Drinking Context–Specific Dose-Response Models of Intimate Partner Violence Among an Urban Emergency Department Sample

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ABSTRACT. Objective: This cross-sectional study evaluates the association between physical intimate partner violence (IPV) and frequencies of drinking and volume consumed in six different contexts among a sample of urban emergency department (ED) patients. **Method:** We obtained survey data from 1,037 married, cohabiting, or partnered patients (53% female; 50% Hispanic; 29% African American) at a Northern California safety-net hospital. Past-year physical IPV was measured with the Revised Conflict Tactics Scale. We asked patients about frequency of drinking and usual number of drinks consumed at bars, restaurants, homes of friends or relatives, own home, public places such as street corners or parking lots, and community centers or large events. Gender-stratified dose-response models were estimated for frequencies of IPV perpetration and victimization, with adjustment for sociodemographic and psychosocial factors, marijuana use, and spouse/partner problem

drinking. **Results:** None of the women's context-based frequency and volume measures were associated with frequency of IPV victimization. Women's volume of alcohol consumed at home was associated positively with frequency of their IPV perpetration ($\beta = .008$, $SE = .003$, $p < .01$), and volume consumed in public places was associated negatively with this outcome ($\beta = -.023$, $SE = .010$, $p < .05$). Among men, none of the context-based frequency and volume measures were associated with frequency of either IPV outcome. Spouse/partner's problem drinking was associated with each gender's IPV victimization, and with IPV perpetration by men. **Conclusions:** Frequency of drinking and volume consumed in specific contexts do not substantively contribute to frequency of IPV perpetration or victimization in this sample of urban ED patients. (*J. Stud. Alcohol Drugs*, 81, 780–789, 2020)

INTIMATE PARTNER VIOLENCE (IPV) remains a significant public health problem in the United States (Miller & McCaw, 2019). Lifetime and past-12-month prevalence estimates based on the 2015 U.S. National Intimate Partner and Sexual Violence Survey indicate that 36.4% and 5.5% of women and 33.6% and 5.2% of men have experienced sexual or physical violence, or stalking by an intimate partner, respectively (Smith et al., 2018). Those who experience IPV are at risk for an array of physical, behavioral, and mental health problems (Breiding et al., 2008; Sugg, 2015).

Excessive alcohol use contributes to the occurrence and severity of partner aggression (Leonard & Quigley, 2017). Most alcohol-related IPV research has focused on the individual's heavy or problem drinking, yet the ecological dimensions of drinking (i.e., the social context of drinking or venue in which drinking occurs) may also increase IPV risk.

For example, in a cross-sectional analysis of data collected from a clinical sample in St. Petersburg, Russia, Zhan et al. (2011) found that those who usually drank in the street or in a park were at elevated risk for IPV. Cunradi and colleagues (2012) reported that among a sample of couples from 50 California cities, the male partner's volume of alcohol consumed in bars, in public places, and during quiet evenings at home was associated with increased IPV. These studies, however, do not differentiate between frequency (number of drinking occasions) and volume of alcohol consumed within each location. Distinguishing between the effects of frequency of drinking and volume of alcohol consumed in a context or location requires an approach that separates the effects of these two types of context-specific risk (Mair et al., 2015).

Use of dose-response models is an analytic technique that helps make this distinction between correlated measures of drinking behaviors. This is important because frequency of drinking in a context versus volume of alcohol consumed in that context may point to different causal mechanisms linking a venue type to IPV. Hypothetically, the social ecological model proposed by Gruenewald (2007) asserts that alcohol sellers “niche market” to select strata of drinkers, and that drinkers return to venues at which they find people like themselves (i.e., assortative

Received: November 3, 2019. Revision: August 3, 2020.

