

Intimate partner violence victimization and alcohol consumption in women: a systematic review and meta-analysis

Karen M. Devries¹, Jennifer C. Child¹, Loraine J. Bacchus¹, Joelle Mak¹, Gail Falder¹, Kathryn Graham^{2,3,4,5}, Charlotte Watts¹ & Lori Heise¹

London School of Hygiene and Tropical Medicine, London, UK,¹ Social and Epidemiological Research Department, Centre for Addiction and Mental Health, London, Ontario, Canada,² Department of Psychology, University of Western Ontario, London, Ontario, Canada,³ Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada⁴ and National Drug Research Institute, Curtin University, Perth, Western Australia, Australia⁵

ABSTRACT

Aims To examine the evidence of association between intimate partner physical or sexual violence (IPV) victimization and alcohol consumption in women. **Methods** We conducted a systematic review and meta-analysis of cross-sectional and longitudinal studies released before 6 June 2013. Studies providing an estimate of association between violence and alcohol consumption or alcohol use disorders were eligible for inclusion. Quality was assessed and random effects meta-analyses used to generate pooled odds ratios (OR) where appropriate. Higgins I^2 where $P < 0.10$ was taken to indicate heterogeneity. **Results** Fifty-five studies providing 102 estimates of association met the inclusion criteria. Most estimates were not controlled for partner alcohol use and other key confounders. Seven longitudinal studies provided 12 estimates of the association between alcohol and subsequent IPV; nine of 12 estimates showed a direction of increased odds of subsequent IPV, pooled OR = 1.27 [95% confidence interval (CI) = 1.07–1.52], $I^2 = 0\%$, $P = 0.437$. Nine longitudinal studies provided 15 estimates of association between IPV and subsequent alcohol use; 14 of 15 estimates showed a direction of increased odds of subsequent alcohol use, pooled OR = 1.25 (95% CI 1.02–1.52), $I^2 = 0\%$, $P = 0.751$. Cross-sectional studies showed an association between IPV and alcohol use, pooled OR = 1.80, 95% CI 1.58–2.06, but with substantial heterogeneity, $I^2 = 60.8\%$, $P < 0.0001$. Definition of alcohol use partly accounted for heterogeneity in cross-sectional estimates. **Conclusions** There is a clear positive association between alcohol use and intimate partner physical or sexual violence victimization among women, suggesting a need for programming and research that addresses this link. However, the temporal direction of the association remains unclear. Longitudinal studies with multiple waves of data collection are needed.

Keywords Alcohol consumption, intimate partner violence, women.

Correspondence to: Karen M. Devries, London School of Hygiene and Tropical Medicine, Gender Violence and Health Centre, 15–17 Tavistock Place, London WC1H 7SH, UK. E-mail: Karen.Devries@lshtm.ac.uk

Submitted 27 March 2013; initial review completed 15 May 2013; final version accepted 21 October 2013

INTRODUCTION

Both alcohol use and intimate partner violence are key public health concerns [1–3]. Globally, alcohol accounts for 3.8% of deaths and the loss of 4.5% of all disability-adjusted life years (DALYs) per year [1]. Intimate partner violence against women is also a major health problem world-wide, with 30% of ever-partnered women having experienced physical and/or sexual IPV in their life-time [4]. IPV experience is associated with short- and long-term health consequences in women, ranging from direct

physical trauma to poor sexual and reproductive health [5,6], post-traumatic stress disorder, anxiety and depression [7–11] and poor pregnancy outcomes [12]. In severe instances it can also lead to intimate femicide [13–15].

There is abundant evidence of an association between alcohol use and intimate partner violence, particularly around IPV perpetration by men [16–21]. However, the nature of the linkage between alcohol consumption by women and their experiences of IPV is less clear. Alcohol use can be both a cause and a consequence of experiencing violence. In particular, women may drink alcohol

to cope with the traumatic sequelae of abuse [22]. Conversely, women's consumption of alcohol may lead to abuse from their partners; for example, because partners perceive them to have behaved in an unacceptable way or to have transgressed a gender norm or to be a more 'deserving' victim because they have been drinking. The relationship between alcohol use and IPV victimization is also likely to be confounded by partner alcohol use, as women and men may drink together and men's alcohol use is strongly linked with IPV perpetration [23]. It is also possible that both intimate partner violence and alcohol consumption are both caused by a third factor, such as previous trauma, partner choice or mental health issues such as depression [11].

To reduce the considerable public health burden that results from alcohol use and violence, it is essential to understand the extent that women's experience of violence is associated with alcohol use. Previous reviews on the topic have shown positive associations between women's alcohol use and increased likelihood of victimization [24–26]; however, even the most recent reviews [25,26] were limited to studies conducted before 2000. In addition, two reviews [23,24] focused only on physical intimate partner violence, and included clinical samples which can skew population estimates, while the third review [24] grouped alcohol with other psychoactive drugs, thus precluding an estimate of the relationship between IPV and alcohol use. Finally, none of these reviews considered estimates from longitudinal studies separately.

To address the limitations of previous reviews, we conducted a systematic review and meta-analysis, examining: (i) the evidence of association between women's alcohol use, alcohol use disorders and experience of physical and/or sexual intimate partner violence victimization; (ii) the direction, magnitude and consistency of the association; and (iii) sources of heterogeneity in estimates. This systematic review was undertaken as part of the Global Burden of Disease (GBD) Study 2010 by the Expert group on Intimate Partner Violence (co-chaired by C.W.). The GBD study estimated the disease burden associated with a range of conditions, including exposure to IPV and alcohol [27].

METHODS

Search strategy

We sought published and unpublished studies in all languages from all regions of the world. We searched 23 databases from first records until 2008, and updated the search in the major databases for articles from 2008 to June 06 2013 (listed in Appendix 1). Comprehensive search strategies were developed using the controlled

vocabularies of each database, using terms such as 'domestic violence', 'alcohol' and terms to identify appropriate study designs [11]. Researchers were contacted to identify additional studies, and we searched the internet to find additional population-based surveys.

Study selection

The flow of studies through the review is described in Fig. 1. Case-control, cross-sectional and cohort studies that included female participants and examined the association between IPV and alcohol were eligible for inclusion. Studies could conceptualize alcohol both as a potential risk factor for or as an outcome of IPV. Studies needed to report a separate estimate of association for female populations to be included. We sought to identify studies that could provide estimates of association applicable to the general population, hence we excluded cross-sectional studies conducted on clinical and other subpopulations (for example, studies looking at the association between IPV and alcohol use among female suicidal inpatients, pregnant women or other subpopulations, because these conditions may be related to either IPV or alcohol use). We also excluded case-control studies that drew their control populations from clinical samples because this is likely to lead to biased estimates. Longitudinal studies on any population were included, because they can provide within-subjects comparisons. Intervention studies analysed as cohorts were also eligible for inclusion.

Intimate partner violence

Studies reporting any definition of physical and/or sexual violence, experienced when the participant was 15 years of age or older, perpetrated by any definition of 'intimate partner', were considered. Although emotional and financial forms of intimate partner violence are important, these forms of violence were excluded from the GBD 2010 project and from the present review because of the extremely limited data on prevalence and health effects available globally, and the lack of standard measurement of these constructs.

Alcohol use

Alcohol measures of interest included both alcohol consumption and alcohol use disorders based on codes from the International Classification of Diseases (ICD) version 10 (ICD-10-F10). Any author definitions of these terms were accepted and the influence of definition is examined in the analysis. Studies examining only partner alcohol use were excluded.

