



NIH PUBLIC ACCESS

Author Manuscript

J Fam Violence. Author manuscript; available in PMC 2014 July 01.

Published in final edited form as:

J Fam Violence. 2013 July 1; 28(5): 459–470. doi:10.1007/s10896-013-9516-y.

Alcohol Outlet Density and Young Women's Perpetration of Violence Toward Male Intimate Partners

Bonita J. Iritani,

Pacific Institute for Research and Evaluation, Chapel Hill, NC

Martha W. Waller,

Pacific Institute for Research and Evaluation, Chapel Hill, NC

Carolyn Tucker Halpern,

Carolina Population Center and Department of Maternal & Child Health, UNC Gillings School of Global Public Health, University of North Carolina at Chapel Hill

Kathryn E. Moracco,

Department of Health Behavior and Health Education, UNC Gillings School of Global Public Health, University of North Carolina at Chapel Hill

Sharon L. Christ, and

Department of Human Development and Family Studies and Department of Statistics, Purdue University

Robert L. Flewelling

Pacific Institute for Research and Evaluation, Chapel Hill, NC

Abstract

This paper examines the relationships between alcohol outlet density, alcohol use, and perpetration of intimate partner violence (IPV) among young adult women in the US. Data were from Wave III of the National Longitudinal Study of Adolescent Health (Add Health; $N = 4,430$ in present analyses). Multinomial logistic regression was used to examine occurrence of past year IPV perpetration toward a male partner based on tract-level on-premise and off-premise alcohol outlet density, controlling for individuals' demographic, alcohol use, and childhood abuse characteristics and neighborhood socio-demographic factors. Higher off-premise alcohol outlet density was found to be associated with young women's perpetration of physical only IPV, controlling for individual-level and ecological factors. Alcohol use had an independent association with IPV perpetration but was not a mediator of the outlet density-IPV relationship. Findings suggest that considering alcohol-related environmental factors may help efforts aimed at preventing young women's use of physical violence toward partners.

Keywords

domestic violence; female perpetration; off-premise outlet density; alcohol use; young adults; neighborhoods; drinking

Intimate partner violence (IPV) is a widespread problem that has been linked to deleterious physical and mental health consequences for both male and female victims (Coker, Weston, Creson, Justice, & Blakeney, 2005; Fletcher, 2010). Women, as well as men, perpetrate IPV,

and female perpetration is common from adolescence through adulthood (Williams, Ghandour, & Kub, 2008). In studies of college students, prevalence of female-perpetrated physical IPV was found to have ranged from 12 to 39% (Williams et al., 2008). Few of the studies reported on college women's sexual IPV perpetration, but the four that did estimated prevalence at 2 to 46%. In a national study sample, 35.5% of the young adult women reporting a heterosexual relationship in the past 5 years reported ever perpetrating physical violence in a relationship (Whitaker, Haileyesus, Swahn, & Saltzman, 2007). Much or most IPV among college students (Testa, Hoffman, & Leonard, 2011) and young adults in general (Renner & Whitney, 2010) is bidirectional (both partners perpetrating). Male young adult perpetrators are more likely to inflict injury on their partner (Whitaker et al., 2007). Given the high prevalence of IPV in young adulthood and the tendency of women especially to perpetrate, it is important to examine young women's perpetration. In particular, examining individual level and environmental level conditions that may lead to IPV perpetration is necessary to develop effective prevention strategies. Women's alcohol use is one promising area for understanding female-perpetrated IPV (Langhinrichsen-Rohling, 2010).

Alcohol Use and IPV Perpetration

Young adulthood (ages 18–25) includes peak years of alcohol use, binge drinking, and heavy drinking (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). Over half (57%) of young adult women are current drinkers (SAMHSA, 2008); 30% of 18 to 20-year-old women and 39% of 21 to 23-year-old women report binge drinking in the past 30 days (Gruca, Norberg, & Bierut, 2009). Studies of young adults have yielded mixed findings regarding whether or not there is an association between alcohol use and IPV, and these studies have had limitations, including: using a college sample from a limited area (Stappenbeck & Fromme, 2010; Testa et al., 2011), not reporting results specifically for young women, and not specifically assessing perpetration as opposed to any violence in the relationship (Stappenbeck & Fromme, 2010). An exception is a national study that used a young adult couples sample and reported higher values of female-to-male violence among the group of couples characterized by heavy female drinking (Wiersma, Cleveland, Herrera, & Fischer, 2010).

Studies of adults generally have suggested that alcohol use and alcohol problems are positively associated with female IPV (Caetano, Ramisetty-Mikler, & Field, 2005; Cunradi, 2007; Foran & O'Leary, 2008). Although these adult samples typically include individuals 18 years and older (e.g., Caetano et al., 2005; Cunradi, 2007) and therefore include young adults, further research specifically on young adult women is needed given differences in young adults' versus older adults' behaviors, relationships, and environments.

Alcohol Outlet Density and IPV

Alcohol outlet density refers to the level of concentration of establishments in which alcohol is sold in a defined area. It is typically measured as number of retail outlets either per area unit or roadway miles or per capita. On-premise alcohol outlets, such as bars and restaurants, sell alcohol for consumption on the premises; off-premise outlets, such as liquor stores and grocery stores, sell alcohol for consumption off the premises. Outlet densities have been implicated in a variety of problem behaviors, including excessive alcohol consumption, crime, and medical harms (Campbell et al., 2009); violent assaults (Gorman, Speer, Gruenewald, & Labouvie, 2001; Gruenewald & Remer, 2006); child maltreatment (Freisthler, Midanik, & Gruenewald, 2004); campus sexual violence offenses (Scribner et al., 2010); and young adults' injuries (Gruenewald et al., 2010). Outlet density has been found to be correlated with frequent drinking and problem drinking among college students (Scribner et al., 2010), including women specifically (Weitzman, Folkman, Folkman, &

Wechsler, 2003). As with other forms of violence, greater alcohol availability in locales with higher outlet density (both on- and off-premise) could foster IPV through increased drinking occurring either in the home or elsewhere, by either a potential perpetrator or a potential victim. This process suggests an indirect link between outlet density and IPV with more frequent or heavier drinking as a mediator.