Research reported in this article was supported by National Institute on Alcohol Abuse and Alcoholism Award Number R01AA022990. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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drinking). A drinker's propensity for aggressive behavior may therefore be reinforced by drinking in venues frequented by like-minded drinkers (Gruenewald, 2007). Under such conditions, exposure to a social environment with permissive norms toward violence (e.g., "violent" bars) (Quigley et al., 2003; Treno et al., 2008) may potentiate IPV more than volume of alcohol consumed in that venue. Drinking in a setting that does not promote aggression or aggressive norms (e.g., restaurants) would not be expected to have an impact on likelihood of IPV (Cunradi et al., 2014). In other circumstances, volume of alcohol consumed in a specific context may be of greater significance for IPV than the social characteristics of that environment. By way of illustration, volume of alcohol consumed by one or both partners at home could either be a source of conflict or could result in conflict escalation and thereafter lead to IPV (Cunradi et al., 2012). Here, the impact of volume of alcohol consumed may be independent of the dyad's frequency of drinking occasions in the home. Proximal effects models, such as alcohol myopia, propose that the direct psychopharmacological effects of alcohol on cognitive functioning may result in increased aggression (Giancola et al., 2010). Meta analytic reviews of experimental studies find support for proximal effects of acute alcohol on male-to-female intimate partner aggression (Crane et al., 2016); a smaller effect size is seen for female aggression (Crane et al., 2017). Use of context-specific dose response models allows us to assess if volume consumed (beyond the first drink) in specific venues is associated with IPV. Studying the ecological dimensions of drinking by quantifying the extent to which context-specific risks are related to IPV will provide information that can be used to design interventions aimed at preventing alcohol-related IPV. Frequent drinking in certain contexts can be used as a marker of risk to help identify higher-risk populations and/or couples.

This study tests if drinking contexts are associated with frequency of physical IPV perpetration and victimization among a sample of urban ED patients. Urban ED patients represent an at-risk, socially disadvantaged population, with elevated rates of IPV, substance use, and mental health problems (Bazargan-Hejazi et al., 2014; Beaudoin et al., 2015; Gilbert et al., 2012; Houry et al., 2008; Rhodes et al., 2009). Little is known about the drinking contexts of this population and whether frequency of drinking in specific contexts and volume consumed there are independently associated with greater frequency of IPV. Our first hypothesis is that drinking in bars and public settings (e.g., parks, street corners, parking lots) will be associated with frequency of IPV perpetration for men and women. Empirical evidence for this is found in studies that link drinking in bars with arguments and fighting (Nyaronga et al., 2009) and with IPV (Cunradi et al., 2012; Mair et al., 2013), and studies that found drinking in public settings is associated with IPV (Cunradi et

al., 2012; Zhan et al., 2011). Our second hypothesis is that drinking at home will be associated with frequency of IPV perpetration among women and IPV victimization among men. These associations were observed in dyadic-level analyses among a geographic sample of California couples (Cunradi et al., 2012; Mair et al., 2013). We did not have a priori hypotheses about whether other contexts would be associated with IPV frequency given the dearth of research in this area.

Method

The project was approved by the Alameda Health System Institutional Review Board. Participants provided informed consent and received a \$30 grocery store gift card for completing the survey.

Sample and data collection

This cross-sectional study was based among patients seeking nonemergency care at the ED of an urban Level I trauma center in Northern California. The hospital is part of a county-wide integrated public health care system. Study eligibility criteria were as follows: 18–50 years old; English or Spanish speaker; resident of the county in which the hospital is located; and married, cohabiting, or in a romantic (dating) relationship for the past 12 months. Patients who were intoxicated, experiencing acute psychosis or suicidal or homicidal ideation, were cognitively/psychologically impaired and unable to provide informed consent, in custody by law enforcement, or in need of immediate medical attention were ineligible and excluded.

Survey interviews were conducted with 1,037 participants (53% female) between February and December 2017. Data collection procedures have been described elsewhere (Caetano et al., 2019). In brief, trained research assistants identified potentially eligible participants through the ED's electronic patient information system and conducted face-to-face screening in the ED waiting room or in a treatment cubicle. The research assistants conducted survey interviews in the patient's room without others present using computer-assisted personal interview (CAPI) techniques. Sample recruitment occurred during weekdays from 9 A.M. to 9 P.M. Average survey interview completion time was 37 minutes ($SD = 20.7$). See Supplemental Figure A for the recruitment sequence.