Data extraction

Study characteristics, quality information and estimates of association were entered into a specially designed data

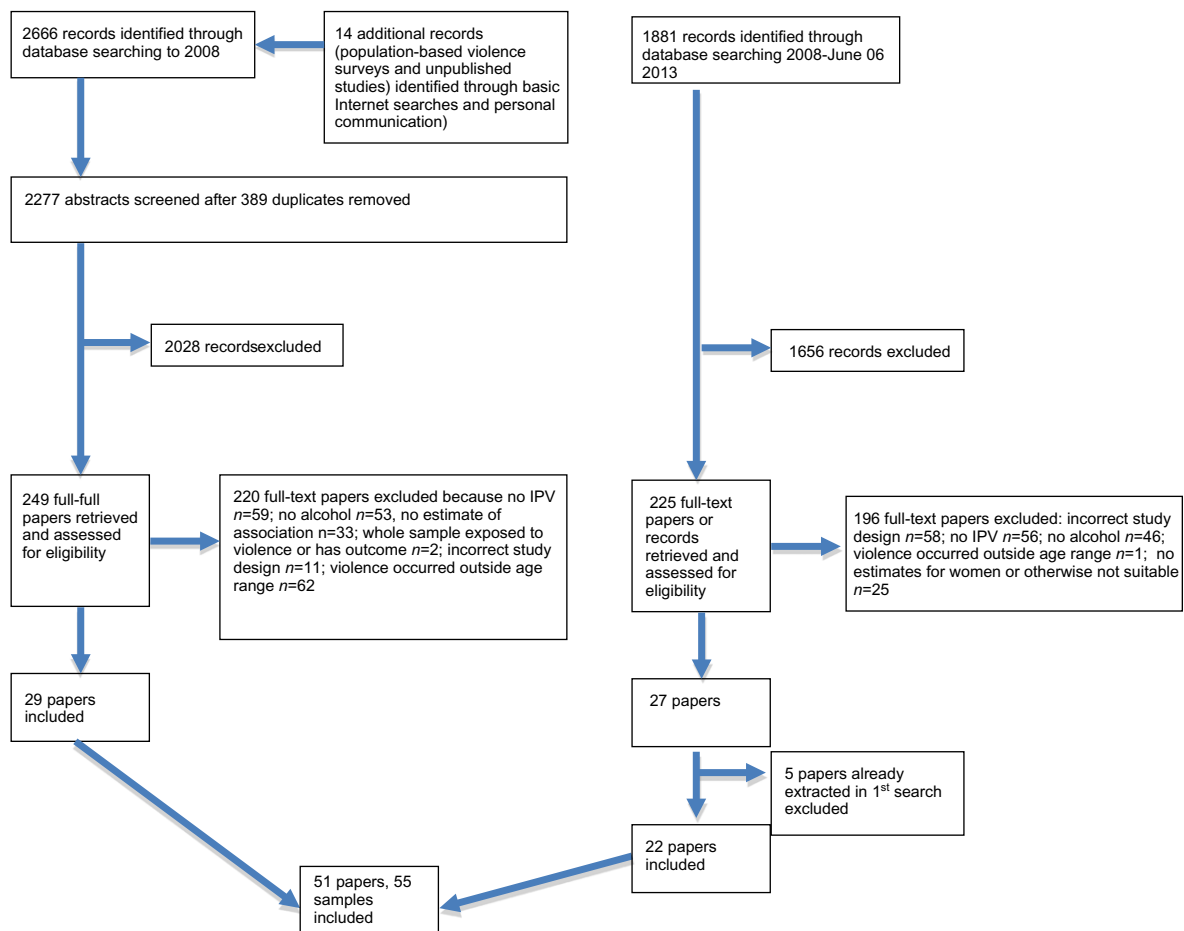


Figure 1 Flow of studies throughout the review

extraction form using Epidata Entry version 3.1. We used a range of items to collect information related to quality, drawing on bias assessment tools for different study designs from the UK National Institutes of Clinical Excellence [22] and the Cochrane EPOC Group [28]. Data from studies were extracted by trained violence researchers fluent in the language used by study authors (J.C., G.E., J.M.). Extracted data for all included studies were checked by K.D. for accuracy and completeness. Wherever possible, multivariate measures of association were extracted rather than bivariate results. We collected information on any confounders that were controlled for in analyses.

Quality assessment

We considered studies measuring intimate partner violence and/or alcohol consumption at more than one time-point to provide higher quality evidence of association because it is possible to have information on the timing of exposure and outcome, which lends support to a possible causal association. Cross-sectional and case-control studies that collect data at one time-point only were considered to provide lower quality evidence.

We also considered the quality of the measure of exposure to intimate partner violence. There is evidence that in a wide range of settings, women's experiences of physical and sexual violence by intimate partners are moderately correlated [29]. This means that studies that consider only one form of violence and classify women as exposed or unexposed to that type of violence will be misclassifying a substantial proportion of women. For example, a study measuring alcohol use in women who have experienced physical violence versus those who have not could actually have a substantial proportion of sexual violence cases in the 'no physical violence' category. This misclassification would dilute potential associations between alcohol use and violence; hence, we consider studies that construct an 'unexposed' reference group of women who have experienced neither physical nor sexual violence to be less biased.

In assessing control for confounding, we paid particular attention to variables related to both violence and alcohol use. These included age, income, employment and marital status, history of childhood physical/sexual/psychological abuse or non-partner violence experienced as an adult, concurrent or previous use of substances

other than alcohol and partner alcohol use. We also recorded whether longitudinal studies controlled for baseline levels of the outcome variable.

Statistical analysis

All analyses were conducted using STATA version 13.0. We provide descriptive data on study characteristics and quality and results by type of study design. We pooled odds ratios (ORs) by study design, using random-effects meta-analyses. We chose a random-effects approach because it allows study estimates to vary by setting (whereas fixed-effects models assume that all variation is due to chance) [30].

We hypothesized a priori that alcohol use definition would explain some heterogeneity, and we present results stratified by type of alcohol use. Some studies reported more than one estimate; thus, the total number of estimates exceeds the total number of studies. In our pooled analysis, only one estimate from each data source was included (the estimates judged to be the least biased as described in the Quality assessment section above). Higgins' I^2 was used to assess heterogeneity, with $P < 0.10$ taken as indicative of heterogeneity. I^2 describes the total variation across studies due to underlying differences between studies, rather than chance [31]. We assessed publication bias visually using a contour funnel plot (Appendix 2).

RESULTS

Study characteristics

In total, 55 studies described in 51 publications met our inclusion criteria, providing 102 estimates of association between physical and/or sexual intimate partner violence and alcohol use or disorder (see Appendix 3 for study details). A number of US samples were described in multiple publications: two papers each, Foshee *et al.* [32,33], Youth Risk Behavior Survey (YRBS) 2003 [34,35], 1999 YRBS [36,37]; three papers each (National Violence Against Women Survey [9,10,38]) and National Epidemiologic Survey of Alcohol and Related Conditions [39–41]; and four papers Add Health [42–45]. Two papers described data from the GENder Alcohol and Culture: an International Study (GENACIS) project in 11 countries [46,47] and four from the World Health Organization (WHO) Multi-Country Study on Women's Health and Domestic Violence Against Women Study (WHO MCS) in seven countries [48–51].

Twenty-six studies were from the United States, four samples from Peru [46,48], three from Brazil [46,48], two from New Zealand [52,53], Thailand [48] and Tanzania [48] and one study was drawn from each of Argentina [46] Australia [54], Belize [46], Canada

[46], Chile [55], Columbia [56], Costa Rica [46], Ethiopia [48], Japan [51], Namibia [48], Nicaragua [46], Nigeria [57], South Africa [58], Uganda [59], Uruguay [46] and the Ukraine [60]. Fourteen studies were longitudinal [33,42,52–54,61–69], one was case-control [70] and the remaining were cross-sectional. Seven studies focused on 'dating violence' [33,34,36,42,65,66,71]; the remainder focused on intimate partner violence (in some contexts these studies included adolescents as young as 15 years). We did not uncover evidence of publication bias (Appendix 2).

