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Partner Alcohol Use and Attitudes Toward Intimate Partner Violence: Independent and Synergistic Effects on Intimate Partner Violence Across 19 Low- and Middle-Income Countries

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Abstract

Although partner alcohol use and acceptance of intimate partner violence against women (IPVAW) are critical determinants of IPVAW, little is known about their interaction. We explored how partner alcohol use and attitudes toward IPVAW act independently and jointly at the individual and community levels to influence women's reports of experiencing IPVAW across low- and middle-income countries. We conducted secondary analyses using a pooled sample of reproductive-aged women ($n = 166,621$) from 19 Demographic and Health Survey datasets. We fit a series of a priori-defined mixed-effects logistic regression models of the total effects, within- and between-community effects, and contextual effects of past-year IPVAW on partner alcohol use, acceptance of IPVAW, and their multiplicative interaction. We then fit a series of models stratified by community alcohol use and acceptance of IPVAW. Partner alcohol use (odds ratio [OR] = 3.20; 95% confidence interval [CI]: [3.07, 3.33]) and women's acceptance of IPVAW (OR = 1.83; 95% CI: [1.76, 1.89]) were consistently associated with increased odds of experiencing IPVAW. Sub-multiplicative interactions were present for within-community effects (ratio of OR = 0.86; 95% CI: [0.79, 0.94]), whereas supra-multiplicative interactions were present for between-community effects (ratio of OR = 1.002; 95% CI: [1.0002, 1.005]) and contextual effects (ratio of OR = 1.003; 95% CI: [1.0007, 1.005]). The odds of IPVAW associated with partner alcohol use was greater in communities with lower partner alcohol prevalence and lower acceptance of IPVAW. It is important to consider norms and attitudes toward IPVAW alongside alcohol use when understanding epidemiological patterns of IPVAW and potential opportunities for preventive programs and policymaking. Future studies should focus on the complex interactions, at multiple social levels, between interacting risk factors for IPVAW.

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Keywords

intimate partner violence; alcohol; attitudes toward intimate partner violence; low- and middle-income country

Intimate partner violence against women (IPVAW), defined as behavior within an intimate relationship that threatens or causes physical, psychological, or sexual harm, is a leading risk factor for poor health outcomes among women globally (World Health Organization, 2022). Although IPV affects all genders, male perpetrated IPVAW especially is prevalent globally and often is associated with more serious consequences (Caldwell et al., 2012). More than one quarter of ever-partnered women aged 15 to 49 years old experience physical or sexual violence perpetrated by an intimate partner during their lifetime (Sardinha et al., 2022). Consequences of IPVAW include physical and mental health problems, functional impairment, social exclusion and stigma, economic impacts, and mortality (Bacchus et al., 2018; Kennedy et al., 2018; Krug et al., 2002). Furthermore, IPVAW presents risks for children exposed to violence (McTavish et al., 2016) and economic and social costs to society (Krug et al., 2002).

Multiple risk factors have shown consistent associations with IPVAW. These include diverse factors related to women (e.g., age, witnessing IPV in childhood, and polygyny), partners (e.g., current alcohol use), and households (e.g., wealth) (Coll et al., 2021). In a recent analysis, fifteen risk factors were evaluated using a decision tree analysis. Witnessing IPV during childhood, partner alcohol use, and empowerment (of which attitudes toward IPVAW is one component) emerged as the three most important risk factors (Coll et al., 2021). Partner alcohol use and attitudes toward IPVAW have overlapping risk factors and pathways occurring at multiple levels of the social ecology; yet, they historically have been addressed by different investigators, disciplines, and interventions, and therefore, their intersections are underexplored.

Alcohol use is a well-established modifiable risk factor for IPVAW perpetration (Abbey et al., 2014; Durevall & Lindskog, 2015; Ezard, 2014; Foran & O'Leary, 2008; Wagman et al., 2016). Alcohol use is believed to directly increase risk for IPVAW perpetration via the psychophysiological effects of alcohol (Pihl et al., 2002). It also shares common risk factors with IPVAW, such as inequitable gender attitudes, that vary across cultures and contexts. Research on the relationship between alcohol use and IPVAW from low- and middle-income countries (LMICs) has identified that in addition to shared individual-level risk factors, contextual factors may also modify the association between alcohol use and IPVAW (Greene et al., 2017). For example, in communities where alcohol use is more normative and acceptable, there may be fewer social consequences related to alcohol use. Improved understanding of the multilevel conditions that strengthen the pathways from alcohol use to IPVAW is critical for the design of effective prevention and early intervention strategies.