Measurements

Intimate partner violence. Frequencies of past-12-month physical IPV victimization and perpetration were measured with the physical assault subscale of the Revised Conflict Tactics Scale (CTS2; Straus et al., 1996). Research assistants introduced the CTS2 questions to the participant by

first stating, “The next section concerns resolving couple conflict. No matter how well a couple gets along, there are times when they disagree, get annoyed with the other person, want different things from each other, or just have spats or fights because they are in a bad mood, are tired, or for some other reason. Couples also have many ways of trying to settle their differences. Please tell me how many times in the past 12 months your spouse or partner did each of these things to you, and how many times you did them to your spouse or partner: My spouse or partner pushed or shoved me. Would you say that happened more than 10 times, 6–10 times, 3–5 times, twice, once, never? I pushed or shoved my spouse or partner. Would you say that happened more than 10 times . . .” etc. All CTS2 physical assault subscale items were asked in this manner. The frequency of each act of perpetration or victimization was valued using the midpoint of each category: *never* (0), *once* (1), *twice* (2), *3–5 times* (4), *6–10 times* (8), and *more than 10 times* (15), then summed. Cronbach’s α for the scale in the data set under analysis was .85.

Drinking and drinking contexts. Participants who consumed at least one drink in the past 12 months (i.e., current drinkers) were asked the frequencies with which they had one or more, two or more, three or more, six or more, and nine or more drinks in the past 4 weeks. A drink was defined as a 12-oz. can, bottle, or glass of beer; a 5-oz. glass of wine; or a 1-oz. shot of distilled spirits. Drinkers were asked how often in the past 4 weeks they drank in a bar or club; restaurant that serves alcohol; friend’s or relative’s home; own home; at a public place outdoors (i.e., park, lake, beach, parking lot or street); and community center, social or banquet hall, or large event venue. Responses constituted number of drinking occasions (frequency or F) for each context. Next, those who drank at least once in each setting were asked how many drinks they usually had there. Continued volumes of use, $V - F$, for each setting were calculated as $[(F \times \text{typical number of drinks}) \text{ minus } F]$. Those who did not drink in the past 4 weeks were asked the same questions over the past 12 months. Drinking context values for nondrinkers were recoded as “0.” All measures related to drinking patterns and contexts were scaled to a 365-day metric.

We used a model developed by Gruenewald et al. (2010) and applied by others (Freisthler & Gruenewald, 2013; Huckle et al., 2016; Mair et al., 2013) in which overall drinking risks, R , are related to frequencies of drinking, F , and continued drinking volumes (total number of drinks beyond 1 per drinking occasion, $V - F$). The model provides estimates of risks related to drinking, b , and risks related to heavier drinking, c , as shown in Equation 1:

$$R = a + bF + c(V - F) \quad (\text{Equation 1})$$

With the assumption that F (overall frequency of drinking) is composed of context-specific drinking frequencies (F_i), such that $F = f_1 + f_2 + \dots + f_n$, this approach can be ex-

tended to model context-specific risks as shown in Equation 2:

$$R_i = a_i + b_i F_i = c_i F_i (V_i - F_i) \quad (\text{Equation 2})$$

We calculated a frequency (F_i) and continued volume ($V_i - F_i$) for each of the six drinking contexts. Total risks related to drinking (R) is a sum of these six venue-specific risks (R_i). The risks associated with frequency of attending each venue and having one drink (b_i) and context-specific continued volumes (total number of drinks beyond one per drinking occasion) (c_i) can be estimated with Equation 2. Estimates of c_i represent different risks related to heavier drinking between venues; estimates of b_i represent different risks related to frequency of attending each drinking context. This continued volume approach is designed to reduce collinearity. F and V are necessarily correlated because both measures include the “first drinks” consumed on any occasion, but “continued volume” counts only the number of drinks beyond the first. In this system, someone who has exactly one drink in a context every day has a very high drinking frequency but zero continued drinks. This person’s risks might be more connected to their choice of location than to the alcohol consumed there. Another person who consumes seven drinks in a context every Friday night, but no other drinking during the week, would have the same continued volume but only one-seventh the drinking frequency.

Sociodemographic factors

Gender. Self-reported gender was coded as male or female. Three participants identified as transgender; these cases were excluded from the analysis.

Race/ethnicity. Participants were asked to name the racial or ethnic group(s) that best describes them. These groups were recoded into five racial/ethnic categories as follows: White, African American, multiracial/multiethnic, other, and Hispanic.