A number of studies defined problematic alcohol use using the Alcohol Use Disorders Identification Test [72], the Michigan Alcohol Screening Test [70], the Composite International Diagnostic Instrument [60], the Rutgers Alcohol Problem Index [61] and alcohol problems generally [54,67,73]. The most common measures of alcohol variables were frequent use plus binge drinking over a defined period of time (for example, drinking at least one drink per day and/or five or more drinks on one occasion during the past 30 days). GENACIS measured consumption using the Alcohol Use Disorders Identification Test (AUDIT) [46]. In general, confounding of the woman's drinking with that of the partner was not well controlled; only four studies [40,68,69,74] controlled for partner drinking (or reasonable proxies such as conflict over partner drinking [74] or history of alcohol problems in the home [40]).

Findings from longitudinal studies

All 14 longitudinal studies are described in Table 1. We were able to include a subset of longitudinal studies reporting effects in a common metric (ORs with binary violence and alcohol measures) in meta-analyses (Fig. 2).

Alcohol use predicting subsequent IPV

Seven longitudinal studies provided 12 estimates of association between alcohol use and subsequent IPV. Nine of the 12 longitudinal estimates (Table 1) show a positive direction of association between alcohol use and incident IPV, although not all estimates were statistically significant. Sample sizes in these seven studies ranged from 65 to 1291. Follow-up periods ranged from 2 months to 6 years. All populations were from the United States. All but two of the studies used items derived from the Conflict Tactics Scale to measure exposure to violence; four studies constructed violence outcomes as a dichotomous measure; two studies modelled violence as a continuous variable; and one study included both dichotomous and continuous measures of violence. Three of the studies measured physical IPV only [61,62,67]. Alcohol consumption was measured using a variety of scales including 'problem drinking', binge drinking or ever using

Table 1 Studies measuring alcohol use and subsequent intimate partner physical or sexual violence (IPV).

<i>Datasource</i>	<i>Measure IPV</i>	<i>Measure alcohol</i>	<i>Association</i>	<i>Covariates</i>
Chen 2004 [61] 359 adults, USA, 3-year follow-up	Past year physical IPV, CTS, at wave 3 (binary)	Problem drinking at wave 2, RAPI—index score of problems resulting from drink past 3 years (continuous)	$\beta = 0.10, P < 0.001$	Education, currently married, length of time living with partner at time 3
Foshee 2004 [33] 1291 adolescents, USA, 5-year follow-up	Onset of physical violence victimization 'Chronic physical victimization' Onset of sexual violence victimization 'Chronic sexual victimization' (binary-incidence and continuous)	Alcohol use past 30 days, YRBS questions (binary)	HR = 1.19 (0.98–1.46) B = 0.17, $P = 0.05$ HR = 1.02 (0.85–1.24) B = –0.01, $P = 0.94$	Friend victim of dating violence, witnessed domestic violence, hit by adult, mother supervision, acceptability of hitting dates, gender stereotyping, self-esteem, conflict resolution skills, depression, physical fight with a peer, alcohol use, mother's education, race, religious importance, single-parent household, two parents, forced sex by non-date, intervention, 'significant interactions'
Gilbert 2012 [68] 241 adult women, USA, 1 year follow-up	CTS2, physical, sexual IPV and any injury (combined to make any IPV measure) (binary)	The Drug Use and Risk Behavior Questionnaire to provide frequency counts of alcohol use, Binge drinking modelled as binary variable, not further defined	aOR = 1.19 (0.86–1.63)	Wave 1 IPV, age, ethnicity, education, employment, marital status, homelessness, incarceration, childhood sexual abuse, psychological distress, active coping, avoidant coping, partner illicit drug use, partner binge drinking, financial dependency, sexual relationship power scale, unmet need, perceived social support
Marsh-Buzy 2004 [66] 65 adolescents, USA, 2 months follow-up	Physical and/or sexual violence, CTS-R (binary)	Quantity–frequency measure, past 4 months (continuous)	aOR = 3.94, $P = 0.04$	Wave 1 violence victimization
Martino 2005 [62] 509 adult women, USA, 6-year follow-up	Physical IPV, 1 item, past 3 years, aged 23 (binary)	Ever having >4 drinks on one occasion, past 30 days, aged 29 (binary)	OR = 1.58 (1.09–2.30)	Unadjusted
Temple 2008 [69] 509 adult women, USA, 6-year follow-up	Severity of Violence Against Women Scale, threats, physical and sexual IPV, all modelled separately (binary)	Frequency of alcohol consumption on 12 point scale from never to daily; modelled as 4 categories	'Women who used alcohol often sustained significantly more physical violence (mean = 0.50) than women who used alcohol negligibly, rarely, or occasionally (mean = 0.24, 0.22 and 0.25, respectively)'; 'Mean' not defined aOR = 1.20 (0.93–1.56)	Adjusted for time, relationship status, partner drinking, and interactions between these
Testa 2003 [67] 724 adult women, USA, 1-year follow-up	Minor physical IPV, CTS-2, past year form same partner Severe physical IPV, CTS-2 past year same partner Minor Physical IPV, CTS-2, past year from new partner (binary)	Heavy episodic drinking, past 12 months at time1 (binary)	aOR = 1.00 (0.71–1.40) aOR = 0.69 (0.36–1.31)	Race, age, cohabiting, married, time 1 psychological aggression, time 1 minor violence*, marijuana use, hard drug use, *analysis with severe IPV controls for time 1 severe IPV

β = standardized regression coefficient; B = unstandardized regression coefficient; HR = hazard ratio; OR = odds ratio; CTS = Conflict Tactics Scale; CTS-R = Conflict Tactics Scale—revised; RAPI = Rutgers Alcohol Problem Index; YRBS = Youth Risk Behaviour Survey.