Attitudes toward IPVAW are another critical link in the complex causal chain toward IPVAW. Attitudes toward IPVAW concern stances about what is and what is not acceptable regarding the use of violence in intimate relationships. They are shaped by cultural and

contextual factors, and in turn, shape the environment in which IPVAV occurs (Gracia et al., 2020). Like alcohol use, attitudes toward IPVAV have been shown to be a risk factor for IPVAV, and attitudes to IPVAV themselves are determined through predictors at multiple levels. Attitudes toward IPVAV measured among women and/or men have been associated with the perpetration of IPVAV (McCarthy et al., 2018), survivors' responses to IPVAV victimization, societal and institutional responses to IPVAV, and differences in IPVAV prevalence across communities and countries (Heise & Kotsadam, 2015). Attitudes that accept or condone male-perpetrated IPVAV may represent a manifestation of broader gender inequity and social and cultural norms that favor men: that is, patriarchal values (Flood & Pease, 2009; Herrero et al., 2017; Tran et al., 2016). They also may reflect broader cultural norms that sanction violence to discipline transgressions against norms and values (Lawoko, 2008). However, multiple interpersonal, situational, and contextual factors shape how gender inequity and likely attitudes toward IPVAV are associated with IPVAV (Weber et al., 2019). Whereas changing IPVAV attitudes has been identified as a primary focus for prevention and early intervention (Ellsberg et al., 2015; Jewkes et al., 2015), limited attention has been granted to characterizing how attitudes toward IPVAV interact with other risk factors to influence IPVAV, which is critical for describing how and at what level to address attitudes to reduce IPVAV. For example, should programs work to change attitudes of individuals or reduce acceptance of violence at the community level? To what extent do such interventions need to address other independent or synergistic risk factors for IPVAV?

As described above, both partner alcohol use and attitudes to IPVAV are well-established risk factors for IPVAV. Both these risk factors interact with IPVAV in complex, multilevel pathways. Understanding these complex interactions is essential for the design of preventive interventions. Using the socioecological model, we therefore seek to explore how partner alcohol use and attitudes toward IPVAV act independently and jointly at the individual and community level to influence IPVAV across LMICs (Figure 1). Established theoretical frameworks acknowledge that multiple factors interact across the social ecology to confer risk for experiencing IPVAV. As articulated by Heise (1998, 2011), a woman's characteristics interact with the characteristics of her male partner, relationship, community, and macrosocial context to increase risk for IPVAV. Research investigating potential synergies at different ecological levels is emerging, yet we are unaware of any epidemiological investigations of these two important risk factors, across ecological levels. Understanding the independent and synergistic roles of alcohol use and attitudes toward IPVAV in context is essential to improving IPVAV prevention and response efforts globally.

Method

Participants and Procedures

Data for this study come from the Demographic and Health Surveys (DHSs), which are publicly available nationally representative surveys conducted in LMICs (The DHS Program, 2017). In each country, 5,000 to 30,000 households were selected using a probability sample from a census frame or complete list of villages/communities (ICF International, 2012). The target population was women aged 15 to 49 years old and children under the age of five. Interviewers were sex-matched, fluent in the local language,

typically had a secondary education, and underwent intensive training and supervision (ICF International, 2012).

This analysis was restricted to women (defined by self-reported sex) who reported being currently married or partnered and who completed the domestic violence module. Domestic violence questions were administered privately to one randomly selected ever-partnered woman in every second sampled household (ICF International, 2012). We included data from 166,621 women living in 19 countries that collected data about IPVAV, partner alcohol use, and attitudes toward IPVAV between 2010 and 2017.

Measures

The outcome in this study, past-year IPVAV victimization, was assessed using a modified version of the Conflict Tactics Scale, which has shown good internal consistency across psychological ($\alpha = 0.79$), physical ($\alpha = 0.86$), and sexual ($\alpha = 0.87$) IPVAV subscales in high-income countries (Straus et al., 1996). In this survey, women were asked to report whether they experienced specific types of IPV in their lifetime and in the past 12 months. Psychological IPVAV included being humiliated, insulted, or threatened by her partner. Physical IPVAV included being slapped, pushed, shaken, having something thrown at her, having her hair pulled, having her arm twisted, being kicked, dragged, beat up, choked, burned, or threatened/attacked with a weapon by her partner. Sexual IPVAV included having been forced by her partner to have sex or perform another sexual act when it was not wanted. In this analysis, we defined IPVAV as any psychological, physical, or sexual IPVAV victimization occurring within the last 12 months.

Partner alcohol use, one of the primary exposures of interest, was assessed by asking the woman whether her male partner drinks alcohol (yes/no). The other primary exposure of interest, acceptance of IPVAV, was a dichotomous indicator generated as the endorsement by the respondent of one or more of the attitudes toward IPVAV indicators. These indicators asked whether a husband is justified in hitting or beating his wife if the woman: (a) argues with him, (b) burns food, (c) goes out without telling him, or (d) neglects the children. At the individual-level, both partner alcohol use and attitudes toward IPVAV were dichotomous indicators (yes/no). We also constructed community-level variables for the prevalence of male partner alcohol use and prevalence of endorsing one or more acceptance of IPVAV indicators. The community-level was defined based on the primary sampling unit, which are groups of households defined by census enumeration areas, electoral zones, or villages (ICF International, 2012). We scaled the community-level variables by multiplying each prevalence estimate by 10. Each unit increase, therefore, reflects a 10% increase in the community prevalence of partner alcohol use and acceptance of IPVAV.

Other variables included in the analysis as covariates included the woman's age, education level, whether the head of household was female, wealth, and urbanicity. Among potential covariates documented in the literature, these were available in the DHSs. Age was a continuous variable. Education was measured by level: no education, primary education, secondary education, and higher education. Wealth was a composite relative wealth index based on assets, housing, water access, and sanitation facilities and categorized respondents

into quintiles. Urbanicity was a dichotomous variable determined by whether the woman resided in a rural or urban setting.