Age. This was used as a continuous variable.

Level of education. This was coded into the following four categories: (a) less than high school; (b) completed high school or General Educational Development (GED) credential; (c) some college, technical or vocational school; (d) completed 4-year college or higher.

Household food insufficiency. Participants rated their level of agreement with the statement, “In the past 12 months, the food we bought ran out and we didn’t have money to get more” (*never, sometimes true, often true*). We dichotomized and compared those who responded “sometimes” or “often” with those who responded “never” (Okechukwu et al., 2012).

Psychosocial factors

Adverse childhood experiences (ACE). The modified ACE measures exposure to the following six adverse childhood

experiences: (a) exposure to a mentally ill person in the home, (b) parent/caregiver alcoholism, (c) sexual abuse, (d) physical abuse, (e) psychological abuse, and (f) violence directed against the respondent's mother (Cabrera et al., 2007). These exposures were summed to create the ACE variable (range: 0–6; Cronbach's $\alpha = .74$).

Impulsivity. This construct was measured with a three-item scale used in prior IPV studies (Caetano et al., 2000; Cunradi et al., 2009b, 2013). Response options ranged from 1 (*quite a lot*) to 4 (*not at all*). Items were reverse-coded and summed to create a score. Cronbach's α was .79.

Posttraumatic stress disorder (PTSD). This four-item measure is from the Primary Care Screener for PTSD (Prins et al., 2003). A score of 3 or more is considered positive. Cronbach's α was .83.

Other substance use factors

Marijuana use. Participants reported how many days during the past 12 months (0–365) they used marijuana or hashish.

Spouse/partner problem drinking. Participants were asked to assess their spouse/partner's drinking via the three-item Alcohol Use Disorders Identification Test–Consumption (AUDIT-C; Bradley et al., 2003; Bush et al., 1998). Male/female partners with a score above 4 or 3, respectively, were considered hazardous drinkers (Cronbach's $\alpha = .81$).

Statistical analysis

Data were analyzed using censored Tobit models with heteroscedasticity corrections, with frequency measured as counts of the number of past-year IPV events. A series of gender-specific models were estimated for IPV victimization and perpetration. Each model contains frequencies of drinking (F) and continued volumes ($V - F$) for the six contexts. All models include sociodemographic, psychosocial, and other substance use (marijuana use and spouse/partner problem drinking) covariates that are related to alcohol use and IPV (Cunradi et al., 2020; Mair et al., 2012). We initially included alcohol outlet densities and Census tract neighborhood demographic characteristics; because outlet densities were not associated with the outcomes, nor were most Census tract demographic characteristics, we excluded these variables from the final models. Missing data ranged from 0 to 1.6% for the study variables and were dropped from the analysis through listwise deletion. Analyses are based on data from 439 men and 521 women, including past-year abstainers ($n = 135$ men; $n = 234$ women), and were conducted with Stata 15.0 (StataCorp LP, College Station, TX). We conducted a sensitivity analysis with counts of IPV frequencies recoded at the lower bound of each range instead of the midpoint; results were essentially unchanged from models presented here. Gender-specific correlation

matrices for frequencies and continued volumes are available in Supplemental Table A.

Results

Sample characteristics

Approximately 22% of men and 17% of women reported at least one incident of IPV victimization. IPV perpetration was reported by approximately 14% of men and 19% of women. Regarding past-12-month drinking contexts, both men and women reported the most drinking occasions (frequency) at home ($M = 28.84$, $SD = 66.96$, and $M = 20.68$, $SD = 66.29$, respectively) and reported the greatest continued volumes in this setting (Table 1).

IPV victimization and perpetration among women

Table 2 presents context-specific results for associations between drinking frequencies, continued volumes, and women's IPV frequencies. None of the context-specific frequencies (i.e., frequency of drinking occasions) or continued volumes were associated with frequency of IPV victimization. Women who categorized their spouse/partner as a problem drinker reported increased IPV victimization.

Continued volumes of alcohol consumed at home were associated with greater frequency of IPV perpetration. Continued volumes in public places were associated with decreased frequency of IPV perpetration. Days of marijuana use were associated with increased frequency of IPV perpetration.