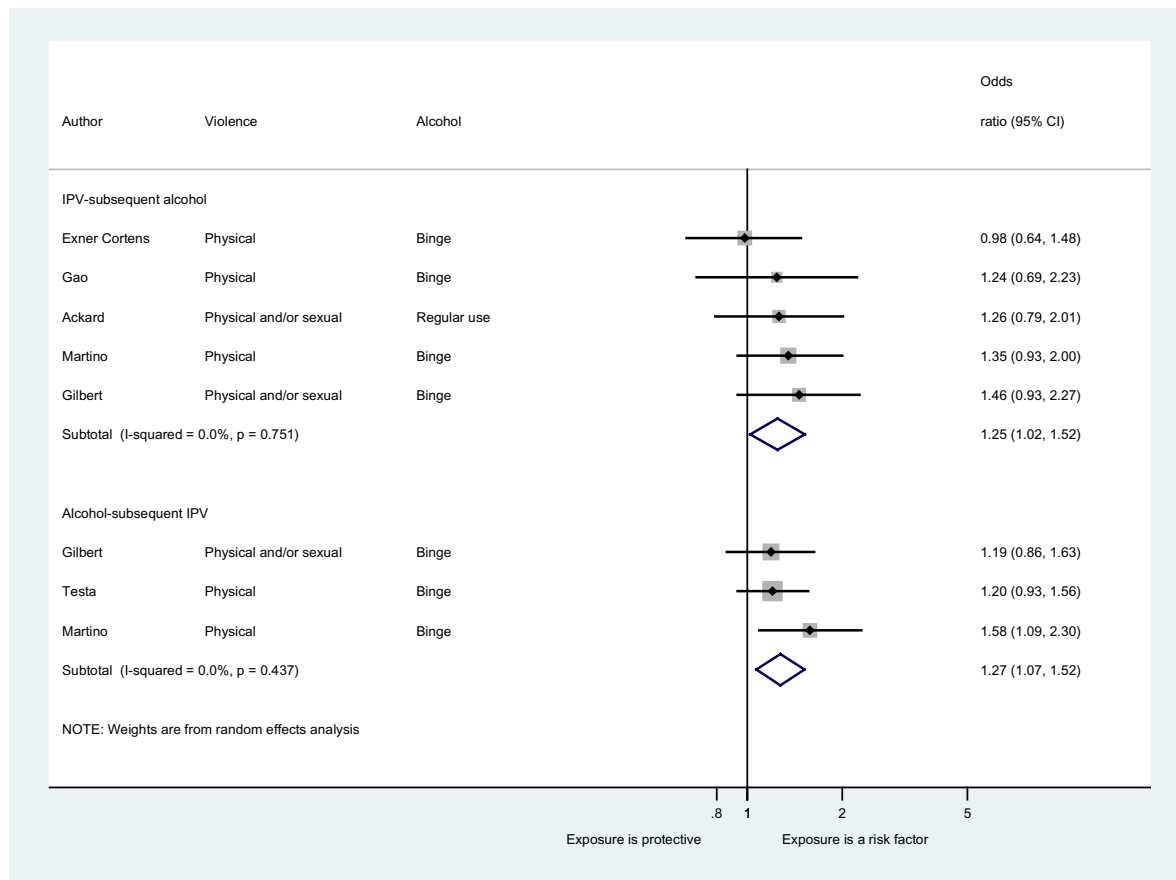


Figure 2 Forest plot, estimates of association between intimate partner physical or sexual violence (IPV) and alcohol consumption in longitudinal studies. Weights given to each study are proportional to the size of the shaded rectangle (the larger the rectangle, the higher the weight). The lozenge or diamond shows the pooled odds ratio (OR) at the highest point, and the 95% confidence interval of the pooled OR at the widest point.

alcohol over a defined time-period; three studies modelled alcohol variables as continuous and four as binary.

In the seven studies examining alcohol use and later IPV, only four accounted for wave 1 violence exposure. Testa, Marsh-Buzy & Gilbert controlled for wave 1 exposure to violence in three studies [67,68,75] and Foshee [76] looked at alcohol use in relation to the onset of violent victimization. Estimates controlling for previous exposure were all in a positive direction, although in the two larger samples with longer follow-up periods (5 years and 1 year, respectively) [67,76], statistical significance was not reached. Marsh-Buzy [66] found a large, statistically significant positive effect in her sample of 65 adolescents followed for 2 months. One longitudinal study reported estimates controlled for partner alcohol use and found that women who drank more frequently reported more physical IPV [69]. The pooled OR from the three studies we were able to include in the meta-analysis (Fig. 2) was OR = 1.27 [95% confidence interval (CI) = 1.07–1.52], with no heterogeneity between studies ($I^2 = 0\%$, $P = 0.437$).

IPV predicting subsequent alcohol use

Nine longitudinal studies with 15 estimates examined whether IPV was associated with later alcohol use. Fourteen of 15 estimates show a positive direction of association between IPV and later alcohol use, although not all were statistically significant (Table 2). Sample sizes in these studies ranged from 509 to 14 739. Follow-up periods ranged from 1 to 30 years. Six samples were from the United States, one was from Australia [54] and two were from New Zealand [34,53]. Four of the studies used items derived from the Conflict Tactics Scale to measure IPV [42,53,54,68], and all used items asking about experience of specific acts of violence. Eight studies constructed violence as a binary measure and one modelled violence as a continuous variable. Five studies measured physical IPV only [42,52,62–64]. Measures of alcohol included abuse/problems, binge drinking and quantity–frequency measures of consumption; seven studies modelled alcohol variables as binary variables and two as continuous variables.

Table 2 Studies measuring intimate partner physical or sexual violence (IPV) and subsequent alcohol use.

<i>Datasource</i>	<i>Measure IPV</i>	<i>Measure alcohol</i>	<i>Association</i>	<i>Covariates</i>
Ackard 2007 [65] 822 adolescents, USA, 3-year follow-up	Physical and/or sexual IPV ever, 5 items (binary)	Past year alcohol consumption weekly or daily versus monthly or less (binary)	aOR = 1.26 (0.79–2.01)	Time 1 alcohol consumption
Boden 2013 [53] 630 adult women, New Zealand, birth cohort followed until age 20–30, 4 waves used here	Physical and/or sexual IPV, CTS2, at each assessment (binary)	Number of symptoms of alcohol abuse/dependence at age 17–30, CIDI, DSM-IV criteria (binary-incidence)	IRR, 1–2 symptoms versus 0 = 1.58 (1.37–1.82) IRR, 3–4 symptoms versus 0 = 2.50 (1.88–2.89) IRR, 5+ symptoms versus 0 = 3.38 (2.57–6.03) aOR = 0.98 (0.64 to 1.48)	Unadjusted
Exner-Cortens 2013 [42] 2501 young women, USA, 5-year follow-up	Physical IPV, 5 items from CTS2 (binary)	Heavy episodic drinking, defined as having at least 2–3 such episodes a month for each of the preceding 12 months (yes/no) (binary)		Race, age, socio-economic status, child maltreatment, pubertal status, wave 2 heavy episodic drinking
Gao 2010 [52] 636 adult women, New Zealand, 2-year follow-up	Physical IPV, past year at time 2 Physical IPV, past year at time 1 and 2 (binary)	Consumed 6 or more alcoholic drinks one at least one occasion, past year at time 2 (binary)	aOR = 1.24 (0.69–2.23) aOR = 1.49 (0.78–2.84)	Age, education, ethnicity, duration living in New Zealand, marital status, household income, whether born in New Zealand, cultural orientation
Gilbert 2012 [68] 241 adult women, USA, 1 year follow-up	CTS2, physical, sexual IPV and any injury (combined to make any IPV measure), past 6 months (binary)	The Drug Use and Risk Behavior Questionnaire to provide frequency counts of alcohol use, Binge drinking modelled as binary variable, not further defined	aOR = 1.46 (0.93–2.27)	Wave 1 binge drinking, age, ethnicity, education, employment, marital status, homelessness, incarceration, childhood sexual abuse, psychological distress, active coping, avoidant coping, partner illicit drug use, partner binge drinking, financial dependency, sexual relationship power scale, unmet need, perceived social support
Martino 2005 [62] 509 adult women, USA, 6-year follow-up	Physical IPV, 1 item, past 3 years, aged 23 (binary)	Ever having >4 drinks on one occasion, past 30 days, aged 29 (binary)	OR = 1.35 (0.93–2.00) r = 0.479, $p < 0.05$	Unadjusted SEM: heavy drinking, marijuana use, other illicit substance use, IPV perpetration, at ages 23, 29
Testa 2001 [63] 543 adult women, USA, 2-year follow-up	Physical IPV, past year, Wave 1 (binary)	Alcohol consumption, average daily volume Heavy drinking index, 6+ drinks single occasion and drinking to intoxication (continuous)	$\beta = 0.07$, $P > 0.01$ $\beta = 0.09$, $P < 0.05$	Race, have a child/pregnant, time 1 marital satisfaction, time 1 verbal aggression
Vos 2006 [54] 14 739 adult women, Australia, 4-year follow-up	Physical and/or sexual IPV, CTS before past year Physical and/or sexual IPV, CTS, past year (binary)	'Alcohol abuse' (binary)	aRR = 1.47 (1.03–2.10) aRR = 1.82 (1.04–3.18)	Education, employment, occupation, marital status, language spoken, indigenous status, place of residence, smoking
Zlotnick 2006 [64] 2905 adult women, USA, 5-year follow-up	Past year physical IPV, several items (binary)	Alcohol use past 30 days, time 1, quantity–frequency measure (continuous)	Weighted mean score for time 2 alcohol use: Wave 1 IPV+: 1.45 (SE 0.19) Wave 1 IPV–: 0.87 (SE 0.06) $P > 0.01$	Unadjusted

β = standardized regression coefficient; B = unstandardized regression coefficient; aRR = adjusted risk ratio; aOR = adjusted odds ratio; r = path coefficient; SE = standard error; CTS = Conflict Tactics Scale; SEM = structural equation model; CIDI = Composite International Diagnostic Interview.