Statistical Analysis

We estimated the distribution of the sociodemographic covariates, partner alcohol use, and acceptance of IPVAV by past-year IPV in the analytic sample. We then constructed a series of mixed-effect regression models with random intercepts for country and primary sampling unit. In each model, we estimated the independent effects of partner alcohol use and acceptance of IPVAV from which we then computed the joint effect of these two exposures. The joint effect was estimated using the linear combination of main effects and the interaction term at the individual and, separately, at the community level. For each model, we estimated the unadjusted model including only main effects and interaction terms for the individual- and/or community-level exposures of interest as well as an adjusted model controlling for age, education level, sex of the head of household, wealth, and urbanicity.

Model 1 estimated the total effect of partner alcohol use, acceptance of IPVAV, and their interaction on IPVAV victimization (Table 1). As parameter estimates in this model combine individual- (Level 1) and community-level (Level 2) effects, we estimated the within- and between-community effects in Model 2. We included the cluster-mean-centered individual-level effects of partner alcohol use, acceptance of IPVAV, and their interaction at the individual level (Level 1; within-community effect) and the prevalence of male partner alcohol use, the prevalence of acceptance of IPVAV, and their interaction at the community level (Level 2; between-community effect). The within-community effects estimate the association between individual differences and past-year individual odds of IPVAV within a given community and country. The between-community effects capture the association between community risk factor prevalence and past-year individual odds of IPVAV. Model 3 included partner alcohol use, acceptance of IPVAV, and their interaction and the prevalence of male partner alcohol use, the prevalence of acceptance of IPVAV, and their interaction at the community level (Level 2). Contextual effects were estimated from this model using the community-level (Level 2) coefficients. Results from this model effectively compare two women with similar partner alcohol use and attitudes accepting IPVAV, but who live in separate communities with a 10% difference in risk factor prevalence. Models 4a to 4d examined the within-community effect of partner alcohol use and acceptance of IPVAV stratified across the following types of communities:

- i. communities with a low prevalence of partner alcohol use and low justification of IPVAV,
- ii. communities with a low prevalence of partner alcohol use and a high prevalence of favorable attitudes toward IPVAV,
- iii. communities with a high prevalence of partner alcohol use and a low prevalence of justification of IPVAV, and
- iv. communities with a high prevalence of partner alcohol use and strong endorsement of IPVAV.

Communities were classified as low versus high by whether they were below versus equal to or above the median prevalence of these exposures across the communities included in this analysis (median prevalence of partner alcohol use = 25%; median prevalence of attitudes accepting of IPVAV = 40%). Within each of these community types, we estimated the cluster-mean-centered individual-level effects of partner alcohol use, acceptance of IPVAV, and their interaction. These models investigate whether the association between individual risk factors and IPVAV differ based on community characteristics.

Results

We included data from 166,621 women living in the 19 countries that collected data about IPVAV, partner alcohol use, and attitudes toward IPVAV. The countries included in the analysis were Afghanistan ($n = 17,573$), Angola ($n = 6,498$), Myanmar ($n = 2,877$), Burundi ($n = 6,391$), Democratic Republic of the Congo ($n = 4,898$), Ethiopia ($n = 4,102$), India ($n = 61,795$), Kenya ($n = 3,712$), Malawi ($n = 4,593$), Mali ($n = 2,930$), Mozambique ($n = 4,616$), Namibia ($n = 1,220$), Nepal ($n = 3,698$), Nigeria ($n = 20,224$), Rwanda ($n = 1,601$), Senegal ($n = 2,486$), Zimbabwe ($n = 4,867$), Egypt ($n = 6,186$), and Tanzania ($n = 6,354$).

Table 2 shows proportions and univariable associations for the pooled sample. Of the 166,621 women included in the analysis, the average age was 31.7 years. The majority had primary school education or less (62.6%), resided in male-headed households (87.1%), and lived in rural settings (68.4%). More than one quarter (27.9%) reported partner alcohol use. Regarding attitudes toward IPVAV, nearly half (45.8%) endorsed IPVAV as justified for at least one specified reason. In simple logistic regression models, the odds of past-year IPVAV was slightly lower among women with increasing age, education, and wealth. Having a female head of household and urban residence also were associated with lower odds of IPVAV. By contrast, partner alcohol use was associated with a 2.3-fold higher odds of past-year IPVAV (odds ratio [OR] = 2.29; 95% confidence interval [CI]: [2.24, 2.34]), and any attitudes accepting of IPVAV was associated with a 2.2-fold higher odds of past-year IPVAV (OR = 2.19; 95% CI: [2.14, 2.24]).

Mixed-effects regression models, with random intercepts for community and country, are summarized in Table 3 and Figure 2. Model 1 captured the main effects of partner alcohol use, attitudes accepting of IPVAV, and their multiplicative interaction for past-year IPVAV. The adjusted model shows deleterious associations for partner alcohol use (OR = 3.20; 95% CI: [3.07, 3.33]), acceptance of IPVAV (OR = 1.83; 95% CI: [1.76, 1.89]), and the combination (OR = 5.65; 95% CI: [5.41, 5.90]). These results suggest that partner alcohol use and attitudes have sub-multiplicative effects on IPVAV (i.e., the combined effects are less than if the individual effects were multiplied together). However, the ability to interpret these associations is limited in this model because the effects of individual- and community-level risk factors are mixed.