IPV victimization and perpetration among men

Table 3 presents context-specific results for associations between frequencies, continued volumes, and men's IPV frequencies. None of the context-specific frequencies nor continued volumes were associated with frequency of IPV victimization. Those who categorized their spouse/partner as a problem drinker reported more frequent IPV victimization.

Context-specific frequencies and continued volumes were not associated with frequency of IPV perpetration. Those who categorized their spouse/partner as a problem drinker reported more frequent IPV perpetration. Group F tests did not identify significant across-context differences in effects of either drinking frequency or continued volume in any of the models presented above.

Discussion

Our hypotheses concerning associations between drinking in bars and public settings and IPV perpetration, and between drinking at home and IPV victimization, were not supported by the findings among men. Several potential

TABLE 1. Sample characteristics

Variable	Women (<i>n</i> = 521; 54.3%) <i>M</i> (<i>SD</i>)	Men (<i>n</i> = 439; 45.7%) <i>M</i> (<i>SD</i>)
Respondent characteristics		
Age	33.95 (8.49)	36.55 (8.17)
Race/ethnicity		
Hispanic (reference group)	0.49 (0.5)	0.55 (0.50)
African American	0.32 (0.47)	0.27 (0.45)
White	0.07 (0.25)	0.07 (0.25)
Multiethnic/multiracial	0.06 (0.24)	0.05 (0.21)
Other	0.06 (0.24)	0.07 (0.25)
High school graduate	0.71 (0.45)	0.61 (0.49)
Food insufficiency	0.54 (0.50)	0.45 (0.50)
Impulsivity	5.33 (2.60)	5.30 (2.48)
Adverse childhood experiences	1.48 (1.65)	1.14 (1.43)
PTSD (positive)	0.27 (0.45)	0.22 (0.42)
Days using marijuana	47.83 (115.89)	56.56 (122.51)
Partner AUDIT-C (positive)	0.23 (0.42)	0.19 (0.40)
IPV victimization events in past 12 months	2.09 (9.90)	1.50 (5.49)
IPV perpetration events in past 12 months	1.52 (6.66)	0.63 (2.74)
Drinking contexts: Frequency (past 12 months)		
Bars	4.95 (21.34)	5.28 (23.55)
Restaurants	2.79 (9.88)	4.93 (16.38)
Friends' or relatives' homes	4.88 (20.92)	11.87 (42.42)
Respondent's own home	20.68 (66.29)	28.84 (66.96)
Parks, parking lots, public settings	2.67 (22.05)	7.73 (35.79)
Community centers or large events	0.37 (2.73)	1.46 (9.14)
Drinking contexts: Continued volumes (past 12 months)		
Bars	7.42 (38.80)	13.30 (59.09)
Restaurants	3.12 (27.18)	6.31 (27.98)
Friends' or relatives' homes	19.42 (125.06)	53.17 (255.44)
Respondent's own home	76.12 (450.62)	123.81 (510.69)
Parks, parking lots, public settings	13.33 (151.35)	24.71 (182.09)
Community centers or large events	0.52 (5.15)	2.01 (13.77)

Notes: PTSD = posttraumatic stress disorder; AUDIT-C = Alcohol Use Disorders Identification Test–Consumption; IPV = intimate partner violence.

explanatory factors (e.g., male underreporting of IPV and/or drinking, survey methodology) should be considered when evaluating these results. Regarding underreporting of IPV, the overall prevalence of past-year IPV in the sample (23%), as well as the gender-specific rates of perpetration and victimization, are consistent with those reported in other urban ED-based studies of IPV (Bazargan-Hejazi et al., 2014; Houry et al., 2008; Rhodes et al., 2009; Walton et al., 2009). Underreporting of IPV, however, cannot be excluded. Agreement among couples about the occurrence of IPV behaviors has been shown to be low in community-based studies (Cunradi et al., 2009a; Schafer et al., 2002; Testa & Derrick, 2014). An effective alternative method to mitigate IPV underreporting is to separately interview both spouses/partners in the couple. This approach allows for calculating lower-bound and upper-bound IPV prevalence estimates. The former is based on both members of the couple agreeing that an IPV event occurred. The latter is based on either member reporting the occurrence of an IPV event (Cunradi et al., 2009b, 2012).