At the same time, there may be other pathways not involving increased alcohol use by either partner through which outlet density influences the likelihood of IPV. Alcohol outlets may signal loosened social controls on violence and thereby facilitate violence, and they may offer places where people at risk for IPV may form and mutually reinforce IPV-promoting behaviors or attitudes (Cunradi, 2010). Furthermore, plentiful alcohol outlets in one's neighborhood may influence a person's routine activities, affecting the timing or location of one's drinking in ways that could promote violence in the home (Freisthler et al., 2004; Livingston, 2010).

Extant studies examining alcohol outlets and IPV often have been ecological studies (Cunradi, Mair, Ponicki, & Remer, 2011; Gorman, Labouvie, Speer, & Subaiya, 1998; Livingston, 2010, 2011) that lacked key individual-level data, including the perpetrator's gender, measures of alcohol use, and measures of intimate partner violence (Cunradi, 2010). A national population-based survey of married and cohabitating couples examined alcohol outlets by zip code in relation to partner violence and did not find outlet density to be significantly associated with female-to-male IPV, but the sample was of adults 18 years and older (McKinney, Caetano, Harris, & Ebama, 2009). Recent studies have examined outlet density, drinking, and IPV victimization among young adult men (Waller, Iritani, Flewelling et al., 2012) and women (Waller, Iritani, Christ et al., 2012), but research on alcohol outlets and young adult women's IPV perpetration is lacking.

Purpose of the Present Study

The present study uses data from the National Longitudinal Study of Adolescent Health (Add Health) to examine on-premise and off-premise alcohol outlet density as predictors of young women's perpetration of IPV toward an other-sex partner, controlling for individual- and neighborhood-level characteristics, such as neighborhood social disorganization and disadvantage (Gorman et al., 1998). We hypothesize that: (1) higher outlet density of both types will be associated with greater likelihood of women perpetrating IPV, and (2) there will be both direct links and indirect links (through alcohol use as a mediator) from outlet density to IPV perpetration. Strengths of the present study include: (1) measuring outlet density at the census tract level rather than the larger zip code level; (2) including dating and other nonmarital and noncohabiting relationships to better understand female perpetration by type of relationship; and (3) distinguishing between physical only violence from IPV that includes sexual violence in order to address the paucity of literature on female perpetration of sexual aggression against partners (Williams et al., 2008).

Method

Data and Sample

Data were from Wave III of Add Health, a prospective cohort study that has followed a nationally representative sample of U.S. adolescents into young adulthood. Wave III respondents were young adults who were approximately 18 to 26 years old when they were interviewed in 2001 to 2002 ($N = 14,322$ in the national probability sample). Add Health's original sample was drawn from 7th- to 12th-grade students on school enrollment rosters in 1994 to 1995. A sample of 80 high schools and 52 middle schools was selected with unequal probability of selection. Incorporating systematic sampling methods and implicit

stratification into the study design ensured that selected schools were representative of U.S. schools with respect to region of the country, urbanicity, school size, school type, and ethnicity. At Wave III, Add Health researchers sought to interview all original study participants living in the U.S., including homeless and incarcerated individuals. The Wave III response rate was 77.4% (Harris et al., 2009). The survey was administered using laptop computers; computer-assisted self-interviewing technology was used for sensitive topics, including sexual, substance use, and violence self-reports. Further information about Add Health is available elsewhere (Harris et al., 2009). Participants provided written informed consent. Add Health procedures were approved by the institutional review board (IRB) of the University of North Carolina at Chapel Hill. The IRB of the Pacific Institute for Research and Evaluation deemed protocols of the present study exempt from review.

At Wave III, Add Health participants were asked to list all romantic and sexual relationships since summer 1995 and were asked if they were currently involved with each person. One current sexual or romantic relationship per respondent was examined for present analyses. For participants who reported more than one current partner, a single current relationship was selected using the relationship, which happened to have the lowest relationship identified number. Respondents whose identified relationship was with a same-sex partner were sparse (1.4%) and excluded from analyses. A total of 8,463 Wave III respondents reported at least one current relationship and had the appropriate sampling weight. Respondents used in present analyses were female, had an index relationship partner not of the same sex, and had non-missing data on IPV perpetration and alcohol use variables ($N = 4,430$).

Measures

Perpetration of IPV—IPV perpetration was based on the survey items: “How often in the past year have you threatened <PARTNER> with violence, pushed or shoved [HIM/HER], or thrown something at [HIM/HER] that could hurt?;” “How often in the past year have you slapped, hit, or kicked <PARTNER>?;” and “How often in the past year have you insisted on or made <PARTNER> have sexual relations with you when [HE/SHE] didn’t want to?” Responses to each of those three survey questions were dichotomized as no IPV in the past year (which included replies of “never” and “hasn’t happened in past year”) versus happened 1 or more times in the past year. Physical IPV was indicated by having engaged in threatened/pushed/thrown or slapped/hit/kicked in the past year. A 3-category nominal variable was then created to represent type of IPV respondents reported perpetrating in the past year in their relationship: (0) no IPV (referent category), (1) physical IPV only, or (2) either sexual IPV only or both physical and sexual IPV (i.e., sexual with and without [w/wo] physical IPV). Due to the way the threatened/pushed/thrown item was worded, it is possible that a participant may have been coded as having perpetrated physical IPV who had only threatened their partner with violence (psychological aggression). However, prior research has found the threatened/pushed/thrown item to be highly correlated with the slapped/hit/kicked item (Cronbach alpha = 0.77 cited in Brown & Bulanda, 2008).