To disentangle these associations, Model 2 separated the total effects into within-community and between-community effects. The within-community effects estimate the association between individual differences and past-year IPVAV within a given community. Among women with attitudes at the community mean, those who report partner alcohol use have

nearly 300% higher odds of IPVAW than women who do not report partner alcohol use (OR = 2.98; 95% CI: [2.88, 3.08]). Among women with partner alcohol use at the community mean, the corresponding increase in odds among women who agree versus do not agree with any reasons accepting of IPVAW is 60% (OR = 1.60; 95% CI: [1.55, 1.65]). The combination of risk factors operating together is associated with higher odds than either individual exposure (OR = 4.11; 95% CI: [3.75, 4.50]) but lower odds than if they combined multiplicatively (ratio of OR = 0.86; 95% CI: [0.79, 0.94]).

The between-community effects capture the association between community risk factor prevalence and past-year IPVAW. Among communities where women do not report attitudes justifying IPVAW, each 10% increase in the community prevalence of partner alcohol use is associated with a 15% increase in the odds of IPVAW (OR = 1.15; 95% CI: [1.13, 1.16]). The same 10% increase in community acceptance of violence is associated with a 12% increase in the odds of IPVAW (OR = 1.12; 95% CI: [1.11, 1.13]). At the community level, this combination of risk factors is associated with excess odds of IPVAW. Each combined 10% increase in the prevalence of alcohol use and accepting attitudes is associated with a 29% increase in IPVAW odds (OR 1.29; 95% CI: [1.26, 1.31]); a small increase above what the independent effects predict (ratio of OR = 1.002; 95% CI: [1.0002, 1.005]) suggesting a synergistic interaction.

Contextual effects in Model 3 estimated the effect of community risk factors among women with comparable individual risk factors. Results effectively compare two women who report similar individual attitudes accepting of IPVAW and partner alcohol use, but who live in separate communities with a 10% difference in risk factor prevalence. In the case where the prevalence of attitudes is the same, but partner alcohol use differs, the woman from the community with a 10% higher prevalence of partner alcohol use has 3% greater odds of IPV (OR = 1.03; 95% CI: [1.01, 1.04]). Where the communities have equal prevalence of partner alcohol use, but acceptance of IPVAW differs, the woman from the community with a higher prevalence of women who accept IPVAW has 7% greater odds of IPVAW (OR = 1.07; 95% CI: [1.06, 1.08]). Again, the combination of alcohol use and attitudes is associated with a small excess odds of IPV (ratio of OR = 1.003; 95% CI: [1.0007, 1.005]).

Model 4a to 4d explored potential cross-level interactions through stratification by community characteristics (Table 3, Figure 3). Variations in effect estimates across 4a to 4d suggest that the association between individual risk factors and IPVAW differ based on community characteristics. These models reveal that the odds of IPVAW associated with partner alcohol use is greater in communities with lower partner alcohol prevalence (lower acceptance of IPVAW: OR = 4.29; 95% CI: [3.83, 4.80]; higher acceptance of IPVAW: OR = 3.84; 95% CI: [3.43, 4.30]) and lower acceptance of IPVAW (lower alcohol: OR = 1.65; 95% CI: [1.52, 1.80]; higher alcohol: OR = 1.64; 95% CI: [1.53, 1.76]). When both individual risk factors are present, there is a sub-multiplicative interaction in communities with lower alcohol-lower acceptance (ratio of OR = 0.72; 95% CI: [0.53, 0.98]), higher alcohol-lower acceptance (ratio of OR = 0.83; 95% CI: [0.71, 0.96]), and higher alcohol-higher acceptance (ratio or OR = 0.87; 95% CI: [0.77, 0.98]).

Discussion

In this analysis, we sought to jointly analyze two well-known risk factors for IPVAV: partner alcohol use and attitudes toward IPVAV (Coll et al., 2021). We aimed to examine these risk factors' independent and joint influence on IPVAV across levels of the social ecology.

Our results suggest that, firstly, partner alcohol use and attitudes toward IPVAV are strongly associated with IPVAV at the individual, community, and contextual levels—both independently and in combination. At the individual and community levels, both were associated with large independent effects, yet the OR for the impact of alcohol use on IPVAV was more than 1.5 times greater than the OR for acceptance of IPVAV in adjusted models. Given their similar ORs in univariable analyses, multiple explanations are possible. For example, alcohol use may be a more proximal risk factor, therefore explaining more variance (Crane et al., 2016). A more complex explanation may be that attitudes toward IPVAV mediate the association between partner alcohol use and IPVAV (i.e., partner alcohol use may fuel the manifestation of male justificatory attitudes that mirror respondents' attitudes, resulting in IPVAV). Finally, alcohol use may serve as closer proxy variable than IPVAV attitudes for a construct that is shared with IPVAV (e.g., masculinity norms that encourage both drinking and IPVAV, broader demoralization, or level of social vulnerability), thereby explaining the stronger relation with IPVAV. The latter explanation may align with findings about the interaction between reporting partner alcohol use and justificatory attitudes toward IPVAV. At the individual level, the combination was associated with lower odds of IPVAV than what would be expected if the results combined multiplicatively or synergistically. However, the combination of risk factors contrastingly resulted in a small excess odds of IPVAV at both the community and contextual levels. This underscores the potential for complex interactions that vary across the social ecology.