Three studies [42,65,68] that controlled for wave 1 alcohol consumption found no significant association between wave 1 IPV and wave 2 alcohol consumption, however. Additionally, Martino [62] fitted a structural equation model which included heavy drinking at wave 1 and found a positive association between IPV at wave 1 and alcohol use at wave 2. In the one study that controlled for partner alcohol consumption [68], there was a positive association between IPV and later alcohol consumption, but it did not reach statistical significance. Two studies accounted for time 1 violence [62,63], and both found positive associations. The pooled OR from the five studies we were able to include in the meta-analysis was $OR = 1.25$ (1.02 – 1.52), which was consistent across studies ($I^2 = 0\%$, $P = 0.751$).

Findings from case-control studies

There was only one case-control study, which sampled 45 alcoholic women and 40 community controls, and found a positive association between alcoholism measured using the MAST and physical IPV [70]. Matching was not described.

Findings from cross-sectional studies

Forty-one cross-sectional studies met the inclusion criteria (see Appendix 1 for details about each of the studies); 23 studies [34,36,40,46,56,57,59,60,64,71,72,74,77,78] measured or analysed data on physical violence only and therefore had a reference group potentially exposed to sexual violence. For the meta-analysis, we made use of all available data with one estimate used per data source. We found an overall positive and significant association between IPV and alcohol use of $OR = 1.80$ ($95\% \text{ CI} = 1.58$ – 2.06) (Fig. 3). Only one cross-sectional study showed an inverse relationship (i.e. that alcohol use was associated negatively with IPV), although the $95\% \text{ CIs}$ for some other studies did not exclude this possibility. However, the positive association was highly heterogeneous ($I^2 = 60.8\%$, $P < 0.0001$); therefore, we present pooled ORs stratified by alcohol use definition in Fig. 3. Studies that included the WHO measure of heavy drinking and the GENACIS measure of any past year drinking both showed consistent associations with IPV exposure. Other measures of alcohol use, including binge drinking, combined binge drinking and regular alcohol use as well as studies measuring 'ever' alcohol use, problematic alcohol use or alcohol use disorders showed substantial heterogeneity in the magnitude of positive association with IPV.

DISCUSSION

Longitudinal studies show a general pattern of a positive association between women's intimate partner violence

victimization and subsequent alcohol use, but also between alcohol use and subsequent intimate partner violence. Cross-sectional studies show a statistically significant positive and consistent association between IPV and any alcohol use in the past year in the GENACIS Study as well as 'heavy drinking' as measured in the WHO MCS Study. The cross-sectional association between IPV and other measures of alcohol use is in a positive direction, but heterogeneous. However, the quality of the evidence base is limited. Few studies have controlled adequately for partner alcohol use, and few longitudinal studies controlled for baseline estimates of IPV or alcohol use.

Strengths and limitations

Our review included searches of global databases in multiple languages. However, due to our large number of search results we were unable to employ double screening of abstracts. We also did not contact study authors for additional information. The main limitations of our review related to the quality of included studies.

In general, control of confounding was poor in the included studies. Few longitudinal studies controlled for baseline characteristics, yet both IPV and alcohol use are episodic conditions which can occur at varying frequencies over time. Some studies controlled for mental health issues and other forms of victimization, such as childhood sexual abuse, which can be associated with increased alcohol use. Of particular relevance is partner drinking—women's alcohol consumption is correlated with that of their partners [23], yet only four studies controlled for partner's alcohol consumption. Particularly for studies examining alcohol use in women and incident IPV, failure to account for partner alcohol use could lead to a systematic overestimation of the relationship between women's alcohol use and IPV experience. The heterogeneity observed in associations probably stems at least in part from differences in confounders adjusted for, as well as variations in measures of alcohol use and IPV.

All longitudinal studies and most cross-sectional studies that met the inclusion criteria were from high-income regions. The majority of data from other regions was derived from the GENACIS and WHO MCS, both of which are large international surveys. While this biased geographic distribution is a common problem in research, in this review study location was also confounded with measure of association. Estimates for studies outside high-income countries tended to be much broader, for 'ever' consumption of alcohol or consumption in the past year. Relationships between these types of alcohol consumption and IPV may be different from relationships between binge drinking and IPV. Both IPV

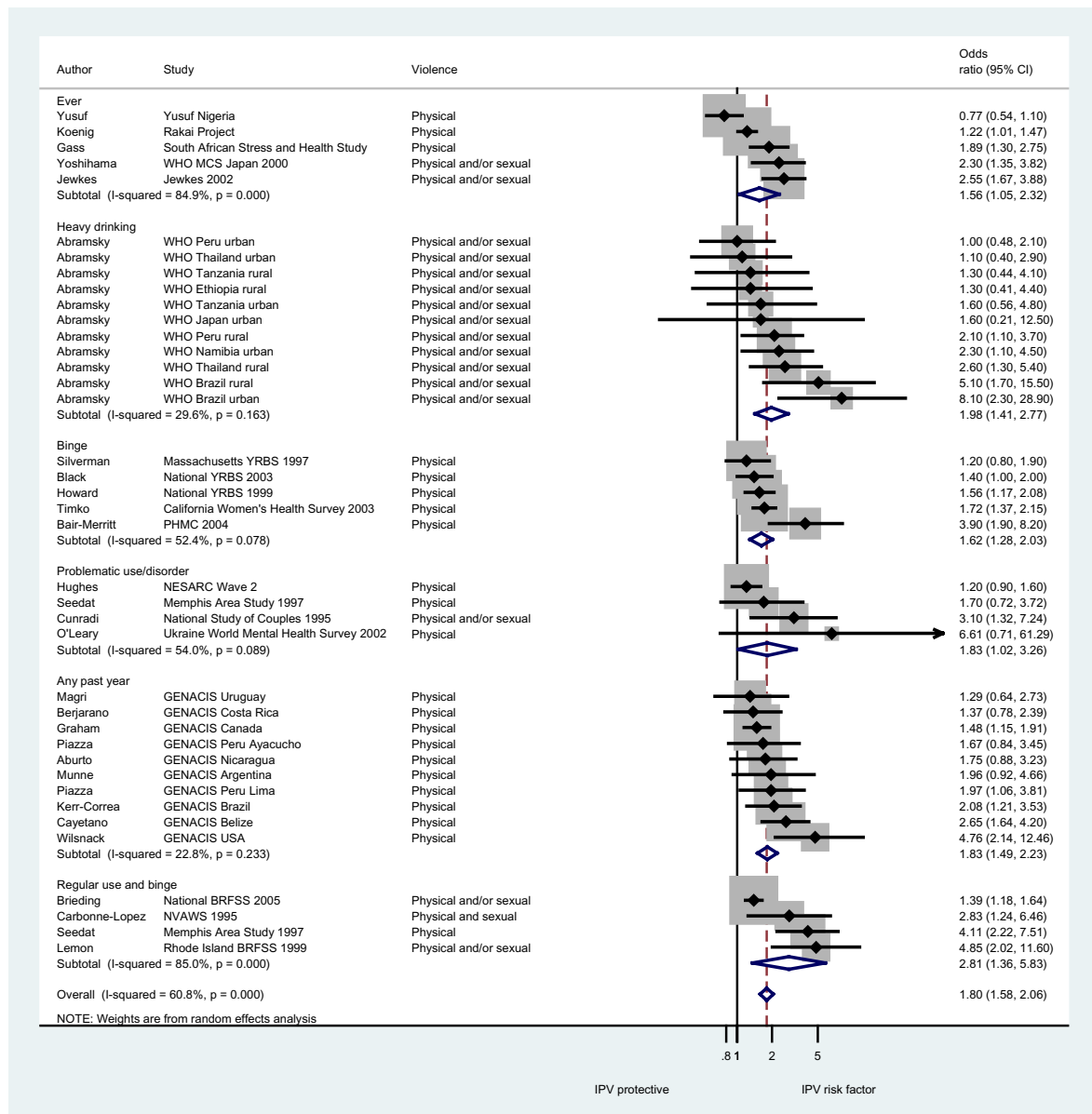


Figure 3 Forest plot, estimates of association between intimate partner physical or sexual violence (IPV) and alcohol consumption in cross-sectional studies. Weights are proportional to the size of the shaded rectangle (the larger the rectangle, the higher the weight). The lozenge or diamond shows the pooled odds ratio (OR) at the highest point, and the 95% confidence interval of the pooled OR at the widest point

and alcohol use are stigmatized to varying degrees across settings, and it is likely that both could be under-reported in the original studies included in the review. This could result in associations biased in either direction. Future studies could explore the use of computer-assisted anonymized reporting methods, which has been shown to increase disclosure of sensitive information in some settings [79], but not others [80].