Underreporting of alcohol use by gender has been reported in general population surveys (Livingston & Callinan, 2015; Stockwell et al., 2004, 2016) and among ED

injury patients (Cherpitel et al., 2018; Hoonpongmanont et al., 2019). Although we cannot exclude underreporting of alcohol use by male study participants, we note that men reported greater mean frequencies and continued volumes than female participants for all drinking contexts (Table 1). Previous analysis of the data showed that those categorized as at-risk drinkers (women/men who drank 4+/5+ on any one day) reported greater rates of any IPV (36% vs. 19%) than those not categorized as at-risk drinkers (Caetano et al., 2020). In a multinomial analysis of the data (adjusted for gender), frequency of intoxication was associated with increased odds of perpetration only and bidirectional IPV (Cunradi et al., 2020). This suggests that measures of problem drinking may be more strongly associated with IPV behaviors among the sample than context-specific drinking measures.

Among women, one hypothesis was confirmed: continued volume of alcohol consumed at home was linked with frequency of IPV perpetration, thus demonstrating a dose-response effect. Results from the only previous dose-response analysis of drinking contexts and IPV found that the male partner's frequency of drinking in the context of a "quiet evening at home" was associated with frequency of

TABLE 2. Associations between context-specific frequencies, continued volumes, and intimate partner violence frequencies among females

Variable	Victimization β (SE)	Perpetration β (SE)
Drinking context frequency		
Bars	-0.022 (0.111)	0.019 (0.051)
Restaurants	0.398 (0.221)	0.129 (0.121)
Friend/relative's home	-0.104 (0.098)	-0.045 (0.056)
Own home	-0.048 (0.037)	-0.026 (0.019)
Parks, parking lots, public settings	0.159 (0.100)	0.099 (0.056)
Community centers/large events	-0.502 (0.930)	-0.539 (0.628)
Drinking context continued volumes		
Bars	0.002 (0.054)	-0.007 (0.025)
Restaurants	-0.060 (0.093)	-0.003 (0.041)
Friend/relative's home	0.003 (0.019)	0.005 (0.010)
Own home	0.008 (0.006)	0.008** (0.003)
Parks, parking lots, public settings	-0.027 (0.017)	-0.023* (0.010)
Community centers/large events	0.217 (0.372)	0.218 (0.229)
Age	-0.276 (0.236)	-0.210 (0.134)
Race/ethnicity (reference: Hispanic)		
African American	13.649** (4.939)	7.947** (2.791)
White	-1.516 (9.009)	-1.017 (4.789)
Multiracial/multiethnic	5.161 (8.157)	5.925 (4.407)
Other	2.383 (9.219)	3.534 (5.158)
Education	7.744 (5.279)	2.669 (2.936)
Food insufficiency	20.162** (4.829)	5.387* (2.420)
Impulsivity	1.314 (0.776)	1.995** (0.422)
Adverse childhood experiences	1.597 (1.215)	1.787** (0.672)
PTSD	4.867 (4.502)	-0.757 (2.541)
Marijuana use (days)	0.027 (0.015)	0.033** (0.008)
Spouse/partner AUDIT-C	14.847** (4.331)	1.241 (2.531)
Constant	-61.318** (11.852)	-34.170** (6.421)
Tobit constant	-26.253** (2.186)	-15.064** (1.179)

Notes: PTSD = posttraumatic stress disorder; AUDIT-C = Alcohol Use Disorders Identification Test-Consumption.

* $p < .05$; ** $p < .01$.

female-to-male partner violence (Mair et al., 2013). Gender differences in disinhibition, particularly among women who have experienced physical abuse (Winhusen & Lewis, 2013), may account for why the association between continued volumes consumed at home and IPV perpetration is significant for women. For example, in a sample of stimulant-dependent study participants, the proportion reporting clinically significant disinhibition was greater among women than men, and women with a lifetime history of physical abuse had the highest rates of disinhibition (Winhusen & Lewis, 2013). Although the current study cannot temporally link specific drinking occasions with IPV events, it is reasonable to postulate that volume of alcohol consumed at home, and couple conflict that arises in that setting, could proximally lead to IPV. This is consistent with prospective studies that link alcohol with IPV either as a main effect or in an interaction (Schumacher et al., 2008; Shorey et al., 2017; Testa & Derrick, 2014). Because of the cross-sectional study design, however, an alternative interpretation of our finding is that women who perpetrate IPV may consume greater continued volumes at home.