In the stratified analyses, we found that the association between partner alcohol use and IPVAV was largest in communities where the prevalence of alcohol use among male partners is low. This suggests that in contexts where drinking is less normative, alcohol use may confer stronger alcohol related IPVAV risk, a finding that is consistent with prior research (Bye & Rossow, 2008; Coleman & Straus, 1983; Greene et al., 2021). This contrasted with the association between acceptance of IPVAV and IPVAV, which remained relatively consistent across varied levels of community attitudes and alcohol use prevalence. Therefore, acceptance of IPVAV within communities appears to be similarly associated with risk of IPVAV regardless of community norms or alcohol use prevalence. In contrast, partner alcohol use may be a particularly salient risk factor for IPVAV in communities where alcohol use is less normative.

Our results have important implications for practice and policy. First, the emergent focus on gender norms for IPVAV intervention, while important, may neglect a critical correlate of IPVAV with a large magnitude of association. There is need for interdisciplinary conversations that bring mental health/substance use researchers into conversation with feminist scholars focusing on norms surrounding acceptance of IPVAV. These findings reveal that it is important to consider norms and attitudes alongside alcohol use when

understanding epidemiological patterns of IPVAV and potential opportunities for preventive programs and policymaking. Further research unpacking the joint effects between alcohol use and attitudes toward IPVAV (e.g., whether they share an underlying trait, such as masculinity norms) could further guide the choice of preventive interventions. Another important consideration for policy and practice that emerged from this study relates to the relatively consistent association between individual-level acceptance of IPVAV across communities with varying community attitudes toward IPVAV or alcohol use prevalence. Further research on how individual-level attitudes toward IPVAV are shaped, including the role of community norms, is needed to identify whether focusing on altering community norms is the most efficient way to mitigate the proximal effect of individual acceptance of IPVAV. To the extent that these questions measure a combination of personal attitudes and community norms (Schuler & Islam, 2008), it is possible that couples- and individual-level preventive interventions focused on attitudes toward IPVAV are needed to complement community-level interventions to reduce risk of IPVAV.

These results should be evaluated considering several limitations. Among these, we utilized cross-sectional data, which precludes the ability to make causal inferences. Partner alcohol use was measured imprecisely, as no recall period or severity level was specified. This may introduce temporal biases and recall bias, if women who experience IPV are differentially likely to report partner alcohol use. It is also possible that recall bias may be greater in communities where alcohol use is less normative, thus introducing bias into the stratified analyses. Moreover, attitudes toward IPVAV were measured by self-report; they may be underreported or overreported due to social desirability bias. There may be potential endogeneity between acceptance of IPVAV and IPVAV, such that accepting attitudes emerge as a coping mechanism or response to experienced violence. For these reasons, we conservatively interpret our findings as associations, although we recognize both partner alcohol use (Choenni et al., 2017) and acceptance of IPVAV (Raj et al., 2018) are established risk factors, also found in longitudinal studies. Additionally, we developed a composite measure of IPVAV inclusive of any past-year psychological, physical, and/or sexual violence. Some scholars now advocate that only high-intensity psychological violence be included (Heise et al., 2019). In this analysis, we retain any psychological violence to remain consistent with the extant literature on partner alcohol use and attitudes toward IPVAV.

We also acknowledge several limitations related to how we have framed this work. First, we acknowledge that this work is more salient to LMICs. This focus was selected given the preponderance of evidence historically has been generated in high-income countries. Within LMICs, however, we have grouped diverse countries. This is both a strength, to the extent that the data are more generalizable, and limitation, to the extent that we have not captured the unique cultures and sub-cultures present within these countries. We recognize that the etiology of IPVAV is complex, and its presence or absence is related both to the risk factors on which we have focused this work and risk and protective factors across the social ecology, which include the unique strengths of diverse communities and cultures. Similarly, we acknowledge that this work focuses on male perpetrated IPVAV, drawing on an historical literature that largely presupposes cisgender status and heterosexual relationships (Henry et al., 2021). Although it is critical to grow our understanding of

male perpetrated IPVAV, building theory and empirical findings that advance understanding of IPV in transgender/gender nonconforming persons and diverse relationships likewise is essential, especially in LMIC contexts.

In summary, these analyses revealed the importance of evaluating risk factors for IPVAV in context. First, risk factors for IPVAV should be considered together to understand their interconnected roles in conferring risk for IPVAV. Second, individual-level risk factors must also be considered within the community context. Understanding community norms and how they modify individual-level risk factors for IPVAV, as was the case for alcohol use in this study, can inform tailored preventive intervention approaches. Third, focusing on gender norms alone may be insufficient to effectively reduce the risk of IPVAV for women in LMICs. Alcohol use and acceptance of IPVAV were consistently associated with increased odds of IPV. We identified notable and nuanced interactions between individual- and community-level risk factors for IPVAV as well as moderation of the association between risk factors and IPVAV based on community-level characteristics. Future studies should focus on the complex interactions, at multiple social levels, between interacting risk factors for IPVAV—to pave the way for the design of optimally effective IPVAV-focused interventions that have the smallest risk of doing harm.