One important limitation is the exclusion of emotional violence from the current review. There are extremely limited data available globally on emotional and other forms of IPV relative to physical and sexual IPV, and

lack of consensus on how to measure emotional IPV most appropriately. However, emerging evidence suggests experience of emotional IPV is associated with a range of adverse health effects [81]. We hope that future reviews will be able to include emotional violence as more data becomes available.

Findings in relation to other studies

Our systematic review builds upon the early work of Golding [24], and confirms that there is a clear association between IPV victimization and alcohol consumption.

However, the nature of this relationship remains unclear—evidence reviewed here supports a bidirectional relationship, but the role of shared causal factors cannot be ruled out. One hypothesis is that women who drink heavily are more likely to partner with men who drink, which in turn increases their own risk of being victimized (because heavy drinking by men is associated strongly with perpetration of partner violence) [26]. This may occur either through ‘assortive mating’ (the tendency to choose a partner who has similar drinking habits as oneself) or through influence of one spouse’s drinking patterns, expectations and behaviour on the other’s. There is evidence from the United States that this sort of pairing between people with similar drinking patterns occurs within some relationships [76].

It is also possible that the man’s drinking (or the woman’s own drinking) becomes a source of arguments in the relationship. Analysis of overlapping individual, relationship and community-level risk factors for partner violence in Brazil and Peru, for example, demonstrate that the association between men’s drinking and violence is mediated partially through couple conflict, suggesting that alcohol affects risk in part through conflicts over drinking [28]. In one US study using nationally representative data, Leadley *et al.* [23] found that those partners who drank in similar styles (for example, were both abstinent, or both binge drinkers, and so on) were less likely to have IPV in their relationships, and that discordant drinking was more predictive of IPV. This also suggests that relationship conflict might be leading to IPV, rather than alcohol use alone (otherwise high alcohol consumption would be more predictive rather than discordance). In other settings, where it is not as common for women to drink as much, then there will be more discordant drinking and alcohol use may be a stronger predictor of IPV.

Some of the relationship between alcohol use and IPV may be due to the effects of alcohol on one or both partners, consistent with research on 10 countries in the Americas showing a stronger and more consistent relationship of IPV with amount consumed per occasion and binge drinking than with simple frequency of drinking [46]. For example, excessive drinking by either partner may make them less able to read social cues [16]. This, in turn, may increase the likelihood that arguments will escalate to violence. Indeed, studies demonstrate that alcohol’s effects on cognitive abilities and problem-solving makes it more difficult to resolve conflicts peacefully [2]. Similarly, alcohol increases one’s willingness to take risks, making individuals less aware of and concerned by the consequences of their behaviour [16,17]. Thus, drinking by either partner may play a direct role in escalation of a conflict to more severe forms of aggression [75].

Women who drink may also be predisposed to turn to alcohol during times of stress or emotional turmoil, such as may be precipitated by partner violence. Consistent with this, studies suggest that battered women self-medicate with alcohol as a means to cope with abuse-related trauma [22].

Implications

Although the causal relationship between IPV experience and alcohol consumption in women is far from clear, there is clear evidence that women with histories of violence consume more alcohol and, conversely, that women who binge drink and consume alcohol in other problematic ways are more likely to report experiences of violence. Public health programming, therefore, needs to address alcohol use in IPV prevention and treatment, and potential IPV victimization needs to be addressed in alcohol misuse programmes. Indeed, addressing alcohol use is already a component of some successful batterer treatment programs in the United States [82].

CONCLUSION

The preponderance of evidence suggests that women’s drinking and victimization from intimate partner violence are linked, but the causal direction of this relationship is not clear. Further analysis of longitudinal data sets and new data collection focused on examining the temporal links, and studies that examine both victimization and perpetration, are needed to understand more clearly the relationship between IPV experience and alcohol use.

Declaration of interests

All authors declare that the material has not been published in whole or in part elsewhere; the paper is not currently being considered for publication elsewhere; all authors have been personally and actively involved in substantive work leading to the report, and will hold themselves jointly and individually responsible for its content; no ethical approval was necessary for this work (all data were published and in the public domain). The work was supported by grants from the ESRC and Sigrid Rausing Trust to C. Watts. No funders had any role in the design of the work or interpretation or results.

References

1. World Health Organization. *Facts and Figures on Substance Abuse*. 2010. Available at: http://www.who.int/substance_abuse/facts/alcohol/en/index.html (accessed 22 November 2013) (Archived at <http://www.webcitation.org/6LK3ync4o>).
2. Hoaken P. N. S., Assaad J. M., Pihl R. O. Cognitive functioning and the inhibition of alcohol-induced aggression. *J Alcohol Stud* 1998; **59**: 599–607.

