Alcohol and policy interventions to reduce intimate partner violence: a review

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Abstract

Background

Intimate partner violence (IPV) is a significant global public health issue. The consistent evidence that alcohol use by one or both partners contributes to the frequency and severity of IPV suggests the potential for indirect interventions that reduce alcohol consumption to also reduce IPV. This study sought to review the evidence for effects on intimate partner violence (IPV) of alcohol intervention at the population, community and individual levels using the World Health Organization ecological framework for violence.

Methods

Eleven databases including Medline, PsycINFO, CINAHL and EMBASE were searched for English-language studies and grey literature published 1 January 1992 – 1 March 2013 investigating whether alcohol interventions/policies were associated with IPV reduction within adult (≥18) intimate relationships. Eleven studies meeting design criteria for attributing effects to the intervention and 10 studies showing mediation of alcohol consumption were included in the review. The heterogeneity of study designs precluded quantitative meta analysis, therefore a critical narrative approach was used.

Results

Population taxation studies found weak or no evidence for alcohol price changes influencing IPV. Studies of community-level policies or interventions (e.g., hours of sale, alcohol outlet density) showed weak evidence of an association with IPV. Treatment studies for alcohol dependency found a relationship between reductions in alcohol consumption and reductions in IPV but their designs precluded attributing changes to treatment. Randomized control trials of combined alcohol and violence treatment programs found positive effects of brief alcohol intervention as an adjunct to batterer treatment for alcohol-dependent perpetrators, and brief interventions with non-dependent younger populations.

Conclusions
Despite evidence associating problematic alcohol use with IPV, the potential for alcohol interventions to reduce IPV has not been adequately tested. Research using rigorous designs should target young adult populations for whom IPV and drinking is highly prevalent. Combining IPV and alcohol intervention/policy approaches at the individual, community and population-level may provide the best opportunity for effective intervention.

Background

The World Health Organization (WHO) defines intimate partner violence (IPV) as 'any behaviour within an intimate relationship that causes physical, psychological or sexual harm.' [1] It recently estimated the global prevalence of physical and/or sexual IPV to be 30% among all ever-partnered women. [2] Thus, IPV is a significant global public health and human rights issue that has damaging effects on the health and well-being of women and children, [3] and significant social and economic costs. [4]

Alcohol use, especially heavy drinking and drinking large amounts per occasion, is linked to male-to-female partner violence. [5] Across different cultures, violence is more severe when one or both partners (most often the male partner) has been drinking. [6] Meta-analyses suggest that alcohol plays a causal contributing role in aggression generally; [7] however, the extent to which alcohol's role in IPV is causal, is complex and contested. [8]
Alcohol is thought to influence aggressive behaviour through detrimental effects on the drinker's cognitive executive functioning, [9] and problem-solving abilities, [10] narrowing the focus of attention, [11] increasing their willingness to take risks, [12] and increasing concern about personal power among male drinkers. [13] Social and cultural perceptions of alcohol can also play a role where the acceptance and tolerance of alcohol-related

misbehaviour (including aggression), can influence drinkers' expectations about their behaviour while drinking. [14]

Although drinking can occur without IPV and IPV without drinking, both are sufficiently linked that the WHO proposed that primary prevention interventions to reduce the harm caused by alcohol could potentially reduce IPV. [15] Further investigation of the effects of alcohol prevention on IPV is important because direct interventions addressing violence against women have been shown to have limited impact. [16]

Recognising the multi-dimensional and complex nature of IPV, the WHO recommends an ecological framework for violence prevention wherein factors influence violent behaviour separately and cumulatively at the individual, relationship, community and societal levels (Fig. 1). [1] Although previous reviews of alcohol interventions have focused exclusively on the individual level, [17, 18] as this model suggests, alcohol interventions relevant to alcohol-related IPV can occur at the community level (e.g., restricting the availability of alcohol) and the societal level (e.g., changing policies that promote or facilitate alcohol consumption) as well as at the individual/relationship level (e.g., treatment for alcohol dependency).

INSERT FIGURE ONE HERE – Fig.1. Ecological model for understanding violence. Reproduced with permission from the World Health Organization (pending).

As alcohol use is 'one of the factors most open to intervention and change,' [19](p.viii) and broad evidence exists of effective interventions that reduce alcohol consumption and related harms, [20] the aim of this review is to assess the effects of alcohol interventions on IPV at all levels within the WHO ecological framework.

Methods

Eleven bibliographic databases were searched systematically for English language studies published between 1 January 1992 and 1 March 2013 including: Medline, CINAHL, EMBASE, PsycINFO, Proquest Central, Cochrane Library, Campbell Collaboration Library, ATSI Health, Drug and Rural Health, and Women's Studies International. The search strategy combined three concepts of interest: (i) alcohol use, (ii) IPV, and (iii) interventions, using medical subject headings (MeSH), database-specific thesauri search terms, and text-based keywords. Specific terms for alcohol prevention policies were added.

A study was included in the review if it investigated whether an intervention or policy to reduce alcohol consumption was directly or indirectly associated with a reduction of any form of IPV as a primary or secondary outcome. The review included IPV perpetration by either sex within a current heterosexual or homosexual dating, co-habiting or marital relationship, or from a former partner. Because the focus was on alcohol use and IPV within adult intimate relationships, studies of persons less than 18 years of age were excluded, as was sexual violence between non-intimate partners.

The search retrieved 1,810 citations (Figure 2). IW conducted the initial review of study titles with 93 (5%) full text papers retrieved and a further 24 papers were identified from hand searching reference lists and contacting key experts. A total of 117 papers were examined against the eligibility criteria in consultation with AT and KG. Commentaries, reviews or articles that reported no original data were excluded. Due to questions regarding the integrity of research by Dr. William Fals-Stewart (State of New York v. William Fals-Stewart, 2010), studies in which he was first author or using his data were excluded.

Forty studies (44 papers) met the selection criteria. Studies were prioritised by whether the design and sample size allowed outcomes to be attributed to the intervention or policy being evaluated. Eleven studies met this criterion (Table 1). These included randomized control trials, longitudinal studies that measured IPV over multiple time points before and after the intervention or included multiple replications and interrupted time series designs.

Hypothesizing that the impact of alcohol interventions and policies on IPV will be mediated through the effect on alcohol consumption, 10 studies are also discussed that did not meet the design criteria but where results provided evidence of possible mediation (Table 2). The remaining excluded studies used cross-sectional and pre-post designs, small pilot samples and other designs where it was not possible to conclude that the outcome was a result of the intervention/policy, and mediation was not measured.

INSERT FIGURE 2 HERE - Fig. 2. Selection of articles for review of alcohol and policy interventions to reduce intimate partner violence

Selected studies were categorised according to the levels in the ecological framework – population, community and individual/relationship-level interventions. IW and AT independently reviewed the individual treatment studies, and IW and KG independently reviewed the population and community-level interventions. Discrepancies were resolved through discussion amongst all three authors.