Alcohol outlet density in neighborhood—Data were obtained for number of alcohol outlets (establishments possessing on-premise or off-premise alcohol licenses) per square kilometer in the communities of Add Health Wave III respondents. These outlet licensing data were collected from individual states during 2006 to 2007, which was 5 to 6 years after Wave III interviews. However, alcohol outlet density in small geographic areas is relatively stable over time (Gruenewald & Remer, 2006). Outlet addresses were geocoded to the census tract level. Separate variables were created for on-premise and off-premise alcohol outlet density. These variables were dichotomized to indicate respondents’ neighborhoods (tracts) as having higher or lower alcohol outlet density (defined here as one or more outlets

per square kilometer or not). The cutoff of one outlet was used because it fell between the 50th and 75th percentile of both on-premise and off-premise outlet density and therefore indicates medium or greater outlet density. Preliminary analyses indicated that the dichotomized on-premise and off-premise variables were highly correlated (Cramer's $V = 0.65$; Rao-Scott Chi-Square = 933.72, $df = 1$, $p < .001$). However, we decided against combining the two types of outlets into a single variable because different forms of alcohol availability may operate through different mechanisms and have different effects on young adult drinking and injuries (Gruenewald et al., 2010; Scribner et al., 2008), and they can have different relationships with IPV (Cunradi et al., 2011; Livingston, 2010; McKinney et al., 2009). Analyses were conducted examining on-premise and off-premise outlet density in separate models.

Alcohol use—Prior literature review has suggested the importance of accounting for more in depth aspects of alcohol consumption than simple frequencies or quantities of drinking in relation to IPV (Foran & O'Leary, 2008). Like other researchers (Cunradi, 2007; Lipton, 1994), we developed a complex, categorical variable in order to capture multiple dimensions of alcohol use. Specifically, we incorporated ever drinking alcohol, ever drinking in the past 12 months, frequency and quantity of drinking in the past 12 months, heavy episodic (binge) drinking (4 or more drinks on a single occasion in the past 2 weeks), and having ever been drunk in the past 12 months. The final 6-category nominal variable was coded: (1) lifetime abstainer or former (but not current) drinker (reference category), (2) light drinker, (3) moderate drinker (4) infrequent heavy drinker, (5) occasional heavy drinker, and (6) frequent heavy drinker (see Table 1).

Control variables—Age was measured in years. Race/ethnicity, based on respondent self-report, was Hispanic (any race) and non-Hispanic categories of white (reference category), black, Asian/Pacific Islander, and American Indian/Native American. Race for multiracial participants was based on the category they said best described their racial background. Marital status of the reference relationship was represented by never married nor ever lived with this partner (reference category), lived with this partner but never married to him or her, or ever married to this partner. Because only current relationships were selected for present analyses, nearly all (99%) of those who had ever been married to their partner were currently married to the person.

Measures of child abuse and neglect were controlled for in analyses because individuals who have been maltreated as children have been found to be more likely to perpetrate IPV in young adulthood (Gover, Kaukinen, & Fox, 2008; Melander, Noel, & Tyler, 2010), especially women (Fang & Corso, 2007). Three variables indicated the respondent's recollection of a parent or other adult caregiver's behavior before the respondent was in 6th grade pertaining to: (1) neglect (left the respondent home alone when an adult should have been present or did not take care of the respondent's basic needs), (2) "slapped, hit or kicked" the respondent, and (3) sexually abused the respondent, defined as the adult touching the child in a sexual way, forcing the child to touch the adult in a sexual way, or forcing the child to have sexual relations. Each neglect/abuse measure was dichotomized to indicate the event had occurred or not.

Several neighborhood-level sociodemographic characteristics indicating social disorganization in the community were included as control variables. These measures included ones pertaining to concentrated disadvantage, immigrant concentration, and residential stability (Sampson & Groves, 1989; Sampson, Raudenbush, & Earls, 1997) and have been used in prior outlet density and social disorganization research (Freisthler, 2004). Using tract-level census data (as cited in Swisher, 2008), measures were prepared pertaining to (1) poverty (the average of the standardized estimates for the proportion of persons in the

tract below the poverty level, proportion of families with a child in a female-headed household, and unemployment rate; Cronbach's $\alpha = .72$), (2) transience (average of the standardized estimates for the proportion of the population in the tract who had moved in the past 5 years and the proportion of occupied units that were renter-occupied; Cronbach's $\alpha = .82$), (3) proportion of residents who were foreign born, and (4) proportion of housing units vacant (Swisher, 2008). Factor analyses were used to guide selection of items for indices. An additional tract-level census variable that was included as a control was population density because both on- and off-premise alcohol outlets may be more concentrated in urban than rural or suburban areas. Population density was measured as persons per square kilometer divided by 1000.

Data Analyses

Using multinomial logistic regression, bivariate associations were examined of each control variable and the dependent variable (IPV perpetration). In addition, the following key posited relationships were examined in bivariate analyses: (1) alcohol outlet density (on-premise and off-premise) and IPV perpetration, (2) outlet density and alcohol use, and (3) alcohol use and IPV perpetration.

Multiple variable analyses were conducted using a set of two multinomial logistic regression models to examine the effects of on-premise alcohol outlet density and off-premise outlet density on female-perpetrated IPV. Each regression model used IPV perpetration as the dependent variable with the reference category being not having perpetrated IPV in the relationship. In Model 1, the predictors assessed were alcohol outlet density and alcohol use. Model 2 included outlet density; alcohol use; individual-level control variables of respondent's age; race/ethnicity; marital status; whether or not the respondent had been neglected, sexually abused, or physically abused as a child; and community-level control variables of neighborhood poverty, neighborhood transience, foreign-born residents, housing vacancy, and population density. Although analyses incorporated community-level variables, multilevel modeling was not used because the majority of tracts had only one respondent, and, as others have noted, the data were not sufficiently nested (Cubbin, Brindis, Jain, Santelli, & Braveman, 2010; Cubbin, Santelli, Brindis, & Braveman, 2005).

Models in which alcohol outlet density was found to be a significant predictor of IPV perpetration were further examined for alcohol use as a mediator of this relationship by using criteria based on examining the paths between the independent variable, potential mediator, and dependent variable elements (Baron & Kenny, 1986). If it was determined that support for mediation was not found, then exploration of alcohol use as a moderator variable also would be considered through post-hoc analysis in order to better understand the relationships among the constructs. Finally, in order to address the possibility that outlet density effects would vary by whether or not a person was underage for legally purchasing alcohol or entering bars (Gruenewald et al., 2010), moderator analyses were conducted that removed the age in years variable and instead tested for an interaction of each type of outlet density by age group (less than 21-years-old versus 21 years or older).