An unexpected finding for women was that continued volume of alcohol consumed in public settings was associated with less frequent IPV perpetration, indicating that lower

levels of drinking presented greatest risks. At first blush, this finding seems counterintuitive, and its interpretation is made challenging by the lack of comparable studies using dose-response models. One speculative explanation is that since public drinking is typically illegal, women who drink greater volumes in this context and are publicly inebriated may be more likely to avoid conspicuous behaviors in public (e.g., acting aggressively or fighting) that would result in arrest or police intervention. Additional research is needed to determine if these findings can be replicated and to test potential mechanisms that can explain this association. The overall picture that emerges is that context-specific frequencies and continued volumes do not appear to substantively contribute to frequency of IPV victimization or perpetration among men and women in a sample of at-risk, underserved adults. Furthermore, overall (non-context specific) frequency of drinking (F) and continued volumes ($V - F$) were not associated with IPV frequencies after adjustment for demographic and psychosocial variables (data not shown). Lack of heterogeneity among the sample may explain the null associations.

Previous context-specific dose-response analyses demonstrate that frequency and continued volumes consumed in settings other than home are related to interpersonal

TABLE 3. Associations between context-specific frequencies, continued volumes, and intimate partner violence frequencies among males

Variable	Victimization β (SE)	Perpetration β (SE)
Drinking context frequency		
Bars	-0.119 (0.077)	-0.039 (0.044)
Restaurants	0.082 (0.063)	0.016 (0.048)
Friend/relative's home	-0.022 (0.028)	-0.011 (0.021)
Own home	0.002 (0.019)	0.009 (0.015)
Parks, parking lots, public settings	0.031 (0.026)	0.012 (0.017)
Community centers/large events	0.023 (0.116)	-0.040 (0.111)
Drinking context continued volumes		
Bars	0.022 (0.020)	0.002 (0.016)
Restaurants	-0.041 (0.049)	0.011 (0.033)
Friend/relative's home	0.004 (0.004)	-0.005 (0.005)
Own home	-0.001 (0.002)	-0.004 (0.003)
Parks, parking lots, public settings	0.000 (0.005)	0.005 (0.004)
Community centers/large events	0.059 (0.059)	0.043 (0.038)
Age	-0.228* (0.113)	-0.124 (0.077)
Race/ethnicity (reference: Hispanic)		
African American	4.249 (2.579)	3.485* (1.711)
White	4.724 (3.565)	-0.099 (2.574)
Multiracial/multiethnic	9.072* (4.044)	5.432* (2.693)
Other	7.821* (3.569)	5.864* (2.372)
Education	-3.546 (2.088)	-2.083 (1.425)
Food insufficiency	2.219 (1.831)	2.933* (1.306)
Impulsivity	0.806* (0.375)	0.529* (0.260)
Adverse childhood experiences	1.134 (0.672)	1.079* (0.467)
PTSD	5.250* (2.097)	2.481 (1.415)
Marijuana use (days)	0.005 (0.007)	0.005 (0.005)
Spouse/partner AUDIT-C	9.579** (2.089)	5.918** (1.442)
Constant	-14.566** (5.090)	-12.951** (3.780)
Tobit constant	-12.386** (0.984)	-7.370** (0.744)

Notes: PTSD = posttraumatic stress disorder; AUDIT-C = Alcohol Use Disorders Identification Test–Consumption.

* $p < .05$; ** $p < .01$.

violence. Mair et al. (2013) found that the male partner's frequency of drinking in the context of parties at another's home was associated with male-to-female partner violence. In a study of parental drinking patterns and physical child abuse and corporal punishment using dose-response models, Freisthler and Gruenewald (2013) found that frequency of drinking at bars or homes and parties was positively related to the use of severe physically abusive parenting practices. More frequent drinking at restaurants was inversely related to these practices. Their results also showed that greater levels of drinking (i.e., continued volumes) were associated with reduced risks of physical abuse, indicating that lower levels of drinking presented greater risks (Freisthler & Gruenewald, 2013). These findings are not entirely dissimilar from the inverse association seen in our study between female continued volumes in public settings and frequency of IPV perpetration.