The breadth of the review and the heterogeneity in design and quality precluded formal meta-analysis; therefore, findings were synthesized using a critical narrative approach.

Results

Population-level interventions

Alcohol taxation and IPV

Alcohol consumption is affected by the price of alcohol, which is largely determined by government policy on taxation. Increasing the price of alcohol would be expected to reduce the amount of alcohol consumed by those who perpetrate alcohol-related IPV, and by extension the frequency and severity of IPV. Four studies [21-24] evaluated the relationship between alcohol taxation and IPV. Three met the design criteria [21-23] (Table 1, discussed below). The fourth study [24] was excluded; a pre-post comparison in a single country, it could not rule out confounding factors such as prevailing community attitudes toward IPV.

Only one study [21] found a significant relationship between changes in taxation and changes in IPV (measured by self-reported abuse from a national family violence survey) where a 1% increase in the price of alcohol was associated with a reduction of 3.1 – 3.5% in wife abuse. No association was found for husband abuse. The limited changes in alcohol pricing data over the three year period suggests that the results reflected mainly cross-sectional associations. The study showed no evidence linking the effect found to consumption.

Of the remaining two studies, one was a longitudinal study of the association of changes in alcohol taxes across 46 states in the USA with femicide rates (with most women killed by an intimate partner). [22] Their modelling found a significant association between (a) alcohol tax increases and reduced per capita consumption, and (b) reduced consumption and reduced IPV. However, they were unable to detect a significant relationship between alcohol taxes and IPV, although their results point in this direction.

The other study [23] used a multiple time series design to assess a range of policy interventions, including taxes on beer, against femicide rates across 46 U.S. cities over 14 years, and found no relationship.

In summary, only weak or indirect evidence was found that increasing the price of alcohol through taxation reduces IPV.

Community-level interventions

Alcohol consumption is affected by the physical availability of alcohol. [20] Policies that restrict the retail hours or the numbers and density of alcohol outlets within a geographical area decrease consumption and related harms through increasing the effort to obtain alcohol. [25] Such community-level interventions would be expected to reduce IPV by decreasing drinking opportunities and overall consumption by those who perpetrate alcohol-related IPV.

Alcohol sales restrictions and IPV

Only one [26] of eight studies (10 papers) [26-35] that evaluated the impact of community-level restrictions on the hours and days of sale of alcohol on IPV met design criteria for inclusion. The remaining seven studies (9 papers) [27-35] evaluated alcohol restrictions in remote Australian Indigenous communities, with IPV one of several outcome measures. All were pre-post designs with no comparison group for IPV outcomes; although some found decreases in alcohol consumption following the intervention, there was no clear pattern of effects on IPV.

The one study with multiple time points [26] examined the effect of a city-wide bar closing time of 11pm in a mid-sized Brazilian city with high rates of alcohol and violence (Table 1). Analysing homicide rates over a 10-year period and assaults against women over a 5-year period, this study found that earlier bar closing was associated with a significant reduction in homicides in the first three years post-restriction, and a non-significant reduction in assaults against women. The impact of the intervention on alcohol consumption was not assessed.

Alcohol outlet density and IPV

Eleven studies [36-46] conducted in the USA, New Zealand and Australia specifically examined the relationship between alcohol outlet density and IPV. Three studies [36-38] used longitudinal designs (Table 1). Three cross-sectional studies [39-41] provide additional insight into the possible mediating role of alcohol consumption in the relationship between outlet density and IPV (Table 2). The remaining five studies [42-46] were cross-sectional designs which did not allow attribution about causal effects. These studies revealed inconsistent findings regarding the association between outlet density, type of outlet and IPV. Livingston (2011) [36] examined licensing data and police-recorded IPV incidents in Melbourne, Australia, over ten years and found a positive association between IPV and outlet density, and a particularly strong relationship with packaged liquor ("off-premises") outlets.

A longitudinal study [37] from California using two police-recorded measures of IPV found similar results. However, a second study by the same authors [38] using a shorter time period found on-premises outlet density was associated with increased likelihood of IPV-related emergency department visits, while off-premises outlet density was associated with a significant reduced risk.

In terms of support for mediation, a Western Australian study [39] found a significant association between off-premises sales volume and assaults in private residences, suggesting a potential mediating link between the amount of alcohol sold/consumed (not just number of outlets) and IPV. Similarly, another study using self-reported IPV from a national U.S. survey [40] found the relationship between outlet density and male-to-female physical IPV was stronger for couples who had alcohol problems than for couples without. A study in the U.S. District of Columbia [41] found the association between domestic violence police call-outs and off-premises outlet density was greater for calls on weekends, suggesting links

between outlet density and IPV during times (i.e., weekends) when heavier drinking was more likely to occur.

Overall, evidence from community studies provides weak support for the association between alcohol availability restrictions and IPV.

Individual/relationship-level interventions

Treatment

Treatment interventions aim to reduce or eliminate problem drinking in individuals with a clinical diagnosis or who drink in hazardous or harmful ways. To the extent that their drinking is linked to IPV perpetration, reducing or eliminating alcohol use would be expected to also reduce or eliminate IPV.

Seventeen individual/couple-level treatment studies (19 papers) were identified, all conducted in the USA.

Eleven studies (13 papers) involved alcohol treatment interventions delivered to individuals or couples. [47-59] Although these studies mostly found clinically significant reductions in drinking and IPV in alcohol-dependent samples after treatment, all were excluded because their single group pre-post study design precludes attributing the change in IPV to treatment; most did not control for confounders or for participants experiencing multiple treatments. However, several of these studies [49-57] (Table 2) found evidence linking alcohol and IPV outcomes, suggesting possible mediation of alcohol consumption in treatment effect on IPV, though other explanations for the correlation cannot be ruled out.

Six studies [60-65], all conducted in the USA, combined alcohol and batterer treatment using stronger designs (randomized controlled trials) four of which are shown in Table 1 and discussed below; the two remaining trials of a pharmacologic treatment [60] and brief

motivational intervention [61] with alcohol dependent male samples were excluded due to methodological limitations including small sample size, attrition and lack of power.

Three studies [62-64] trialled brief interventions which have been found to achieve clinically significant reductions in drinking, particularly in males. [66] One study [62] found a standard batterer program combined with a brief alcohol intervention resulted in reduced IPV and decreased alcohol use among 252 hazardous drinking male IPV perpetrators. However, improvements dissipated by 12 months follow-up. A motivational intervention delivered by telephone [63] resulted in reduced IPV in a community sample of substance-using male perpetrators at 30 day follow-up, although these reductions were unrelated to substance use during this period. A trial with 49 dating university couples of an individual motivational feedback session on aggression and IPV risk factors (including alcohol use) [64] found a greater decrease in physical aggression over time and reduction in harmful alcohol consumption when compared with those in the control condition; however, the reduction in alcohol use was not related to changes in physical aggression.