Post-stratification sampling weights were applied in order to yield estimates representative of the national population. Data analyses were conducted using SAS (version 9.13), MPlus (version 6), and Stata (version SE 11.1). Following Add Health user protocols, procedures for survey data analysis in MPlus and Stata were used to account for Add Health's complex sampling design in the regression models, incorporating schools as the primary sampling unit and region of the country as the strata. Weighted estimates and unweighted sample sizes are reported in results.

Results

Characteristics of the sample, as reflected in summary statistics for all of the variables used in the analyses, are displayed in Table 2. As shown in Table 2, 22.6% of this female young adult sample reported perpetrating physical IPV only in their index current relationship in the past year, 3.5% reported perpetrating either sexual IPV only or both physical and sexual IPV in the past year, and 73.9% reported no IPV perpetration in the past year.

Bivariate Associations

As shown in Table 3, there was no significant bivariate relationship between on-premise alcohol outlet density and either physical only or sexual w/wo physical IPV perpetration among women. Respondents in neighborhoods with medium or greater off-premise alcohol outlet density, however, were significantly more likely to perpetrate physical only IPV. There was no association between off-premise density and sexual w/wo physical IPV perpetration. There was no significant bivariate relationship between the alcohol use categories and IPV perpetration. Table 3 also shows that most of the control variables have a significant bivariate association with IPV. Exceptions were neighborhood transience, percent foreign-born, and vacant housing. These variables were kept in the final models based on theory from the social disorganization literature (Freisthler, 2004; Sampson et al., 1997). Table 4 indicates that there were no significant bivariate relationships between either on-premise or off-premise alcohol outlet density and alcohol use.

Multivariable Models

Results from the multinomial logistic regression models that include variables for on-premise and off-premise alcohol outlet density are shown in Tables 5 and 6, respectively. On-premise outlet density was not a significant predictor of female IPV perpetration in either Model 1 (which controlled for alcohol use) or Model 2 (which controlled for alcohol use, other individual-level characteristics, and neighborhood characteristics). However, off-premise alcohol outlet density was significantly associated with physical only IPV perpetration in both Model 1 ($OR = 1.30$; 95% $CI = 1.07-1.56$) and Model 2 ($OR = 1.35$; 95% $CI = 1.07-1.70$). Off-premise outlet density was not a significant predictor of sexual w/wo physical IPV. Except for the outlet density and population density variables, results for all other variables in the models were similar across Tables 5 and 6. In the full models (Model 2) of both Table 5 and Table 6, occasional heavy drinking and frequent heavy drinking both were associated with increased odds of physical IPV perpetration, and frequent heavy drinking also was associated with greater odds of sexual w/wo physical IPV perpetration. Age was significantly associated with physical IPV in a negative direction. Hispanics, blacks, and Native Americans all had increased odds of physical only IPV perpetration compared to non-Hispanic whites. Hispanics and blacks also had greater likelihood of sexual IPV perpetration. Young women who cohabited with their partner were more likely to report both physical and sexual IPV perpetration toward that partner; women who were married to the partner had greater odds of physical only perpetration. Respondents who reported physical abuse as a child were more likely to perpetrate physical and sexual IPV. In addition, respondents in neighborhoods with more transience were less likely to report physical IPV. Population density was significantly negatively correlated with physical IPV perpetration in the model that included off-premise outlet density.

Assessment of Mediation and Moderation

Although off-premise outlet density was found to have an effect on physical IPV (Table 6), our findings did not meet criteria which would suggest alcohol use to be a mediator of this relationship (Baron & Kenny, 1986). Namely, as the bivariate results indicated, significant

associations were not found between the independent variable (outlet density) and the potential mediator (drinking; Table 4) nor between the mediator and the outcome variable (IPV; Table 3).

Given the lack of support for alcohol use as a mediator, we conducted additional analyses examining it as a possible moderator of the outlet density-IPV relationship in order to explore further the nature of the causal mechanisms (Baron & Kenny, 1986). Specifically, we conducted multinomial logistic regressions that tested for an interaction of outlet density and alcohol use (dichotomized as heavy drinker or not). This post-hoc analysis did not indicate there to be a significant interaction between either on-premise outlet density and alcohol use ($OR = 1.03$, 95% CI = 0.66–1.60 for physical IPV and $OR = 0.57$, 95% CI = 0.21–1.56 for sexual IPV) or between off-premise outlet density and alcohol use ($OR = 0.79$, 95% CI = 0.52–1.21 for physical IPV and $OR = 0.91$, 95% CI = 0.35–2.40 for sexual IPV) in predicting IPV perpetration.

Another moderator of the outlet density-IPV relationship that was examined was being underage for buying and drinking alcohol. When an interaction of age group (less than 21-years-old versus 21-years or older) by alcohol outlet density was tested in the multinomial logistic regression models, the interaction variable was not significant in the on-premise model for either physical IPV ($OR = 1.22$, 95% CI = 0.78–1.93) or sexual IPV compared to no IPV ($OR = 1.25$, 95% CI = 0.42–3.73), nor was the interaction significant in the off-premise outlet density model ($OR = 1.16$, 95% CI = 0.69–1.94 for physical IPV and $OR = 0.82$, 95% CI = 0.28–2.40 for sexual IPV).

Discussion

Using a nationally representative sample, we tested the hypotheses that both on- and off-premise alcohol outlet density would be associated with greater likelihood of young women perpetrating IPV and that there would be both direct and indirect links (through alcohol use as a mediator) from outlet density to perpetration. We found that young women who lived in a neighborhood having relatively higher density of off-premise alcohol outlets (one or more outlets per square kilometer versus fewer) had significantly increased odds of reporting that they had perpetrated physical only IPV against their male partner in the past year. Residing in a neighborhood with higher on-premise alcohol outlet density was not similarly associated with women's IPV perpetration. These findings are consistent with ecological studies linking off-premise alcohol outlets with domestic violence police calls (Cunradi et al., 2011) and domestic violence rates (Livingston, 2011). However, unlike those studies, the present research had information about perpetrators' sex and age and was able to provide results specifically about young adult female perpetration. A study using couples data of adults had not found either off-premise or on-premise outlet density to be associated significantly with female-to-male partner violence (FMPV; McKinney et al., 2009). It is possible that off-premise density has an influence on young women's perpetration but not adults of all ages. It also is possible that the relatively large geographic unit of zip codes may have limited the study's ability to detect an outlet density effect (McKinney et al., 2009).