3. Rehm J., Baliunas D., Borges G. L. G., Graham K., Irving H. M., Kehoe T. *et al.* The relation between different dimensions of alcohol consumption and burden of disease: an overview. *Addiction* 2010; **105**: 817–43.
4. Devries K., Mak J., Child J., Falder G., Bacchus L., Petzold M. *et al.* The global prevalence of intimate partner violence. *Science* 2013; doi: 10.1126/science.1240937. Express online, 20 June 2013.
5. Coker A. Does physical intimate partner violence affect sexual health? A systematic review. *Trauma Violence Abuse* 2007; **8**: 149–77.
6. Brown-Peterside P., Ren L., Chiasson M., Koblin B. Double trouble: violent and non-violent traumas among women at sexual risk of HIV infection. *Women Health* 2002; **36**: 51–64.
7. Campbell J. Health consequences of intimate partner violence. *Lancet* 2002; **359**: 1331–6.
8. Bonomi A., Thompson R., Anderson M., Reid R. J., Carrell D., Dimer J. A. *et al.* Intimate partner violence and women's physical, mental, and social functioning. *Am J Prev Med* 2006; **30**: 458–66.
9. Carbone-Lopez K., Kruttschnitt C., Macmillan R. Patterns of intimate partner violence and their associations with physical health, psychological distress, and substance use. *Public Health Rep* 2006; **121**: 382–92.
10. Coker A., Davis K., Arias I., Desai S., Sanderson M., Brandt H. M. *et al.* Physical and mental health effects of intimate partner violence for men and women. *Am J Prev Med* 2002; **23**: 260–8.
11. Devries K. M., Mak J. Y., Bacchus L. J., Child J. C., Falder G., Petzold M. *et al.* Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. *PLoS Med* 2013; **10**: e1001439.
12. Bailey B., Daugherty R. Intimate partner violence during pregnancy: incidence and associated health behaviors in a rural population. *Matern Child Health J* 2007; **11**: 495–503.
13. Krug E. G., Dahlberg L. L., Mercy J. A., Zwi A. B., Lozano R. *World Report on Violence and Health*. Geneva: World Health Organization; 2002, pp. 87–113.
14. Cohen M., Deamant C., Barkan S., Richardson J., Young M., Holman S. *et al.* Domestic violence and childhood sexual abuse in HIV-infected women and women at risk for HIV. *Am J Public Health* 2000; **90**: 560–5.
15. Stöckl H., Devries K., Rotstein A., Abrahams N., Campbell J., Watts C. *et al.* The global prevalence of intimate partner homicide: a systematic review. *Lancet* 2013; doi: 10.1016/S0140-6736(13)61030-2. Early online publication, 20 June 2013.
16. Klostermann K., Fals-Stewart W. Intimate partner violence and alcohol use: exploring the role of drinking in partner violence and its implications for intervention. *Aggress Viol Behav* 2006; **11**: 587–97.
17. Fromme K., Katz E., D'Amico E. Effects of alcohol intoxication on the perceived consequences of risk taking. *Exp Clin Psychopharmacol* 1997; **5**: 14–23.
18. Tumwesigye N. M., Kasirye R., Nansubuga E. Is social interaction associated with alcohol consumption in Uganda? *Drug Alcohol Depend* 2009; **103**: 9–15.
19. World Health Organization (WHO). *WHO Facts on Intimate Partner Violence and Alcohol*. 2010. Available at: http://www.who.int/violence_injury_prevention/violence/world_report/factsheets/fs_intimate.pdf (accessed 22 November 2013) (Archived at <http://www.webcitation.org/6LK4A0bol>).
20. Jewkes R. Intimate partner violence: causes and prevention. *Lancet* 2002; **359**: 1423–9.
21. Leonard K. Patterns of alcohol use and physically aggressive behavior in men. *J Stud Alcohol* 1985; **46**: 279–82.
22. Kaysen D., Dillworth T. M., Simpson T., Waldrop A., Larimer M. E., Resnick P. A. Domestic violence and alcohol use: trauma-related symptoms and motives for drinking. *Addict Behav* 2007; **32**: 1272–83.
23. Leadley K., Clark C., Caetano R. Couples' drinking patterns, intimate partner violence, and alcohol-related partnership problems. *J Subst Abuse* 2000; **11**: 253–63.
24. Golding J. Intimate partner violence as a risk factor for mental disorders: a meta-analysis. *J Fam Violence* 1999; **14**: 99–132.
25. Schumacher J. A., Feldbau-Kohn S., Slep A. M. S., Heyman R. E. Risk factors for male-to-female partner physical abuse. *Aggress Viol Behav* 2001; **6**: 281–352.
26. Stith S. M., Smith D. B., Penn C. E., Ward D. B., Tritt D. Intimate partner physical abuse perpetration and victimization risk factors: a meta-analytic review. *Aggress Viol Behav* 2004; **10**: 65–98.
27. Murray C., Vos T., Lozano R., Naghavi M., Flaxman A., Michaud C. *et al.* Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1900–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; **380**: 2197–223.
28. Heise L. *Determinants of Partner Violence in Brazil and Peru: Exploring Variation in Individual and Population Level Risk*. Faculty of Epidemiology and Population Health. London: London School of Hygiene and Tropical Medicine; 2011.
29. Garcia-Moreno C., Jansen H., Ellsberg M., Heise L., Watts C. *WHO Multi-Country Study on Women's Health and Domestic Violence against Women: Initial Results on Prevalence, Health Outcomes and Women's Responses*. Geneva: World Health Organization; 2005.
30. Riley R. D., Higgins J. P. T., Deeks J. Interpretation of random effects meta-analyses. *BMJ* 2011; **342**: d549.
31. Higgins J. P. T., Thompson S. G., Deeks J. J., Altman D. G. Measuring inconsistency in meta-analyses. *BMJ* 2003; **327**: 557–60.
32. Brooks-Russell A., Foshee V. A., Ennett S. T. Predictors of latent trajectory classes of physical dating violence victimization. *J Youth Adolesc* 2013; **42**: 566–80.
33. Foshee V. A., Benefield T. S., Ennett S. T., Bauman K. E., Suchindran C. Longitudinal predictors of serious physical and sexual dating violence victimization during adolescence. *Prev Med* 2004; **39**: 1007–16.
34. Black M., Noonan R., Legg M., Eaton D., Breiding M. Physical dating violence among high school students—United States, 2003. *Morb Mortal Wkly Rep* 2006; **55**: 532–5.
35. Eaton D. K., Davis K. S., Barrios L., Brener N. D., Noonan R. K. Associations of dating violence victimization with lifetime participation, co-occurrence, and early initiation of risk behaviors among U.S. high school students. *J Interpers Violence* 2007; **22**: 585–602.
36. Howard D. E., Wang M. Q. Risk profiles of adolescent girls who were victims of dating violence. *Adolescence* 2003; **38**: 1–14.
37. Silverman J. G., Raj A., Mucci L. A., Hathaway J. E. Dating violence against adolescent girls and associated substance use, unhealthy weight control, sexual risk behavior, pregnancy, and suicidality. *JAMA* 2001; **286**: 572–9.