An integrated substance abuse-domestic violence treatment approach [65] showed a trend towards greater reduction in IPV in alcohol-dependant males and significantly more days abstinent than controls who received substance-only therapy. However, there were no significant differences at 6 months for either alcohol use or physical IPV.
Overall, evidence for treatment interventions reducing IPV shows promise for a batterer intervention combined with an alcohol intervention for alcohol-dependent IPV perpetrators and brief interventions for non-dependent younger populations, though effects were not sustained over time and several studies showed no link between changes in drinking and changes in IPV.

Discussion

The present review is the first to examine the effects of alcohol interventions on IPV from the perspective of all levels of the ecological framework - population, community and individual/relationship levels.

Few studies have examined the effect of population-level alcohol measures on IPV despite consistent evidence that alcohol pricing and taxation are effective strategies for reducing alcohol consumption and related harms. [20, 67] The three studies reviewed showed little evidence of an effect of pricing on IPV; possibly hampered by very small changes in taxation over time. Stronger designs are needed that evaluate meaningful pricing changes using appropriate comparison conditions. Future research should consider whether those who drink and perpetrate IPV are sensitive to price, and tailor pricing policy approaches [68] to suit the patterns of consumption of those highly likely to engage in IPV, such as young adults who engage in heavy episodic drinking.

At the community-level, evidence of an impact on IPV of interventions that restrict alcohol retail hours was also inconclusive. Only one study [26] included multiple baseline and post-intervention measures; but measured violence against women generally (not IPV) and found a positive but non-significant association. Studies of alcohol restrictions in remote Indigenous Australian communities [27-35] were excluded because their designs precluded attributing changes in IPV to the intervention; however their comprehensive community approach provides a model for undertaking better controlled evaluation studies in the future to address alcohol-related IPV, which remains a significant problem in many Indigenous communities worldwide. [69]

Although a relatively strong body of research has linked alcohol outlet density to violence [20], research relating specifically to IPV is inconsistent with regard to outlet type. Two of the longitudinal studies [36, 37] found an association of IPV with off-premises outlet density which is consistent with the fact that most IPV takes place within the home; however, the third [38] found a positive association between IPV and density of on-premises outlets.

Despite these inconsistencies, there is sufficient evidence to suggest that the association between off-premises outlets and IPV is worth further investigation. Better research is also needed to understand why and how outlet density is related to IPV, and affected by cultural, social and individual factors not just availability, such as neighbourhood social disorganization and disadvantage. [70, 71] Nevertheless, the generally positive associations combined with evidence of mediation suggests a need for future research designed specifically to examine how alcohol availability influences both alcohol consumption and related IPV.

At the individual-level, the evidence mostly consists of clinical studies of predominately white, middle-aged, treatment-seeking male alcoholics in long-term heterosexual relationships amongst whom IPV is significantly more prevalent than the general population. [50] These pre-post studies reported some evidence of reduced IPV after treatment associated with reduced drinking. Excessive drinking and related behaviours often decrease over time (e.g., natural recovery, regression to the mean) [20] thus, these studies are suggestive of potential impact but uninterpretable without further evidence using stronger designs.
The more recent treatment studies combined with batterer treatment featured stronger designs (RCTs) though several had methodological limitations. These studies focused on the effects of the addition of an IPV component to addictions treatment and/or addictions component to

IPV treatment to examine the combined effect of addressing both alcohol and IPV. These studies found an initial impact on IPV but either the effect dissipated over time or could not be linked to concurrent reductions in alcohol use. Brief interventions with younger adult populations show promise because these are low cost interventions and address the population most at risk in many countries. The RCT in which a brief alcohol intervention was added to a batterer program [62] is the first of its kind illustrating the potential impact of addressing alcohol within the context of addressing IPV perpetration, an area that has received little attention from the IPV prevention field.

Conclusions

Alcohol-related IPV is a complex, multi-dimensional problem much neglected in intervention and prevention research. Despite its widespread prevalence and evidence that alcohol use contributes to increased risk and severity of IPV, our review found that the effects of alcohol interventions on reducing IPV remain under-explored. A research agenda is urgently needed to investigate the potential impact of alcohol/policy interventions on IPV at the population, community, relationship and individual-level, including:

(a) better theoretical models of the links between IPV and alcohol consumption, pricing and availability;

(b) greater focus on those at risk in many countries, such as heavy episodic drinkers and young adults;

(c) stronger designs - randomised controlled trials where possible or studies with an appropriate comparison group/community, and prospective and longitudinal designs with sufficient statistical power - and designs that test the mediating role of alcohol consumption;

(e) more reliable measures distinguishing alcohol-related IPV from IPV not involving alcohol;

(f) greater consistency of measurement across studies; and

(g) evaluation of interventions in low and middle income countries where the incidence of IPV is often higher and the link with alcohol stronger. [72]

List of abbreviations

IPV Intimate partner violence

WHO World Health Organization

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

IW made a substantial contribution to the conception and desiqn of the review, acquisition and review of papers, analysis of findings and writing the manuscript.

KG and AT made substantial constributions to the conception and desiqn, review of papers, critical review of the manuscript for important intellectual content, and revisions.

All authors read and approved the final manuscript.

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Figures

Figure 1 - Ecological model for understanding violence

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Figure 2 - Selection of articles for review of alcohol and policy interventions to reduce intimate partner violence

Tables

Table 1 - Studies of alcohol and policy interventions to reduce IPV that met design criteria for assessing the effectiveness of the intervention

Table 2 - Studies of alcohol and policy interventions to reduce IPV that did not meet design criteria but that provided evidence of mediation of alcohol consumption on IPV

Table 1 - Studies of alcohol and policy interventions to reduce IPV that met design criteria for assessing the effectiveness of the intervention

Author (date), country, study design	Study aim	Description of intervention and measures	Population/sample	Reported results for IPV, alcohol use, other relevant outcomes and mediation	Strengths and limitations
Population-level interventions: Alcohol taxation					
Markowitz (2000)[21]; USA; repeated measures/cross-sectional design	To examine the direct relationship between the price of alcohol and violence towards husbands and wives across different states.	***Intervention:*** Changes in the price of liquor, wine and beer as measured by the weighted average of the price of pure alcohol assigned to each person based on the state in which they live. ***IPV measure:*** Self-	National representative population, prices calculated by state.	A 1% increase in the price of pure alcohol was associated with 3.1-3.5% reduced probability of severe wife abuse. No association for violence by wives towards husbands. ***Other outcomes:*** No relationship between the availability of alcohol	Adjusted for socio-economic and demographic factors. Only included in analysis married or concurrently cohabiting couples. Did not assess drinking pattern of individual as possible mediator.

		reported husband and wife abuse (CTS) from 1985 National Family Violence Survey (NFVS) and 1986 and 1987 follow ups.		(number of outlets) and probability of wife abuse.	Limited changes in NFVS and pricing data suggests effect found is weak.
Durrance et al. (2011)[22]; USA; longitudinal design	To evaluate the relationships between alcohol taxes, alcohol consumption and violence towards women.	***Intervention:*** Changes in State-level beer, wine and liquor taxes between 1990-2004, and increase in Federal-level beer, wine and liquor (spirits) tax from 1991- 2004. ***IPV measure:*** State-level female homicide victimization rates from	Forty-six U.S. states and the District of Columbia.	No direct link between alcohol taxes and female homicide. Other outcomes: Increase in beer and wine taxes associated with reduction in per capita beer and wine consumption. Changes in liquor (spirits) tax did not affect liquor consumption.	Controlled for important confounders.