McKinney et al.'s (2009) research on adults did find total and on-premise outlets to be linked to increased risk of male-to-female partner violence (MFPV). It is possible that different sources of alcohol affect men's and women's likelihood of IPV perpetration differently. It may be that drinking in bars leads to risky, violence-promoting drinking among men (McKinney et al., 2009). Among women, accessibility to buy alcohol at a nearby liquor, grocery, or convenience store may result in the woman drinking at home rather than elsewhere, and drinking in the home may increase the chance of being violent

toward their partner. Research on outlet density as a factor of young adult men's IPV perpetration is needed.

Importantly, and contrary to our expectation, our study did not find that the relationship between off-premise outlet density and young women's IPV perpetration was due to a mediating effect of alcohol use. The result suggests that other mechanisms by which alcohol outlets may influence IPV should be considered (Cunradi, 2010). Freisthler and colleagues' (2004) examination of child maltreatment records in California may provide some relevant findings and a conceptual analysis for the association. They found that the number of off-premise alcohol outlets (but not of either bars or restaurants) per 1,000 of population was associated with higher rates of child physical abuse and suggested that the presence of off-premise outlets may affect the "routine activities" of parents who may buy the alcohol and drink it at home, fostering greater child abuse. IPV may operate in a similar way among young women in which nearby stores affect their drinking location (in particular, drinking at home), timing, or other contextual factors in their drinking behavior that may lead to or facilitate directing physical violence toward their partners. Alternatively, greater IPV might occur because higher density of outlets may indicate to residents that social controls proscribing violence are relaxed in their neighborhood or because neighborhoods with high outlet density are places where people with a tendency toward IPV congregate and where IPV behaviors and attitudes are reinforced (Cunradi, 2010). Further research is needed to discern the processes by which the availability of off-premise outlets in particular may influence women to perpetrate IPV.

Despite the lack of support for alcohol use as a mediator, the results did indicate an independent association between young women's drinking characteristics and IPV perpetration in the fully controlled models. Women who were occasional heavy drinkers and those who were frequent heavy drinkers were more likely to perpetrate physical IPV. In addition, when compared to nondrinkers, frequent heavy drinkers had 3 times greater odds of sexual IPV perpetration. As in a prior study of adults (McKinney et al., 2009), our analyses did not find alcohol use to moderate the relationship between outlet density and FMPV. Furthermore, we did not find being less than 21-years-old or not to moderate the effects of outlet density. This result is congruent with an ecological study which found that among both underage and of-age individuals, off-premise outlet density was positively associated with number of injuries from assaults (Gruenewald et al., 2010). In the present study, neither on-premise nor off-premise alcohol outlet density was found to be significantly associated with sexual partner violence. These results add new information to the alcohol outlet density literature which has not specifically examined sexual IPV.

Like previous studies, this research found that female-perpetrated IPV is common, given that one-fourth of young women with current relationships in our sample reported having perpetrated any violence toward their partner within just a 12-month span. As has been reported elsewhere, young women who cohabit with their partner are especially likely to perpetrate physical partner violence (Brown & Bulanda, 2008). Results of the present study also indicate that cohabiting young women also are more likely than those not married or cohabiting to perpetrate sexual IPV. Finally, it is of note that neighborhood poverty, which has been a predictor of MFPV and FMPV in previous research (Cunradi, Caetano, Clark, & Schafer, 2000), was not found to be a significant predictor in these analyses.

Our findings should be interpreted within the context of the study limitations. First, our sample was of young adults ages 18 to 27, a period of high rates of drinking and IPV. Differences between young adult and older adult rates of IPV, drinking, and utilization of alcohol outlets all would be expected to affect the association between outlet density and women's perpetration of IPV. Further research is needed to determine if these findings are

similar or different for women of other age groups. This study also is limited in that we have not examined the frequency, seriousness, or harm incurred from the IPV incidents, nor have we examined whether or not the incidents were mutual. Prior research has found a substantial prevalence of bidirectional partner violence (Renner & Whitney, 2010). Further examination of the context of violence and motivations for women's IPV perpetration (Bair-Merritt et al., 2010) as well as examining both the woman's and male partner's alcohol use is important for understanding more fully how alcohol use and alcohol outlets fit into the picture. Add Health did not ask about alcohol use by either the perpetrator or victim at the time of the IPV incident. Thus, while an association between outlet density and IPV perpetration was found in this sample, it does not necessarily mean that alcohol use was involved during specific IPV events. In addition, the survey did not ask how often respondents visited on-premise and off-premise alcohol outlets which could have helped to understand further the mechanisms by which alcohol outlets may affect behavior.

Our analyses also did not control for pregnancy, which could have reduced the young women's alcohol use and also attenuated the link between outlet density and drinking. A further limitation is that the measure of perpetration was self-reported and may have underestimated the prevalence of female-perpetrated IPV. In addition, the low prevalence of sexual aggression by women found in this study may have contributed to not finding a significant association between outlet density and sexual violence. In this research, we do not know if women with a tendency to perpetrate IPV are more likely to choose to live in neighborhoods with high off-premise alcohol outlet density or whether presence of off-premise outlets influences women's violence behavior. Additionally, we recognize that all neighborhood characteristics that might confound the relationship between outlet density and IPV could not be perfectly measured and controlled, and therefore, the association observed here could be in part due to these unmeasured confounding influences.