38. Lacey K. K., McPherson M. D., Samuel P. S., Sears K. P., Head D. The impact of different types of intimate partner violence on the mental and physical health of women in different ethnic groups. *J Interpers Violence* 2013; **28**: 359–70.
39. Afifi T. O., Henriksen C. A., Asmundson G. J. G., Sareen J. Victimization and Perpetration of Intimate Partner Violence and Substance Use Disorders in a Nationally Representative Sample. *J Nerv Ment Dis* 2012; **200**: 684–91.
40. Hughes T., McCabe S. E., Wilsnack S. C., West B. T., Boyd C. J. Victimization and substance use disorders in a national sample of heterosexual and sexual minority women and men. *Addiction* 2010; **105**: 2130–40.
41. la Flair L. N., Bradshaw C. P., Storr C. L., Green K. M., Alvanzo A. A., Crum R. M. Intimate Partner Violence and Patterns of Alcohol Abuse and Dependence Criteria among Women: A Latent Class Analysis. *J Stud Alcohol Drugs* 2012; **73**: 351–60.
42. Exner-Cortens D., Eckenrode J., Rothman E. Longitudinal Associations between Teen Dating Violence Victimization and Adverse Health Outcomes. *Pediatrics* 2013; **131**: 71–8.
43. Renner L. M., Whitney S. D. Risk Factors for Unidirectional and Bidirectional Intimate Partner Violence among Young Adults. *Child Abuse Negl* 2012; **36**:40–52.
44. Waller M. W., Iritani B. J., Christ S. L., Clark H. K., Moracco K. E., Halpern C. T. *et al.* Relationships Among Alcohol Outlet Density, Alcohol Use, and Intimate Partner Violence Victimization Among Young Women in the United States. *J Interpers Violence* 2012; **27**: 2062–86.
45. Wiersma J. D., Cleveland H. H., Herrera V., Fischer J. L. Intimate partner violence in young adult dating, cohabitating, and married drinking partnerships. *J Marriage Fam* 2010; **72**: 360–74.
46. Graham K., Bernards S., Munné M., Gmel G. Comparison of physical partner aggression across ten countries. In: Graham K., Bernards S., Munné M., Wilsnack S., editors. *Unhappy Hours: Alcohol and Physical Partner Aggression in the Americas*. Washington, DC: Pan American Health Organization; 2008, pp. 221–48.
47. De Oliveira J. B., Lima M. C. P., Simao M. O., Cavariani M. B., Tucci A. M., Kerr-Corea F. Violence between Intimate Partners and Alcohol Use: Prevalence and Associated Factors. *Rev Panam Salud Publica* 2009; **26**: 494–501.
48. Abramsky T., Watts C. H., Garcia-Moreno C., Devries K., Kiss L., Ellsberg M. *et al.* What factors are associated with recent intimate partner violence? findings from the WHO multi-country study on women's health and domestic violence. *BMC Public Health* 2011; **11**: 109.
49. d'Oliveira A. F., Schraiber L. B., Franca-Junior I., Ludermir A. B., Portella A. P., Diniz C. S. *et al.* Factors associated with intimate partner violence against Brazilian women. *Rev Saude Publica* 2009; **43**: 299–311.
50. Kiss L., Schraiber L. B., Heise L., Zimmerman C., Gouveia N., Watts C. Gender-Based Violence and Socioeconomic Inequalities: Does Living in More Deprived Neighbourhoods Increase Women's Risk of Intimate Partner Violence? *Soc Sci Med* 2012; **74**: 1172–9.
51. Yoshihama M., Horrocks J., Bybee D. Intimate partner violence and initiation of smoking and drinking: a population-based study of women in Yokohama, Japan. *Soc Sci Med* 2010; **71**: 1199–207.
52. Gao W., Paterson J., Abbott M., Carter S., Iusitini L. Impact of current and past intimate partner violence on maternal mental health and behaviour at 2 years after childbirth: evidence from the Pacific Islands Families Study. *Aust NZ J Psychiatry* 2010; **44**: 174–82.
53. Boden J. M., Fergusson D. M., Horwood L. J. Alcohol Misuse and Violent Behavior: Findings from a 30-Year Longitudinal Study. *Drug Alcohol Depend* 2012; **122**: 135–41.
54. Vos T., Astbury J., Piers L., Magnus A., Stanley L., Walker L. *et al.* Measuring the impact of intimate partner violence on the health of women in Victoria, Australia. *Bull World Health Organ* 2006; **84**: 739–44.
55. Vizcarra L., Beatriz M., Cortes M. Violencia conyugal en la ciudad de Temuco: un estudio de prevalencia y factores asociados [Conjugal violence in Temuco: prevalence and predictive factors]. *Rev Med Chile* 2001; **129**: 1405–12.
56. Tuesta R., Borda M. Violencia física marital en Barranquilla (Colombia): prevalencia y factores de riesgo [Physical marital violence in Barranquilla (Colombia): prevalence and risk factors]. *Gac Sanit* 2003; **17**: 302–8.
57. Yusuf O. B., Arulogun O. S., Oladepo O., Olowokeere F. Physical violence among intimate partners in Nigeria: a multi level analysis. *J Public Health Epidemiol* 2011; **3**: 240–7.
58. Gass J. D., Stein D. J., Williams D. R., Seedat S. Intimate partner violence, health behaviours, and chronic physical illness among South African women. *S Afr Med J* 2010; **100**: 582–5.
59. Koenig M., Lutalo T., Zhao F., Nalugoda F., Wabwire-Mangen F., Kiwanuka N. *et al.* Domestic violence in rural Uganda: evidence from a community-based study. *Bull World Health Organ* 2003; **81**: 53–60.
60. O'Leary K., Tintle N., Bromet E., Gluzman S. Descriptive epidemiology of intimate partner aggression in Ukraine. *Soc Psychiatry Psychiatr Epidemiol* 2008; **43**: 619–26.
61. Chen P., White H. Gender differences in adolescent and young adult predictors of later intimate partner violence: a prospective study. *Violence Against Women* 2004; **10**: 1283.
62. Martino S., Collins R., Ellickson P. Cross-lagged relationships between substance use and intimate partner violence among a sample of young adult women. *J Stud Alcohol* 2005; **66**: 139–49.
63. Testa M., Leonard K. The impact of marital aggression on women's psychological and marital functioning in a newlywed sample. *J Fam Violence* 2001; **16**: 115–30.
64. Zlotnick C., Johnson D. M., Kohn R. Intimate partner violence and long-term psychosocial functioning in a national sample of American women. *J Interpers Violence* 2006; **21**: 262–75.
65. Ackard D., Eisenberg M., Neumark-Sztainer D. Long-term impact of adolescent dating violence on the behavioral and psychological health of male and female youth. *J Pediatr* 2007; **151**: 476–81.
66. Marsh-Buzy W., McDonald R., Jouriles E. N. Adolescent girls' alcohol use as a risk factor for relationship violence. *J Res Adolesc* 2004; **14**: 449–70.
67. Testa M., Livingston J., Leonard K. Women's substance use and experiences of intimate partner violence: a longitudinal investigation among a community sample. *Addict Behav* 2003; **28**: 1649–64.
68. Gilbert L., El-Bassel N., Chang M., Wu E., Roy L. Substance use and partner violence among urban women seeking emergency care. *Psychol Addict Behav* 2012; **26**: 226–35.
69. Temple J. R., Weston R., Stuart G. L., Marshall L. L. The Longitudinal Association between Alcohol Use and Intimate Partner Violence among Ethnically Diverse Community Women. *Addict Behav* 2008; **33**:1244–8.

70. Miller B., Downs W., Gondoli D. Spousal violence among alcoholic women as compared to a random household sample of women. *J Stud Alcohol* 1989; **50**: 533–40.
71. Ackard D., Neumark-Sztainer D., Hannan P. Findings from the Commonwealth Fund Survey; 2003.
72. Seedat S., Stein M., Forde D. Association between physical partner violence, posttraumatic stress, childhood trauma, and suicide attempts in a community sample of women. *Violence Vict* 2005; **20**: 87–98.
73. Cunradi C., Caetano R., Schafer J. Alcohol-related problems, drug use, and male intimate partner violence severity among US couples. *Alcohol Clin Exp Res* 2002; **26**: 493–500.
74. Jewkes R., Levin J., Penn-Kekana L. Risk factors for domestic violence: findings from a South African cross-sectional study. *Soc Sci Med* 2002; **55**: 1603–17.
75. Graham K., Bernardis K., Wilsnack S. C., Gmel G. Alcohol may not cause partner violence but it seems to make it worse: a cross national comparison of the relationship between alcohol and severity of partner violence. *J Interpers Violence* 2011; **26**: 1503–23.
76. Leonard K. E., Eiden R. D. Marital and family processes in the context of alcohol use and alcohol disorders. *Ann Rev Clin Psychol* 2007; **3**: 285–310.
77. Timko C., Sutkowski A., Pavao J., Kimerling R. Women's childhood and adult adverse experiences, mental health, and binge drinking: the California Women's Health Survey. *Subst Abuse Treat Prev Policy* 2008; **3**: 15.
78. Bair-Merritt M. H., Holmes W. C., Holmes J. H., Feinstein J., Feudtner C. Does intimate partner violence epidemiology differ between homes with and without children? A population-based study of annual prevalence and associated risk factors. *J Fam Violence* 2008; **23**: 325–32.
79. Metzger D. S., Koblin B., Turner C., Navaline H., Valenti F., Holte S. Randomized controlled trial of audio computer-assisted self-interviewing: utility and acceptability in longitudinal studies. *Am J Epidemiol* 2000; **152**: 99–106.
80. Rathod S. D., Minnis A. M., Subbiah K., Krishnan S. ACASI and face-to-face interviews yield inconsistent estimates of domestic violence among women in India: the Samata Health Study 2005–2009. *J Interpers Violence* 2011; **26**: 2437–56.
81. Yoshihama M., Horrocks J., Kamano S. The role of emotional abuse in intimate partner violence and health among women in Yokohama, Japan. *Am J Public Health* 2009; **99**: 647–53.
82. Stuart G. L., Temple J. R., Moore T. M. Improving batterer intervention programs through theory-based research. *JAMA* 2007; **298**: 560–2.
83. Breiding M., Black M., Ryan G. Chronic disease and health risk behaviors associated with intimate partner violence—18 US States/Territories, 2005. *Ann Epidemiol* 2008; **18**: 538–44.
84. Caetano R., Vaeth P. A. C., Ramisetty-Mikler S. Intimate partner violence victim and perpetrator characteristics among couples in the United States. *J Fam Violence* 2008; **23**: 507–18.
85. Lemon S., Verhoek-Oftedahl W., Donnelly E. Preventive healthcare use, smoking, and alcohol use among Rhode Island women experiencing intimate partner violence. *J Womens Health Gend Based Med* 2002; **11**: 555–62.
86. Salomon A., Bassuk S., Huntington N. The relationship between intimate partner violence and the use of addictive substances in poor and homeless single mothers. *Violence Against Women* 2002; **8**: 785.

Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix 1 List of databases searched and example search strategy

Appendix 2 Contour funnel plot, estimates from cross-sectional studies

Appendix 3 Summary of studies included in review showing findings for intimate partner physical or sexual violence (IPV) and alcohol outcomes