		1990-2004. ***Alcohol consumption:*** per capita consumption from alcohol sales data.		***Mediation:*** 1% reduction in per capita consumption associated with 1.33% decline in female homicide rates	
Zeoli and Webster (2010)[23]; USA; multiple time series design	To assess the relationships between intimate partner homicide and relevant public policies (including alcohol taxes) in large U.S. cities between	***Intervention:*** Changes in Federal, State and local beer excise taxes as measured by alcohol tax index (and other public policies relating to domestic violence – only alcohol-related results described here). ***IPV measure:*** Intimate partner homicide (IPH)	Forty-six of the largest U.S. cities.	Changes in beer taxation not associated with intimate partner homicide.	Strong design for detecting impact of policy changes; controlled for important confounders. Lack of association may have been affected by low variability in taxation (only 14 of 27 states and 2 cities changed taxation level).

	1979 and 2003.	and firearm IPH for period 1979 to 2003 obtained from FBI Supplementary Homicide Reports.			
Community-level interventions: Alcohol restrictions					
Duailibi et al. (2007)[26]; Brazil; longitudinal design	To investigate whether limiting the hours of alcoholic beverage sales in bars had an effect on homicides and violence	***Intervention:*** Introduction of licensing law closing all bars at 11pm in Diadema, São Paulo, Brazil from July 2002. ***IPV measure:*** Police-recorded assaults against women for period 2000 to 2005.	City of Diadema, São Paulo, Brazil, population approximately 360,000. Industrial city, predominantly low socioeconomic status. One of highest homicide rates in Brazil (103	Non-significant reduction (17%) of assaults against women following intervention, 176 assaults (95% CI: -239, 590). ***Other outcomes:*** Significant decrease (44%) in homicides following intervention, 319 homicides (95% CI: 193, 445).	Could not control for local demographic, social and economic changes due to data limitations. Proportion of assaults against women perpetrated by intimate partners v non-intimate partners is not specified.

	against women in a Brazilian city.	***Other:*** Police-recorded homicide data for period 1995 to 2005.	per 100 000 inhabitants) of which 65% alcohol-related. High rate of assaults and most murders of women in or close to bars between 11pm – 6am.		Generalizability only to cities with similar demographics and level of alcohol-related violence.
Community-level interventions: Alcohol outlet density					
Livingston (2011)[36]; Australia; longitudinal time series design	To assess how changes in postcode-level outlet density related to changes in	***Intervention:*** Changes in in the number and density of alcohol outlets. Geographical unit: postcode. ***IPV measure:*** Police-	Melbourne, Australia (city of Melbourne and suburbs - area covering 5,600m^2, approximately	Increase in outlet density associated with a small increase in domestic violence incidents recorded by police; strong association with packaged liquor (off-	Strong design with long time period enabling assessment of changes over time. Controlled for neighborhood socioeconomic and

	domestic violence rates over a 10-year period (1996-2005).	recorded domestic violence incident data for period 1995 to 2005.	3,350,000 residents).	premises) outlets. An increase of one package outlet per 1,000 residents associated with 28.6% increase in domestic violence rate (B=1.36, p< 0.01).	demographic characteristics. Controlled for spatial autocorrelation. IPV measure (police-reported IPV) likely to under-represent incidence of IPV.
Cunradi et al. (2011)[37]; USA; longitudinal design	To determine if changes in alcohol outlet density are related to changes in rates of IPV-related police calls and	***Intervention:*** Changes in the number and density of alcohol outlets. ***IPV measures:*** IPV-related police calls for period 2006 to 2009 (including calls coded	City of Sacramento, California, USA, population approximately 463,794 (2008).	Increase in off-premises alcohol density associated with an increase in IPV-related police call outs. An additional off-premises alcohol outlet associated with 4% increased risk of an IPV call out RR 1.04 (95% CI:	Controlled for neighbourhood socioeconomic and demographic characteristics. Controlled for spatial autocorrelation. Limited to one urban

	IPV-related crime reports in Sacramento, California.	for physical violence and verbal altercation). IPV-related crime reports for period 2001 to 2009.		1.01, 1.07) and 3% for IPV-related crime reports, RR 1.03 (95% CI: 1.00, 1.06). No clear association with on-premises outlets.	area. IPV measure likely to underrepresent the incidence of IPV.
Cunradi et al. (2012)[38]; USA; longitudinal design	To examine the relationship of outlet density and IPV-related emergency department (ED) visits in California.	***Intervention:*** Changes in the number and density of alcohol outlets. ***IPV measure:*** Half yearly counts of IPV-related ED visits for period 2005 to 2008.	State of California, USA.	Increase in on-premises alcohol density (bars and pubs) associated with an increase in IPV-related ED visits. An increase of one on-premises outlet per square mile associated with 3% increased risk of ED visit, RR 1.030 (95% CI: 1.02, 1.05). An increase of one off-premises outlet density	Controlled for neighbourhood socioeconomic and demographic characteristics. Controlled for spatial autocorrelation. IPV measure (ED visits) likely to represent more severe IPV resulting in physical injury.

				associated with nonsignificant decrease in risk of ED visit for IPV, RR 0.99 (95% CI: 0.99, 0.10).	
Individual/couple-level interventions: Treatment					
Stuart et al. (2013)[62]; USA; RCT	To examine whether adding adjunctive alcohol intervention to batterer intervention reduced both substance use and violence compared to	***Intervention:*** Standard Batterer Program (40 hours) plus one-off 90-minute motivational alcohol intervention (SBP+AI) (*n*=123) Control: Standard Batterer Program which included one session on substance use and violence (SBP) (*n*=129)	252 hazardous drinking men in batterer intervention programs recruited from 5 sites. 98% court ordered. Mean age: Intervention group: 31.5 years (SD 9.6); Control group: 31.6 years (SD 9.9).	***IPV outcomes:*** No significant differences between groups in physical IPV. Secondary analyses, intervention group reported less severe physical aggression (Incidence Rate Ratio=0.18, (95% CI: 0.05, 0.65, *p*=0.009) at 3 months, but not 6- or 12-months; less severe psychological	Sample size calculations showed adequate power for alcohol use outcomes but limited power to detect effects for IPV; reduced sample size as a result of 28% of relationships ending during 12-month follow up. Urn randomization.