The outlet density data available in the data set did not allow us to separate restaurants that served alcohol from bars. Thus, they were grouped together as on-premise outlets, but these establishments may have different effects (Gruenewald & Remer, 2006). Therefore the measurement used may have hindered the study's ability to detect an association between on-premise outlet density and IPV, as well as to assess for differences between restaurant and bar outlets on young adult outcomes, as has been found in other research (Gruenewald et al., 2010). Furthermore, we excluded same-sex relationships in these analyses. Nationally representative data have indicated that individuals with a history of same-sex relationships are more likely to experience IPV of all types (Messinger, 2011). It is important for future research to examine alcohol outlets and alcohol use pertaining to same-sex partner violence. Finally, we have not used spatial regression models designed to control for potential spatial autocorrelation (correlation of IPV rates between neighboring geographic units; Freisthler et al., 2004). It is reassuring, however, that our findings for outlet density are consistent with a prior study that used spatial modeling procedures (Cunradi et al., 2011). In addition, we would not expect substantial autocorrelation in our sample, given that there was usually not more than one respondent in a tract.

Despite these limitations, the findings of this study offer important contributions to the growing literature on alcohol outlet density and IPV. Although the underlying reasons have yet to be determined, present findings indicate that density of off-premise alcohol outlets is a risk factor for female-perpetrated violence. Recently reviewed evidence supports the potential for regulation of alcohol outlet density through public policy to reduce alcohol-related harms (Campbell et al., 2009). Building on that perspective, the findings from this study suggest that policy-based interventions to control outlet density are a potentially promising avenue for preventing female-perpetrated IPV. This study's findings suggest that considering the alcohol sales environment—and, in particular for women, how off-premise

alcohol outlets may affect their use of violence—may better inform and strengthen efforts to prevent and reduce partner violence.

Acknowledgments

Funding for this study was from the National Institute for Alcohol and Alcohol Abuse (grant R03 AA016809, M.W.W., principal investigator). This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (<http://www.cpc.unc.edu/addhealth>). No direct support was received from grant P01-HD31921 for this analysis.

References

- Bair-Merritt M, Crowne SS, Thompson D, Sibinga E, Trent M, Campbell J. Why do women use intimate partner violence? A systematic review of women's motivations. *Trauma, Violence, & Abuse*. 2010; 11:178–189.
- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986; 51:1173–1182. [PubMed: 3806354]
- Brown SL, Bulanda JR. Relationship violence in young adulthood: A comparison of daters, cohabitators, and marrieds. *Social Science Research*. 2008; 37(1):73–87.
- Caetano R, Ramisetty-Mikler S, Field CA. Unidirectional and bidirectional intimate partner violence among White, Black, and Hispanic couples in the United States. *Violence and Victims*. 2005; 20:393–406. [PubMed: 16250407]
- Campbell CA, Hahn RA, Elder R, Brewer R, Chattopadhyay S, Fielding J. ... Task Force on Community Preventive Services. The effectiveness of limiting alcohol outlet density as a means of reducing excessive alcohol consumption and alcohol-related harms. *American Journal of Preventive Medicine*. 2009; 37:556–569. [PubMed: 19944925]
- Coker AL, Weston RW, Creson DL, Justice B, Blakeney P. PTSD symptoms among men and women survivors of intimate partner violence: The role of risk and protective factors. *Violence and Victims*. 2005; 20:625–643. [PubMed: 16468442]
- Cubbin C, Brindis CD, Jain S, Santelli J, Braveman P. Neighborhood poverty, aspirations and expectations, and initiation of sex. *Journal of Adolescent Health*. 2010; 47:399–406. [PubMed: 20864010]
- Cubbin C, Santelli J, Brindis CD, Braveman P. Neighborhood context and sexual behaviors among adolescents: Findings from the National Longitudinal Study of Adolescent Health. *Perspectives on Sexual and Reproductive Health*. 2005; 37(3):125–134. [PubMed: 16150660]
- Cunradi CB. Drinking level, neighborhood social disorder, and mutual intimate partner violence. *Alcoholism: Clinical and Experimental Research*. 2007; 31:1012–1019.
- Cunradi CB. Neighborhoods, alcohol outlets and intimate partner violence: Addressing research gaps in explanatory mechanisms. *International Journal of Environmental Research and Public Health*. 2010; 7:799–813. [PubMed: 20617004]
- Cunradi CB, Caetano R, Clark C, Schafer J. Neighborhood poverty as a predictor of intimate partner violence among White, Black, and Hispanic couples in the United States: A multilevel analysis. *Annals of Epidemiology*. 2000; 10:297–308. [PubMed: 10942878]
- Cunradi CB, Mair C, Ponicki W, Remer L. Alcohol outlets, neighborhood characteristics, and intimate partner violence: Ecological analysis of a California city. *Journal of Urban Health-Bulletin of the New York Academy of Medicine*. 2011; 88:191–200. [PubMed: 21347557]
- Fang X, Corso PS. Child maltreatment, youth violence, and intimate partner violence: Developmental relationships. *American Journal of Preventive Medicine*. 2007; 33:281–290. [PubMed: 17888854]
- Fletcher J. The effects of intimate partner violence on health in young adulthood in the United States. *Social Science and Medicine*. 2010; 70:130–135. [PubMed: 19819603]

