could increase the potential impacts of these preventive interventions.

Despite the difficulties inherent in these lines of inquiry, investigating for whom, where, and when alcohol retail policies have the greatest impacts on violence is of utmost scientific and ethical importance. Very few studies examined heterogeneity of associations between alcohol environments and violence by other contextual characteristics. The impact of decreasing alcohol outlet density, or reducing sales hours, may be quite different in an urban vs. rural community, or in areas with higher vs. lower median household incomes. Relatedly, focusing on heterogeneity of associations by individuals' minoritized identities is a crucial next step. Designing a study with the power to disentangle the strength of associations for Black vs. White adults necessitates careful planning in the study design and analysis stages. Inequities in the relationships between consumption and alcohol problems stem in part from structural, mutually reinforcing, systems promoted by societies. Understanding the impacts of structural determinants on alcohol inequities and how these impact the associations between alcohol retail environments and violence, will enable us to better mitigate the harmful impacts of historic racist socio-political practices [55].

There was a dearth of theoretical frameworks and mechanisms explicated in the included studies. Instead, most articles relied heavily upon the historical literature showing well-supported associations between alcohol retail environment policies and various forms of violence. Combining traditional frameworks such as alcohol availability, crime attractors, and place management [56, 57, 58] with multilevel, explicitly mechanism-based theories could help broaden our understanding of the links between alcohol environments and violence, as well as identify modifiable mechanisms. Ecosocial theory [59], which centers the embodied connections between people, places, policies and politics, and health, can help explicate multilevel and spatiotemporal patterns of alcohol inequities. This theoretical perspective reminds us that social and ecological contexts are never separated from individual behaviors [60]. Thus, alcohol retail environments impact violence not just through how much alcohol each person in a population consumes, but also potentially through the cumulative interplay of embodiment, exposure, susceptibility, and resistance. The alcohol harms paradox [22, 61], the observation that those with lower incomes consume less alcohol but experience more alcohol-related problems, has also insufficiently been incorporated into the literature on alcohol environments and violence. This is similar to observed alcohol inequities related to interpersonal violence among those with one or more minoritized identities. The alcohol retail environment may contribute to the alcohol harms paradox by the inequitable distribution of environments conducive to violent behaviors, concentrating alcohol outlets in disadvantaged neighborhoods, and more marketing of low-cost, high-alcohol content, drinks in communities of color. Understanding

the mechanisms underlying this observed paradox and the ways that the alcohol retail environment may contribute to or mitigate these inequities can strengthen our scientific base.

While the methodological approaches to understanding the links between alcohol retail environments and violence have generally been excellent, there are several avenues that could continue to move the field forward. Natural experiments, both before and during the COVID-19 era, provide opportunities to observe what happens when specific policies are implemented. Though it is potentially quite difficult to use the COVID-19 pandemic as an instrumental variable [62, 63], given that changes in alcohol availability occurred simultaneously with changes in stressors and general routine activities (also potentially correlates of violence), the rapid changes in alcohol availability in 2020 provide a chance to observe changes in real world settings. Partnering with experts in the field of legal epidemiology can provide us with specific details of policies, and their local-, state-, and federal-level implementation over time, generating better exposure measures [64]. NIAAA's Alcohol Policy Information System (APIS) provides a valuable template for state-level alcohol availability changes [65] and now also includes COVID-specific policy details. Similar local-level information would be invaluable.

Other important methodological next steps include designing and analyzing studies to be able to examine heterogeneities, focusing on multiscale processes [66], and continuing to develop agent-based models that allow us to simulate spatiotemporal processes and compare sets of potential changes in the alcohol environment. Finally, we have much to learn from implementation science about how alcohol retail policies can most effectively impact various forms of interpersonal violence [67, 68].

Even with all the evidence that has accumulated, attempts to change the alcohol retail environment to impact violence (and alcohol consumption more generally) have often been ineffective. While it is true that the alcohol industry plays no small role in these failures [69, 70, 71], there is also a more widespread lack of understanding of the alcohol environment as a public health issue [72]. As epidemiologists, how can we contribute to the push for change? One obvious role is to generate research that can provide specific, practical advice about where, when, and for whom changes will reap the biggest effect. Beyond this, though, there is also a need to investigate and amplify the ways in which embodiment of historic injustices contribute to violence. Critical epidemiology invites us to focus not just on understanding the structural and social determinants of health, but also to contribute to the advancement of health as a basic human right [73, 74]. It is high time that we frame alcohol-related violence within the larger context of critical epidemiology and continue to research, and advocate for, healthier alcohol environments and societies.

## Appendix. Terms used in literature searches on PubMed, PsycInfo, Cochrane, and EMBASE

### PubMed:

(Alcohol Drinking[MeSH Terms] OR alcohol\*[tiab] OR liquor\*[tiab]) NOT (amniotic[tiab]) AND (sale\*[tiab] OR retail\*[tiab] OR privatiz\*[tiab] OR tax[tiab] OR taxes[tiab] OR price\*[tiab] OR cost\*[tiab] OR polic\*[tiab] OR outlet\*[tiab]) AND (Intimate Partner Violence[MeSH Terms] OR violen\*[tiab] OR harm\*[tiab] OR injur\*[tiab] OR assault\*[tiab] OR homicid\*[tiab] OR robb\*[tiab] OR murder\*[tiab]).

### PsycInfo:

((Alcohol Drinking/ or alcohol\*.ti,ab. or liquor\*.ti,ab.) not amniotic.ti,ab.) and (sale\* or retail\* or privatiz\* or tax or taxes or price\* or cost\* or polic\* or outlet\*).ti,ab. and (Intimate Partner Violence/ or violen\*.ti,ab. or harm\*.ti,ab. or injur\*.ti,ab. or assault\*.ti,ab. or homicid\*.ti,ab. or robb\*.ti,ab. or murder\*.ti,ab.)

### Cochrane:

((MeSH descriptor: [Drinking Behavior] explode all trees) OR ((alcohol\* OR liquor\*) NOT amniotic):ti,ab,kw) AND (sale\* OR retail\* OR privatiz\* OR tax\* OR price\* OR cost\* OR polic\* OR outlet\*) AND ((MeSH descriptor: [Violence] explode all trees) OR (violen\* OR harm\* OR injur\* OR assault\* OR homicid\* OR robb\* OR murder\*)).

### MEDLINE:

((Alcohol Drinking/ or alcohol\*.ti,ab. or liquor\*.ti,ab.) not amniotic.ti,ab.) and (sale\* or retail\* or privatiz\* or tax or taxes or price\* or cost\* or polic\* or outlet\*).ti,ab. and (Intimate Partner Violence/ or violen\*.ti,ab. or harm\*.ti,ab. or injur\*.ti,ab. or assault\*.ti,ab. or homicid\*.ti,ab. or robb\*.ti,ab. or murder\*.ti,ab.)

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare no competing interests.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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