	batterer intervention alone.	3-, 6-, and 12-month follow up ***IPV measures:*** Self-reported frequency of any physical violence (primary outcome) and psychological aggression (CTS2); arrest records for any IPV for the 12 months following intervention. ***Alcohol use:*** Primary substance use outcome = drinks per drinking day (DPDD) measured by self-report (TLFB);	Relationship length: Intervention group: 5.5 (SD 5.9); Control group: 5.4 (SD 5.3). Ethnicity: White - Intervention group 71.5%; Control group: 72.1%.	aggression at 3 months (B= -1.24, 95% CI: -2.47, -0.02, *p*=0.01); and fewer injuries to partners at 3- and 6-month follow up. (IRR= 0.33, 95% CI: 0.12, 0.92, *p*=0.03). ***Alcohol outcomes:*** Intervention group reported consuming fewer DPDD at 3-months than control (B= -1.36, 95% CI: -2.65, -0.04, *p*=0.04) but not 6- and 12-months; significantly greater abstinence at 3-months (B=0.09, 95% CI: 0.03, 0.14, *p*=0.002) and 6-months	Good retention rates that dropped slightly at 12-months. Intent to treat analysis. No description of how missing data were accounted for. Tested adjustment for clustering in five sites. Did not use partner corroboration of violence and substance use. Acknowledged that arrest not good equivalence for IPV.

		percentage of Days Abstinent from Alcohol (PDAAD); percentage Heavy Drinking Days (PHDD).		(B=0.06, 95% CI: 0.01, 0.11, *p*=0.01) but not at 12-months. ***Mediation:*** Changes in alcohol consumption coincided with changes in IPV.	
Mbilinyi et al. (2011)[63]; USA; RCT	To evaluate telephone-delivered motivational enhancement therapy in motivating entry into treatment among non-	***Intervention:*** Personalised motivational enhancement therapy (MET) delivered by telephone (60-90mins feedback session) (*n*=49). Control: Education materials delivered by	124 male IPV perpetrators recruited from the community through media advertising. 134 eligible, 124 randomized, 9 did not complete MET. 43% had substance use disorder.	***IPV outcomes:*** Men receiving MET reported engaging in IPV less frequently at 30-day follow-up compared to control group. ***Alcohol outcomes:*** Follow-up substance use (43% of sample) was strongly associated with baseline	Non-mandated, non-treatment seeking population. Good retention rates with only small loss to follow up (intention-to-treat analysis). Short follow-up period. Reliance on self-reported data.

	mandated and nontreatment seeking intimate partner violence perpetrators who also used substances.	mail (*n*=66). 1-week, 30 day follow up. ***IPV measures:*** (secondary outcome). Self-reported physical/injurious behavior and psychological abuse (CTS2). ***Alcohol use:*** Self report (Daily Drinking Questionnaire).	Mean age= 39.4 years Ethnicity: 65% White/ Caucasian; 35% men of color.	substance use and no relationship with intervention condition. Average number of drinks was lower at follow up than at baseline but authors note caution with interpreting these findings because alcohol use was considerably skewed.	No partner corroboration for IPV.
Woodin and O'Leary (2010)[64]; USA;	To examine the effectiveness of motivational	***Intervention:*** Individualized motivational feedback	49 dating college couples with male perpetration of	***IPV outcomes:*** Significant overall reduction in physical aggression perpetration over	Non-treatment seeking sample. Used any aggression

RCT	interviewing as a targeted prevention approach for partner aggression in emerging adulthood.	(45 mins) targeting physical aggression and risk factors (including alcohol use). Control: Minimal, non-motivational feedback (10 mins). 3-, 6- and 9-months follow up. ***IPV measures:*** Self-reported psychological and moderate physical partner aggression (CTS2). ***Alcohol use:*** AUDIT.	physical aggression. Recruited from one university site via advertising. Mean age for women 19.64 (SD=1.26) and men 20.28 (SD=1.42) Average relationship length 21.47 months (SD=18.37).	time (effect size *d*=0.58, *p*<0.05) but intervention group reduced their physical aggression at a significantly greater rate than the control group (*d*=0.56, *p*<0.05). ***Alcohol outcomes:*** Reduction in harmful alcohol consumption in intervention group *(d*=0.70, *p*<0.05). ***Mediation:*** Reduction of alcohol use was not related to changes in physical aggression.	reported by either partner to minimize under-reporting. No description of randomization. Small sample. No power calculation. Particularly low follow up participation by male partners.
Easton et al.	To evaluate the	***Intervention:*** 12-week	85 alcohol	***IPV outcomes:*** Trend for	Objective measures of

(2007)[65]; USA; RCT pilot	efficacy of a twelve-session cognitive behavioural group therapy for alcohol-dependent males with co-occurring interpersonal violence.	group-based cognitive behavioural treatment integrating Substance Abuse-Domestic Violence Treatment Approach (SADV) (*n*=40). Control: 12-week Twelve Step Facilitation (TSF) (*n*=38). 12-week, 6-months follow up. ***IPV measures:*** Self-reported physical violence (CTS2) and collateral reports from	dependent males arrested for domestic violence. Recruited from substance abuse outpatient treatment. 78 randomized, 75 started treatment, 62 completed (79% retention). Mean age = 38 years Ethnicity: 49% Caucasian, 33% African American,	greater reductions in frequency of violent episodes for participants in SADV condition compared to TSF group (F=3.3, *p*<0.09). No significant difference between groups at 6 month follow-up. ***Alcohol outcomes:*** SADV group had significantly more days abstinent compared to controls during treatment period (F= 5.4, *p*<0.02). No significant difference on breathalyzer and urine toxicology and no between	substance use. Corroboration of IPV self-report by female partners (55%). Urn randomization by computer. Small sample. No power calculation. Groups differed at baseline on key variables including physical violence (intervention group reported more physical episodes at baseline F=3.33, *p*<0.06), marital

	female partners (55%). ***Alcohol use:*** Self-report (TLFB), breathalyzer, and urine toxicology.	10% Hispanic.	group differences at 6 months. ***Mediation:*** SADV group showed greater improvement in both alcohol consumption and IPV, although both effects had disappeared at 6 months.	status, prior alcohol treatment and years of marijuana use. Majority of TSF group living alone and no intact relationship.

AUDIT – Alcohol Use Disorders Identification Test

CTS – Conflict Tactics Scale

CTS2 – Revised Conflict Tactics Scale

TLFB – Timeline Follow Back Interview

TLFB-SV – Timeline Follow Back Interview for Spousal Violence

Table 2 - Studies of alcohol and policy interventions to reduce IPV that did not meet design criteria but that provided evidence of mediation of alcohol consumption on IPV