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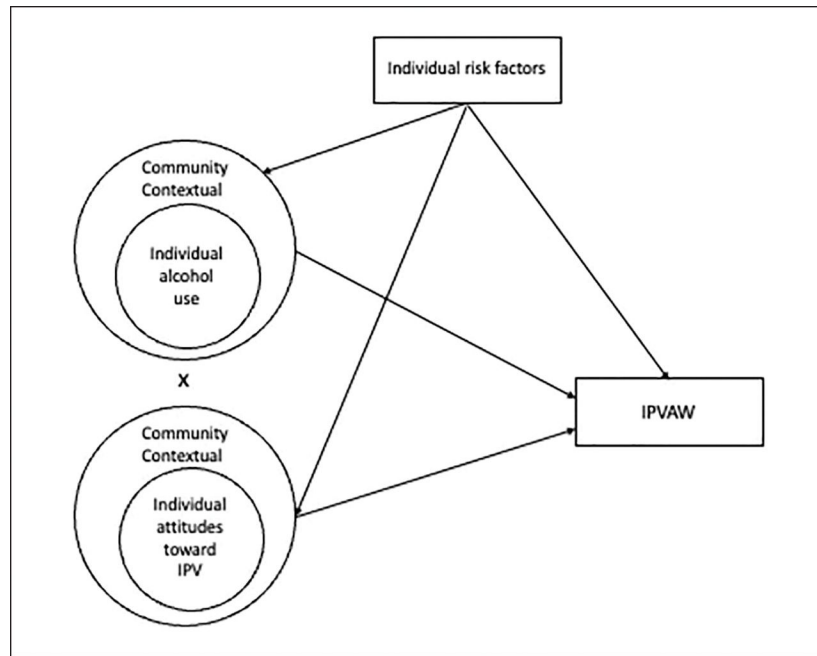


Figure 1. Model of relationships among partner alcohol use, attitudes toward IPVAW, and IPVAW.
Note. IPVAW = intimate partner violence against women.

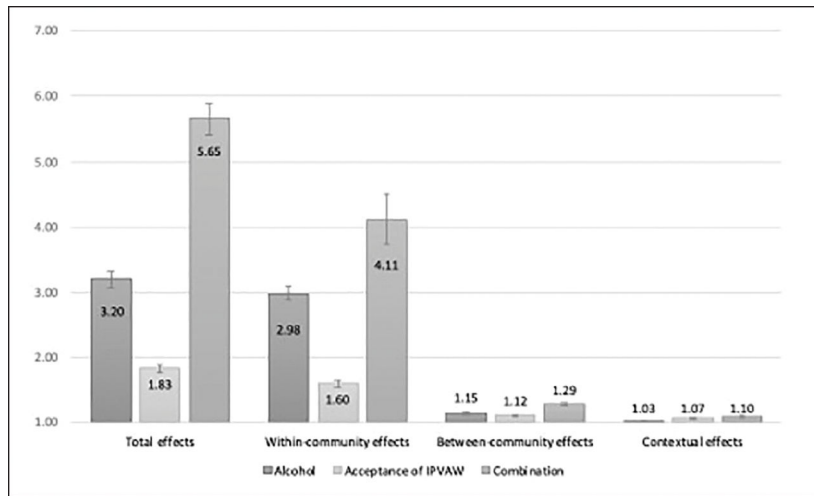


Figure 2. Odds ratios from mixed-effect logistic regression models of past-year IPVAW on partner alcohol use and acceptance of IPVAW ($n = 166,621$; Models 1–3).
Note. IPVAW = intimate partner violence against women.

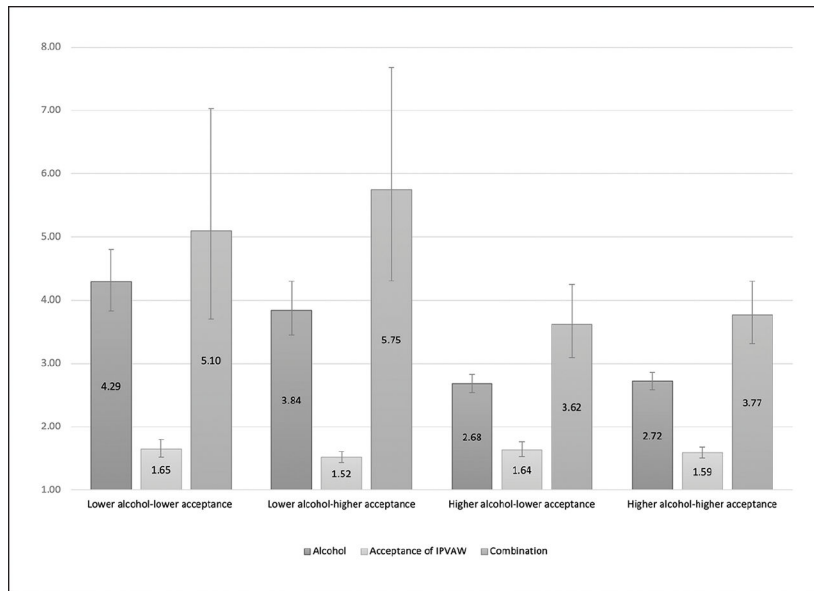


Figure 3. Odds ratios from mixed-effect logistic regression models of past-year IPVAW on partner alcohol use and acceptance of IPVAW, stratified by community alcohol and acceptance of IPVAW ($n = 166,621$; Models 4a–4d).
Note. IPVAW = intimate partner violence against women.

Table 1.

Models of Past-Year IPVAW on Independent and Joint Effects of Partner Alcohol Use and Acceptance of IPVAW in 19 Low- and Middle-Income Countries ($n = 166,621$), 2010 to 2017.