- Foran HM, O'Leary KD. Alcohol and intimate partner violence: A meta-analytic review. *Clinical Psychology Review*. 2008; 28:1222–1234. [PubMed: 18550239]
- Freisthler B. A spatial analysis of social disorganization, alcohol access, and rates of child maltreatment in neighborhoods. *Children and Youth Services Review*. 2004; 26:803–819.
- Freisthler B, Midanik LT, Gruenewald PJ. Alcohol outlets and child physical abuse and neglect: Applying routine activities theory to the study of child maltreatment. *Journal of Studies on Alcohol*. 2004; 65:586–592. Retrieved from <http://www.jsad.com/>. [PubMed: 15536767]
- Gorman DM, Labouvie EW, Speer PW, Subaiya AP. Alcohol availability and domestic violence. *American Journal of Drug and Alcohol Abuse*. 1998; 24:661–673. [PubMed: 9849776]
- Gorman DM, Speer PW, Gruenewald PJ, Labouvie EW. Spatial dynamics of alcohol availability, neighborhood structure and violent crime. *Journal of Studies on Alcohol*. 2001; 62:628–636. Retrieved from <http://www.jsad.com/>. [PubMed: 11702802]
- Gover AR, Kaukinen C, Fox K. The relationship between violence in the family of origin and dating violence among college students. *Journal of Interpersonal Violence*. 2008; 23:1667–1693. [PubMed: 18349342]
- Gruza RA, Norberg KE, Bierut LJ. Binge drinking among youth and young adults in the United States: 1979–2006. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2009; 48:692–702. [PubMed: 19465879]
- Gruenewald PJ, Freisthler B, Remer L, LasScala EA, Treno AJ, Ponicki WR. Ecological associations of alcohol outlets with underage and young adult injuries. *Alcoholism: Clinical and Experimental Research*. 2010; 34:519–527.
- Gruenewald PJ, Remer L. Changes in outlet densities affect violence rates. *Alcoholism: Clinical and Experimental Research*. 2006; 30:1184–1193.
- Harris, KM.; Halpern, CT.; Whitsel, E.; Hussey, J.; Tabor, J.; Entzel, P.; Udry, JR. The National Longitudinal Study of Adolescent Health: Research design. 2009. Retrieved from <http://www.cpc.unc.edu/projects/addhealth/design>
- Langhinrichsen-Rohling J. Controversies involving gender and intimate partner violence in the United States. *Sex Roles*. 2010; 62(3–4):179–193.
- Lipton RI. The effect of moderate alcohol use on the relationship between stress and depression. *American Journal of Public Health*. 1994; 84:1913–1917. [PubMed: 7998629]
- Livingston M. The ecology of domestic violence: The role of alcohol outlet density. *Geospatial Health*. 2010; 5(1):139–149. Retrieved from <http://www.geospatialhealth.unina.it/>. [PubMed: 21080328]
- Livingston M. A longitudinal analysis of alcohol outlet density and domestic violence. *Addiction*. 2011; 106:919–925. [PubMed: 21205052]
- McKinney CM, Caetano R, Harris TR, Ebama MS. Alcohol availability and intimate partner violence among US couples. *Alcoholism: Clinical And Experimental Research*. 2009; 33(1):169–176.
- Melander LA, Noel H, Tyler KA. Bidirectional, unidirectional, and nonviolence: A comparison of the predictors among partnered young adults. *Violence and Victims*. 2010; 25:617–630. [PubMed: 21061868]
- Messenger AM. Invisible victims: Same-sex IPV in the National Violence Against Women Survey. *Journal of Interpersonal Violence*. 2011; 26:2228–2243. [PubMed: 20829231]
- Renner LM, Whitney SD. Examining symmetry in intimate partner violence among young adults using socio-demographic characteristics. *Journal of Family Violence*. 2010; 25(2):91–106.
- Sampson RJ, Groves WB. Community structure and crime: Testing social- disorganization theory. *American Journal of Sociology*. 1989; 94:774–802. Retrieved from <http://www.press.uchicago.edu/ucp/journals/journal/ajs.html>.
- Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*. 1997; 277:918–924. [PubMed: 9252316]
- Scribner RA, Mason K, Theall K, Simonsen N, Schneider S, Towvim L, DeJong W. The contextual role of alcohol outlet density in college drinking. *Journal of Studies on Alcohol and Drugs*. 2008; 69:112–120. Retrieved from <http://www.jsad.com/>. [PubMed: 18080071]
- Scribner RA, Mason KE, Simonsen NR, Theall K, Chotalia J, Johnson S, DeJong W. An ecological analysis of alcohol-outlet density and campus-reported violence at 32 US colleges. *Journal of*

- Studies on Alcohol and Drugs. 2010; 71(2):184–191. Retrieved from <http://www.jsad.com/>. [PubMed: 20230715]
- Stappenbeck CA, Fromme K. A longitudinal investigation of heavy drinking and physical dating violence in men and women. *Addictive Behaviors*. 2010; 35:470–485.
- Substance Abuse and Mental Health Services Administration (SAMHSA). Results from the 2007 National Survey on Drug Use and Health: National findings. Rockville, MD: Author; 2008. Publication No. SMA 08–4343
- Swisher, RR. Wave III contextual database codebook, part 1. Chapel Hill, NC: Carolina Population Center; 2008.
- Testa M, Hoffman JH, Leonard KE. Female intimate partner violence perpetration: Stability and predictors of mutual and nonmutual aggression across the first year of college. *Aggressive Behavior*. 2011; 37:362–373. [PubMed: 21462201]
- Waller MW, Iritani BJ, Christ SL, Clark HK, Moracco KE, Halpern CT, Flewelling RL. Relationships among alcohol outlet density, alcohol use, and intimate partner violence victimization among young women in the U.S. *Journal of Interpersonal Violence*. 2012; 27:2062–2086. [PubMed: 22204949]
- Waller MW, Iritani BJ, Flewelling RL, Christ SL, Halpern CT, Moracco KE. Violence victimization of young men in heterosexual relationships: Does alcohol outlet density influence outcomes? *Violence and Victims*. 2012; 27:527–547. [PubMed: 22978073]
- Weitzman ER, Folkman A, Folkman KL, Wechsler H. The relationship of alcohol outlet density to heavy and frequent drinking and drinking-related problems among college students at eight universities. *Health & Place*. 2003; 9:1–6. [PubMed: 12609468]
- Whitaker DJ, Haileyesus T, Swahn M, Saltzman LS. Differences in frequency of violence and reported injury between relationships with reciprocal and nonreciprocal intimate partner violence. *American Journal of Public Health*. 2007; 97:941–947. [PubMed: 17395835]
- Wiersma JD, Cleveland HH, Herrera V, Fischer JL. Intimate partner violence in young adult dating, cohabitating, and married drinking partnerships. *Journal of Marriage and Family*. 2010; 72:360–374. [PubMed: 20532190]
- Williams JR, Ghandour RM, Kub JE. Female perpetration of violence in heterosexual intimate relationships: Adolescence through adulthood. *Trauma, Violence, & Abuse*. 2008; 9:227–249.