Author (date), country, study design	Study aim	Description of intervention and outcome measures	Population/sample	Reported results for IPV, alcohol use, other relevant outcomes and mediation
Community-level interventions: Alcohol outlet density				
Liang & Chikritzhs (2011)[39]; Australia; cross-sectional design	To investigate the effect of outlet numbers and alcohol sales on the risk of assault in Western Australia for period 2000/2001.	Alcohol outlet density – numbers of outlets and wholesale volume of alcohol sold by outlet. Geographical unit: local government level. ***IPV measure:*** Violent assault	Western Australia, population approximately 1.9 million in 2000/2001.	Increase in alcohol sales volume from off-premises outlets associated with increased risk of violence in private residences - incident rate ratio IRR 1.261 (95% CI: 1.11, 1.43, $p<0.05$). For every 10,000 additional litres of pure alcohol sold by an off-site outlet, the risk of violence in residential premises increased by 26%. No association with *numbers* of outlet (density) and assaults on residential premises. No association between IPV and on-premises outlet

		offences reported to police categorized by location (assaults at private residences proxy for IPV).		density or alcohol sales volume. ***Mediation:*** Interpreting alcohol sales as a proxy for consumption suggests support for mediating effect of alcohol consumption in the relationship between outlet density and IPV.
McKinney et al (2009)[40]; USA; multi-level cross-sectional design	To investigate whether alcohol outlet density is associated with male to female partner violence (MFPV) and female-to-male partner violence (FMPV), and whether this	Alcohol outlet density of the zip code where survey participants resided measured as number of outlets per 10 000 persons (1997 licensing records) divided by total population size (1990 U.S. Census).	National population-based sample in USA (1,597 married/cohabiting couples) from 1995 survey.	An increase in alcohol outlet density was associated with an increased risk of MFPV violence: OR 1.03 (95% CI: 1.00, 1.05, *p*=0.01). No association found with FMPV. Increase in *on-premises* outlet density was associated with an increased risk of MFPV OR 1.03 (95% CI: 1.00, 1.05, *p*=0.01). No association between *off-premises* outlet density and either type of partner violence. ***Mediation:*** The relationship between outlet density and MFPV was stronger for couples who had

	association is stronger for risky drinkers (binge drinkers or with alcohol problems)	***IPV measure:*** Couple-level measures from 1995 national population survey of self-reported MFPV and FMPV and physical violence (CTS). ***Alcohol use***: self-reported binge drinking and alcohol-related problems reported from same survey.		alcohol problems.
Roman & Reid (2012)[41]; USA;	To test whether the density of	Geographic unit for outlet density:	District of Colombia, Washington USA.	An increase in off-premises outlet density was associated with an increase in domestic violence

cross-sectional design	alcohol outlets across neighbourhoods is positively associated with police calls for service for domestic violence.	outlets per square mile. ***IPV measure:*** Number and time of 911 calls to police for domestic violence (1 Jan 2005 – 31 Dec 2006).	High crime, metropolitan area. 581,530 residents (2006 census) Used 431 of 433 block groups; average 573 households and 1,304 residents. High youth (20% under 18yo) and high black population (60%) compared with white (31%).	(b=0.012 p<0.001) but an increase in on-premises outlet density was associated with decrease in 911 calls to police for domestic violence (b= -0.005 p<.001). ***Mediation:*** stronger relationship between off-premises outlet density and IPV on weekends (b=.003 p<0.01) suggesting that effect of density is greater during times when heavier drinking more likely to occur.
Individual/couple-level interventions: Treatment				
Mignone et al (2009)[49]; USA; post-treatment survival analysis.	To investigate whether time to relapse to violence was	***Intervention:*** Individual-based alcoholism treatment (outpatient).	147 male alcoholic IPV perpetrators and non-alcoholic female partners recruited from alcoholism	***Mediation:*** Those who relapsed to alcohol were much more likely to relapse to physical aggression. Odds of any male-to-female partner violence was more than 3.7 times and odds of severe violence 6

	related to male partner's relapse to alcohol after treatment. Also considered the moderating effects of female partner drinking and anti-social personality disorder (ASPD).	12-month follow up. ***IPV measures:*** Self-reported physical aggression (CTS; TLFB-SV); survival analysis to assess time to relapse to violence. ***Alcohol use:*** Daily drinking log completed by both partners.	treatment program. Mean age males = 32.1 years (SD 8.9); females 30.7 years (SD 7.7). Ethnicity (males): Caucasian 54%; African-American 27%; Hispanic 13%.	times greater for those who relapsed than those who did not. Female alcohol consumption increased the likelihood of victimization depending on her level of consumption; heavier consumption increased the risk of experiencing severe violence Significantly stronger relationship between alcohol use and non-severe violence among men diagnosed with ASPD; not significant for severe violence.
O'Farrell and Murphy (1995)[50]; O'Farrell et al	To examine the prevalence and frequency of	***Intervention:*** Behavioural Marital Therapy (outpatient,	88 male alcoholics and wives treated at Veterans Affairs Medical Clinic,	Prevalence and frequency of violence significantly decreased in 12- and 24 months after BMT compared to 12 months before BMT but remained

(1999)[51]; O'Farrell et al (2000)[52]; USA; pre-post design; non-concurrent comparison group.	marital violence in male alcoholics and their wives after Behavioural Marital Therapy (BMT) 12-months and 24-months post treatment. To examine the frequency and prevalence of verbal aggression in male alcoholics	couples-based). ***IPV measures:*** Self-reported violence (CTS); verbal aggression (CTS). ***Alcohol use:*** Self report (TLFB).	and two year follow up of 75 of 88 participants. Mean age: males 43.5 (SD 9.0) females 41.6 (9.7) Ethnicity: White 98.9% males, 98.9% females. Length of relationship: 13.9 years (SD 9.9). Compared IPV with demographically matched non-alcoholic comparison sample from 1985 National Family Violence Re-Survey.	significantly elevated relative to matched non-alcoholic sample. No change between first and second year. Significant decreases for both alcoholic men and their wives in verbal aggression in first and second year after BMT though violence levels remained elevated relative to matched normal comparison sample. ***Mediation:*** Remitted alcoholics no longer had elevated domestic violence levels whereas relapsed alcoholics did. Frequency of violence correlated with number of days drinking. Relapsed alcoholics and wives more verbally aggressive than remitted alcoholics and comparison sample.

	and their wives 24-months after BMT.			
O'Farrell et al (2003)[53]; USA; pre-post design; non-concurrent comparison group.	To examine partner violence in the year before and year after alcoholism treatment for male alcoholic patients.	***Intervention:*** Individual-based alcoholism treatment (outpatient). Comparison 12-months prior and 12-months post treatment. ***IPV measures:*** Self-reported male and female-perpetrated violence and verbal aggression (CTS).	301 male alcoholics entered into treatment in two outpatient clinics. Mean age: males 42.1 (SD 12.6) females 39.2 (12.6) Ethnicity: White 80.7% males, 79.1% females. Length of relationship: 10.2 years (SD 8.0). Compared IPV with demographically matched non-alcoholic comparison sample from 1985	Violence towards wives decreased significantly from 56% to 25% but still higher than comparison group. Significant increase in percentage days abstinent. ***Mediation:*** Couples where alcoholic patient relapsed had significantly greater verbal aggression and overall violence than remitted patients. No difference between groups for severe violence or males' elevated verbal aggression.