Total effect	Effect of partner alcohol use, acceptance of IPVAW, and their interaction on IPVAW (across individual and community levels)
Individual effect	Effect of individual partner alcohol use, acceptance of IPVAW, and their interaction on IPVAW within a given community
Community effect	Effect of community prevalence of partner alcohol use, acceptance of IPVAW, and their interaction on IPVAW
Contextual effect	Effectively compares two women with similar partner alcohol use and attitudes accepting IPVAW, but who live in separate communities with a 10% difference in risk factor prevalence

Note. IPVAW = intimate partner violence against women.

Descriptive Statistics and Univariable Logistic Regression Models for Past-Year IPVAW in 19 Low- and Middle-Income Countries ($n = 166,621$), 2010 to 2017.

Table 2.

	Sample Proportions		Univariable Analysis		Odds Ratio [95% CI] ^a
	No Past-Year IPVAW $n = 119,077$ %(n)	Past-Year IPVAW $n = 47,544$ %(n)	No Past-Year IPVAW $n = 166,621$ %(n)	Past-Year IPVAW $n = 47,544$ %(n)	
Woman's age, M (SD)	31.82 (8.32)	31.41 (8.03)	31.71 (8.24)	31.41 (8.03)	0.994 [0.993, 0.995]
Woman's education					
No education	36.05 (42,930)	44.40 (21,109)	38.43 (64,039)	44.40 (21,109)	ref.
Primary education	22.97 (27,356)	27.20 (12,931)	24.18 (40,287)	27.20 (12,931)	0.96 [0.94, 0.99]
Secondary education	32.90 (39,180)	25.34 (12,049)	30.75 (51,229)	25.34 (12,049)	0.63 [0.61, 0.64]
Higher education	8.07 (9,611)	3.06 (1,455)	6.64 (11,066)	3.06 (1,455)	0.31 [0.29, 0.33]
Female head of household	13.33 (15,869)	11.69 (5,557)	12.86 (21,426)	11.69 (5,557)	0.86 [0.83, 0.89]
Relative wealth index					
Poorest	18.98 (22,601)	23.34 (11,097)	20.22 (33,698)	23.34 (11,097)	ref.
Poorer	20.18 (24,034)	22.83 (10,856)	20.94 (34,890)	22.83 (10,856)	0.92 [0.89, 0.95]
Middle	19.83 (23,614)	21.25 (10,101)	20.23 (33,715)	21.25 (10,101)	0.87 [0.84, 0.90]
Richer	20.21 (24,063)	18.89 (8,982)	19.83 (33,045)	18.89 (8,982)	0.76 [0.74, 0.79]
Richest	20.80 (24,765)	13.69 (6,508)	18.77 (31,273)	13.69 (6,508)	0.54 [0.52, 0.55]
Urban residence	32.99 (39,288)	28.13 (13,373)	31.61 (52,661)	28.13 (13,373)	0.79 [0.78, 0.81]
Partner alcohol use	22.90 (27,273)	40.50 (19,253)	27.92 (46,526)	40.50 (19,253)	2.29 [2.24, 2.34]
Any acceptance of IPVAW	40.24 (47,911)	59.60 (28,337)	45.76 (76,248)	59.60 (28,337)	2.19 [2.14, 2.24]

Note. IPVAW = intimate partner violence against women; CI = confidence interval.

^aOdds ratios from univariable logistic regression models on past-year IPVAW.

Table 3.

Mixed-Effect Logistic Regression Models of Past-Year IPVAV on Independent and Joint Effects of Partner Alcohol Use and Acceptance of IPVAV in 19 Low- and Middle-Income Countries ($n = 166,621$), 2010 to 2019.

	Partner Alcohol Use	Acceptance of IPVAV	Unadjusted OR [95% CI]	Adjusted ^d OR [95% CI]
Model 1: Total effects				
Reference	No alcohol use	No acceptance	ref	ref
Partner alcohol use ^a	No alcohol use	Any acceptance	3.27 [3.14, 3.41]	3.20 [3.07, 3.33]
Justification of IPVAV ^a	Any alcohol use	No acceptance	1.94 [1.87, 2.01]	1.83 [1.76, 1.89]
Partner Alcohol Use × Justification of IPVAV ^b	—	—	0.97 [0.91, 1.02]	0.97 [0.91, 1.02]
<i>Joint effect^c</i>	Any alcohol use	Any acceptance	6.12 [5.86, 6.39]	5.65 [5.41, 5.90]
Model 2: Within- and between-community effects				
<i>Within-community effects</i>				
Reference	Community-mean alcohol use	Community-mean acceptance	ref	ref
Partner alcohol use ^a	Community-mean alcohol use	Higher vs. lower acceptance	3.06 [2.96, 3.17]	2.98 [2.88, 3.08]
Justification of IPVAV ^a	Higher vs. lower alcohol use	Community-mean acceptance	1.66 [1.61, 1.71]	1.60 [1.55, 1.65]
Partner Alcohol Use × Justification of IPVAV ^b	—	—	0.87 [0.80, 0.94]	0.86 [0.79, 0.94]
<i>Joint effect^c</i>	Higher vs. lower alcohol use	Higher vs. lower acceptance	4.40 [4.02, 4.83]	4.11 [3.75, 4.50]
<i>Between-community effects</i>				
Partner alcohol use ^a	No community alcohol use	10% increase in community acceptance	1.15 [1.13, 1.16]	1.15 [1.13, 1.16]
Justification of IPVAV ^a	10% increase in community alcohol use	No community acceptance	1.14 [1.12, 1.15]	1.12 [1.11, 1.13]
Partner Alcohol Use × Justification of IPVAV ^b	—	—	1.002 [0.99988, 1.004]	1.002 [1.0002, 1.005]
<i>Joint effect^c</i>	10% increase in community alcohol use	10% increase in community acceptance	1.31 [1.28, 1.33]	1.29 [1.26, 1.31]
Model 3: Contextual effects				
Reference	No community alcohol use	No community acceptance	ref	ref
Contextual effect of partner alcohol use ^a	No community alcohol use	10% increase in community acceptance	1.02 [1.01, 1.04]	1.03 [1.01, 1.04]
Contextual effect of justification of IPVAV ^a	10% increase in community alcohol use	No community acceptance	1.08 [1.07, 1.09]	1.07 [1.06, 1.08]
Partner Alcohol Use × Justification of IPVAV ^b	—	—	1.003 [1.0005, 1.005]	1.003 [1.0007, 1.005]