Other substance use-related factors included in the models were associated with IPV frequencies, some of which were gender-specific. For example, days of marijuana use were associated with frequency of IPV perpetration among women but not men. The results also showed that men and women who categorized their spouse/partner as a problem drinker had greater frequencies of IPV victimization; men

in this category had greater frequencies of IPV perpetration. These findings underscore the importance of considering the characteristics of the dyad's drinking partnership. Drinking patterns can serve as a precipitator of conflict or can exacerbate existing conflict. For example, Cunradi et al. (2015) found that couples in which only the female spouse/partner was a heavy drinker were at risk for male-to-female partner violence compared with couples in which neither was a heavy drinker.

Strengths and limitations

This study is among the first to analyze the association between drinking contexts and IPV using dose-response models among an underserved, low socioeconomic status (SES) sample of urban ED patients. Use of dose-response models allows us to make statements about the independent contributions of drinking frequency in various contexts, and volume of alcohol consumed beyond one drink in those contexts, to IPV frequency. The at-risk sample is itself a study strength insofar as significant health disparities characterize urban ED populations. Despite these health disparities, effective interventions to reduce IPV have not yet been identified for low-income urban residents. It is therefore imperative to

conduct research among at-risk samples to elucidate how drinking contexts and other factors may be linked to IPV. The sample's approximately equal numbers of men and women allowed for gender-stratified models of IPV. This enabled the study to identify similarities and differences in factors associated with frequency of IPV victimization and perpetration.

Study results should be viewed through the lens of several limitations. The cross-sectional study design precludes making causal inferences. Longitudinal study designs will be needed to assess temporal ordering of factors related to context-specific drinking and IPV. Studies that use intensive longitudinal data methods (e.g., ecological momentary assessment) to measure when and where couples drink, and the occurrence of partner aggression, may help address these questions. The sample was obtained from a single Northern California safety-net ED. This may limit the generalizability of findings. Many sample characteristics (low socioeconomic status, elevated levels of IPV, substance use, and mental health problems), however, are similar to those seen among urban ED patient samples across geographic locations (Bazargan-Hejazi et al., 2014; Beaudoin et al., 2015; Gilbert et al., 2012; Houry et al., 2008; Rhodes et al., 2009); this helps mitigate concerns about generalizability. The study lacks concurrent dyadic reports on IPV because participants' spouses and romantic partners were not recruited to the study. This may result in an underestimation of IPV (Cunradi et al., 2009a). Interactive voice response technology has been used in other studies to elicit confidential reports of illicit or stigmatized behaviors. Financial and logistical constraints precluded use of either approach in our study. Sample recruitment occurred during weekdays from 9 A.M. to 9 P.M., which may have excluded heavier drinkers and those more prone to aggressive behaviors. Lower recruitment rates during the midnight shift in other ED-based studies, however, have been noted (Blow et al., 2006; Walton et al., 2009). Because of survey time constraints, only physical IPV was measured. Recall bias may have affected participants' ability to recall past-year drinking and other behaviors.

Conclusions

Context-specific frequencies and continued volumes did not substantively contribute to frequencies of IPV among study participants. Given the elevated IPV prevalence among urban ED-based samples, however, further research using more granular methods is needed among underserved populations to determine if social contexts of drinking are associated with IPV outcomes. From a public health standpoint, if drinking contexts are shown to be related to IPV risk, then interventions can be designed with the goal of limiting drinking in certain contexts. This could entail encouraging people to alter their choices as to where they drink; a more challenging goal would be to get people to decrease volume consumed in certain contexts (Mair et al., 2013).

Acknowledgments

The authors gratefully acknowledge the work of research assistants Anna Balassone, Steffani Campbell, Leah Frainow-Wong, Christian Hailozian, Reika Kagami, Lori Lujan, Jose Padilla-Hernandez, Simone Phillips, Karla Prodigue, Vanessa Rubio, Marissa Vasquez, Frances Vernon, Eve Zarate, and clinical research coordinator William R. Stewart, M.S.W.

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