		Alcohol use: Self report (TLFB).	National Family Violence Re-Survey.	
O'Farrell et al (2004)[54]; USA; pre- and post-test design; non-concurrent comparison group.	To examine partner aggression among male alcoholic patients and their female partners in the year before and two years after Behavioural Couples Therapy.	***Intervention:*** Behavioural Couples Therapy (BCT). 12- and 24- month follow up. ***IPV measure:*** Self-reported verbal aggression and violence (CTS). ***Alcohol use:*** Self-report (TLFB).	303 male alcoholic patients and female partners. Recruited from four project sites where couples had signed up to participate in Counseling for Alcoholics' Marriages (CALM) program. Mean age: males 43.3 (SD 10.0) females 41.1 (9.9) Ethnicity: White 95.4% males, 96.4% females. Length of relationship: 13.2 years (SD 10.7).	Partner aggression and violence decreased in first and second year after BCT from year before BCT but still higher than comparison sample. ***Mediation:*** Clinically significant violence reductions in patients whose alcoholism was remitted after BCT (violence reduced to almost same level as comparison sample and 30% less than relapsed patients).

			Compared IPV with demographically matched non-alcoholic comparison sample from 1985 National Family Violence Re-Survey.	
Rotunda et al (2008)[55]; USA; pre- and post-test design; no comparison group.	To compare drinking, relationship and psychological distress outcomes before and after BCT for male veterans.	***Intervention:*** Behavioural Couples Therapy (BCT) (outpatient). 12-month follow up. ***IPV measure:*** Self-reported male-to-female violence (CTS).	38 male alcohol dependent veterans with PTSD (*n*=19) or without PTSD (*n*=19) and female partners recruited from Veterans Affairs Outpatient BCT program. Mean age = PTSD group 48.32 (SD 7.70); without PTSD 48.16 (SD 8.30).	***Mediation:*** After treatment, both groups showed reductions in drinking and negative consequences of drinking, increased relationship satisfaction and decrease in frequency of male-to-female violence.

			Length of relationship: PTSD group 14.43 (SD 13.03); without PTSD 13.42 (SD 11.47). Ethnicity: White 94.74% both groups.	
Schumm et al (2009)[56]; USA; pre- and post-test design; non-concurrent comparison group.	To examine partner violence before and 12- and 24-months after BCT.	***Intervention:*** Behavioural Couples Therapy (BCT). 12- and 24-month follow up. ***IPV measures:*** Self-reported male and female-perpetrated verbal aggression, overall violence, and	103 female alcoholic patients and male partners recruited from four project sites where couples had signed up to participate in Counseling for Alcoholics' Marriages (CALM) program. Mean age = 39.96 years (SD 8.10)	Before BCT, female alcoholic patients and male partners had elevated violence levels compared to non-alcoholic comparison group. In first and second year after BCT, female-perpetrated violence decreased significantly from before BCT. Male partner aggression also significantly reduced in first and second year after BCT, except for prevalence and frequency of severe violence at 12-months. ***Mediation:*** Women and men's aggression

		severe violence (CTS). **Alcohol use:** Self-report (TLFB).	Relationship length 11.17 (SD 9.46). Ethnicity: White (92%). Compared IPV with demographically matched non-alcoholic comparison sample from 1985 National Family Violence Re-Survey.	generally significantly lower for remitted than relapsed cases (to level of matched comparison) though reductions did not reach significance in second year; no difference between groups for severe violence by both partners.
Taft et al (2010)[57]; USA; pre- and post test; no comparison group	To examine static and time-varying risk factors for perpetration of IPV among men in alcohol	***Intervention:*** Standard individual-based alcoholism treatment (inpatient, outpatient). 6- and 12-month follow up.	178 male alcoholics (and female partners) with IPV perpetration at baseline (*n*=75) and without (*n*=103). Recruited from alcoholism treatment program.	Those who reported IPV at baseline showed significant declines in IPV following treatment (43% at 6-months and 36% at 12-months). For those without baseline IPV, new incidence of IPV 15% at 6-months and 7% at 12-months. ***Mediation:*** Alcohol use was not associated with IPV recurrence among those who reported IPV at

	treatment.	***IPV measure:*** Self-reported male physical aggression (CTS2). ***Alcohol use:*** Self-report (TLFB).	Mean age = 41.0 years (SD 8.5). Years living together = 10.7 (SD 9.1) Ethnicity: European American (85%).	baseline. However alcohol use was associated with new incidents of IPV among those without prior reported IPV.

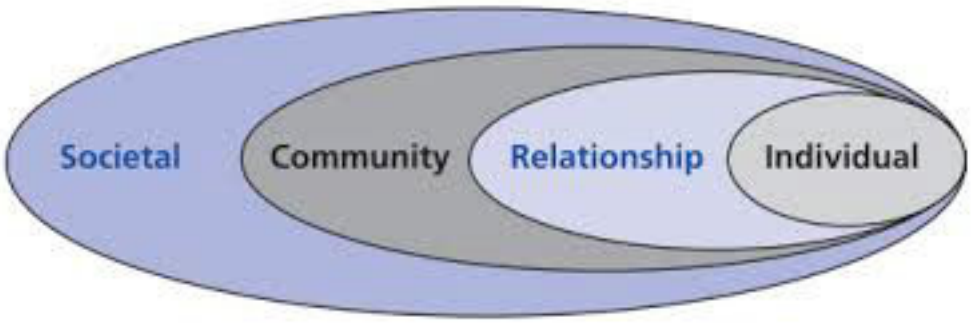


Figure 1

Fig. 2. Selection of articles for review of alcohol and policy interventions to reduce intimate partner violence