	Partner Alcohol Use	Acceptance of IPVAW	Unadjusted OR [95% CI]	Adjusted ^d OR [95% CI]
<i>Joint effect^c</i>	10% increase in community alcohol use	10% increase in community acceptance	1.11 [1.08, 1.13]	1.10 [1.08, 1.12]
STRATIFIED MODELS				
Model 4a: Within-community effects in communities with lower partner alcohol use and lower IPVAW acceptance				
Reference	Community-mean alcohol use	Community-mean acceptance	ref	ref
Partner alcohol use ^a	Community-mean alcohol use	Higher vs. lower acceptance	4.37 [3.91, 4.89]	4.29 [3.83, 4.80]
Justification of IPVAW ^a	Higher vs. lower alcohol use	Community-mean acceptance	1.73 [1.59, 1.89]	1.65 [1.52, 1.80]
Partner Alcohol Use × Justification of IPVAW ^b	—	—	0.70 [0.52, 0.96]	0.72 [0.53, 0.98]
<i>Joint effect^c</i>	Higher vs. lower alcohol use	Higher vs. lower acceptance	5.32 [3.86, 7.32]	5.10 [3.70, 7.03]
Model 4b: Within-community effects in communities with lower partner alcohol use and higher IPVAW acceptance				
Reference	Community-mean alcohol use	Community-mean acceptance	ref	ref
Partner alcohol use ^a	Community-mean alcohol use	Higher vs. lower acceptance	3.94 [3.52, 4.41]	3.84 [3.43, 4.30]
Justification of IPVAW ^a	Higher vs. lower alcohol use	Community-mean acceptance	1.57 [1.49, 1.67]	1.52 [1.44, 1.61]
Partner Alcohol Use × Justification of IPVAW ^b	—	—	0.996 [0.76, 1.30]	0.98 [0.75, 1.29]
<i>Joint effect^c</i>	Higher vs. lower alcohol use	Higher vs. lower acceptance	6.17 [4.62, 8.24]	5.75 [4.31, 7.68]
Model 4c: Within-community effects in communities with higher partner alcohol use and lower IPVAW acceptance				
Reference	Community-mean alcohol use	Community-mean acceptance	ref	ref
Partner alcohol use ^a	Community-mean alcohol use	Higher vs. lower acceptance	2.78 [2.63, 2.93]	2.68 [2.54, 2.83]
Justification of IPVAW ^a	Higher vs. lower alcohol use	Community-mean acceptance	1.73 [1.62, 1.85]	1.64 [1.53, 1.76]
Partner Alcohol Use × Justification of IPVAW ^b	—	—	0.83 [0.72, 0.97]	0.83 [0.71, 0.96]
<i>Joint effect^c</i>	Higher vs. lower alcohol use	Higher vs. lower acceptance	4.01 [3.42, 4.70]	3.62 [3.09, 4.25]
Model 4d: Within-community effects in communities with higher partner alcohol use and higher IPVAW acceptance				
Reference	Community-mean alcohol use	Community-mean acceptance	ref	ref
Partner alcohol use ^a	Community-mean alcohol use	Higher vs. lower acceptance	2.82 [2.68, 2.96]	2.72 [2.59, 2.86]
Justification of IPVAW ^a	Higher vs. lower alcohol use	Community-mean acceptance	1.67 [1.58, 1.76]	1.59 [1.51, 1.68]
Partner Alcohol Use × Justification of IPVAW ^b	—	—	0.87 [0.77, 0.98]	0.87 [0.77, 0.98]
<i>Joint effect^c</i>	Higher vs. lower alcohol use	Higher vs. lower acceptance	4.08 [3.58, 4.65]	3.77 [3.31, 4.30]

Note. IPVAW = intimate partner violence against women; CI = confidence interval.

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- ^aMain effect of partner alcohol use/acceptance of IPVAV (i.e., independent effect).
- ^bInteraction between partner alcohol use and attitudes toward IPVAV.
- ^cJoint effect represents the linear combination of partner alcohol use (main effect), acceptance of IPVAV (main effect), and their multiplicative interaction.
- ^dModels adjusted for woman's age, woman's education, sex of the household head, relative wealth index, and urban vs. rural residence.