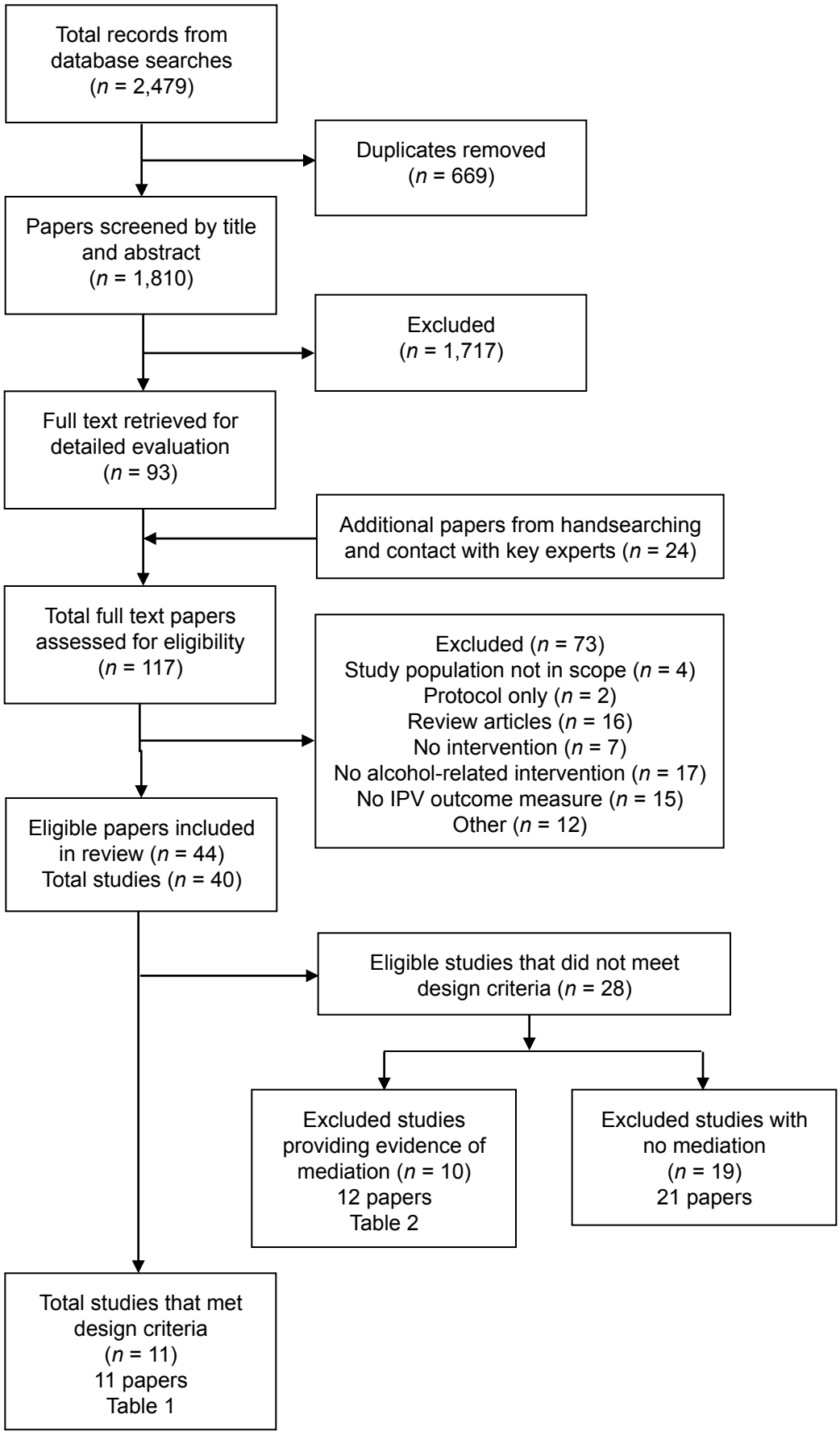
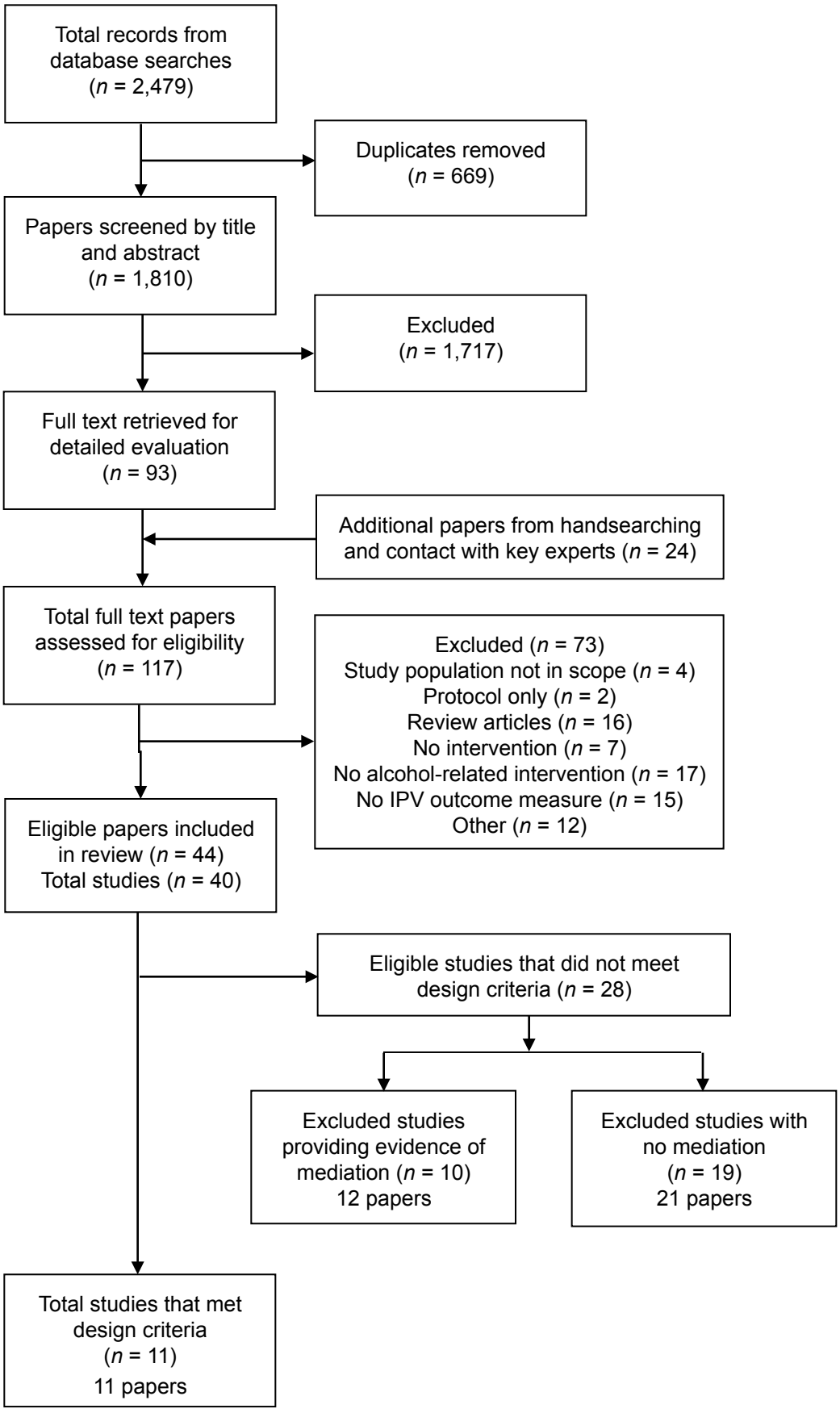


Figure 2


Total records from database searches (n = 2,479)
Duplicates removed (n = 669)
Papers screened by title and abstract (n = 1,810)
Excluded (n = 1,717)
Full text retrieved for detailed evaluation (n = 93)
Additional papers from handsearching and contact with key experts (n = 24)
Total full text papers assessed for eligibility (n = 117)
Excluded (n = 73)
Study population not in scope (n = 4)
Protocol only (n = 2)
Review articles (n = 16)
No intervention (n = 7)
No alcohol-related intervention (n = 17)
No IPV outcome measure (n = 15)
Other (n = 12)
Eligible papers included in review (n = 44)
Total studies (n = 40)
Eligible studies that did not meet design criteria (n = 28)
Excluded studies providing evidence of mediation (n = 10)
12 papers
Excluded studies with no mediation (n = 19)
21 papers
Total studies that met design criteria (n = 11)
11 papers