Table 1

Alcohol Use Categories

Category	Description
1. Lifetime abstainers or ex-drinkers	Lifetime abstainers were respondents who reported never drinking alcohol during adolescence, never drinking alcohol as an adult, and not drinking in the past 12 months. Ex-drinkers were respondents who at Wave I and/or Wave III indicated they drank alcohol but had not drunk any alcohol in the past 12 months.
2. Light drinkers	Reported drinking in the past 12 months but having only 1 or 2 drinks at a time and not having been drunk in the past year nor engaging in heavy episodic drinking in the past 2 weeks.
3. Moderate drinkers	Reported drinking in the past 12 months (typically drinking 3 or more drinks at a time), but not having been drunk in the past year nor engaging in heavy episodic drinking in the past 2 weeks.
4. Infrequent heavy drinkers	Reported drinking infrequently (3 to 12 times) over the past 12 months but reported being drunk in the past year and/or heavy episodic drinking in the past 2 weeks.
5. Occasional heavy drinkers	Reported drinking more frequently (2 or 3 days a month up to 1 to 2 days a week) over the past 12 months and having been drunk in the past year and/or heavy episodic drinking in the past two weeks.
6. Frequent heavy drinkers	Reported drinking frequently (3 to 7 days a week on average) over the past 12 months and having been drunk in the past year and/or heavy episodic drinking in the past 2 weeks.

Table 2

Characteristics of Analysis Sample of Young Women in the National Longitudinal Study of Adolescent Health, 2001–2002 (N =4,430)

Characteristic	Weighted % or Mean (SE)
IPV perpetration	
No IPV	73.9
Physical IPV only	22.6
Sexual IPV only or physical and sexual IPV	3.5
Alcohol use	
Lifetime abstainer or ex-drinker	27.0
Light drinker	14.6
Moderate drinker	6.7
Infrequent heavy drinker	18.8
Occasional heavy drinker	28.2
Frequent heavy drinker	4.7
Higher on-premise alcohol outlet density in neighborhood (1 or more outlets per square kilometer)	30.24
Higher off-premise alcohol outlet density in neighborhood (1 or More outlets per square kilometer)	33.52
Age in years	
18–20	29.0
21	16.1
22	18.2
23	15.3
24–27	21.5
Race/ethnicity	
Hispanic	10.6
White	70.9
Black	14.3
Asian	3.3
American Indian	1.0
Marital status	
Never married or lived with this partner	40.8
Ever lived with this partner but never married to him or her	31.2
Ever married to this partner	28.0
Neglected as a child (percent yes)	37.8
Sexually abused as a child (percent yes)	4.4
Physically abused as a child (percent yes)	26.3
Neighborhood characteristics control variables	
Proportion of population in poverty, standardized [mean (SE)]	–0.17 (0.95)
Transience index , standardized [mean (SE)]	–0.01 (1.03)
Proportion population foreign-born [mean (SE)]	0.09 (0.01)
Proportion housing units vacant [mean (SE)]	0.08 (0.00)

Characteristic	Weighted % or Mean (<i>SE</i>)
Population density [mean (<i>SE</i>)]	1.75 (0.20)

Note. Based on the sample of young adult women at Wave III in the national probability sample with at least one reported current relationship, with nonmissing data on the present study's IPV perpetration and alcohol use variables, and whose index relationship was not a same-sex relationship. *SE* = linearized standard error.

Table 3

Bivariate Associations Between Each Predictor or Control Variable and IPV Perpetration Among Young Women

Predictor or control variable	Physical IPV only vs. no IPV RRR (95% CI)	Sexual only or physical & sexual IPV vs. no IPV RRR (95% CI)
One or more on-premise alcohol outlets per sq. kilometer in tract	1.17 (0.95–1.44)	1.21 (0.79–1.87)
One or more off-premise alcohol outlets per sq. kilometer in tract	1.26 (1.04–1.52) *	1.18 (0.77–1.81)
Alcohol use (reference = abstainer)		
Light drinker	0.81 (0.61–1.08)	0.67 (0.34–1.31)
Moderate drinker	1.42 (0.92–2.18)	1.06 (0.49–2.33)
Infrequent heavy drinker	1.09 (0.82–1.44)	1.13 (0.62–2.06)
Occasional heavy drinker	0.99 (0.76–1.28)	0.72 (0.40–1.30)
Frequent heavy drinker	1.21 (0.75–1.95)	1.69 (0.73–3.91)
Age in years	0.92 (0.87–0.97) **	0.95 (0.84–1.08)
Race/ethnicity (reference = Non-Hispanic white)		
Hispanic	1.76 (1.31–2.36) ***	2.93 (1.79–4.79) ***
Non-Hispanic black	1.77 (1.43–2.20) ***	1.94 (1.17–3.23) *
Non-Hispanic Asian	1.34 (0.75–2.38)	1.52 (0.74–3.12)
Non-Hispanic Native American	2.68 (1.18–6.08) *	4.92 (1.57–15.40) **
Marital status (reference=never married to partner)		
Ever lived with this partner but never married to him or her	3.67 (2.89–4.66) ***	2.89 (1.77–4.73) ***
Ever married to this partner	2.09 (1.66–2.64) ***	1.59 (0.88–2.85)
Neglect as a child (yes vs. no)	1.52 (1.26–1.83) ***	2.42 (1.60–3.67) ***
Sexually abused as a child (yes vs. no)	1.97 (1.25–3.09) **	2.03 (0.87–4.72)
Physically abused as a child (yes vs. no)	1.88 (1.53–2.32) ***	2.38 (1.54–3.68) ***
Neighborhood poverty	1.01 (1.00–1.01 ^a) *	1.01 (1.00–1.02)
Neighborhood transience	1.00 (0.99–1.00)	0.99 (0.98–1.01)
Neighborhood foreign-born	1.25 (0.64–2.46)	2.13 (0.70–6.47)
Neighborhood vacant housing	2.49 (0.71–8.70)	2.29 (0.06–83.65)
Neighborhood population density	0.99 (0.97–1.01)	1.03 (1.00–1.05 ^b) *

Note. Analyses were conducted using multinomial logistic regression unadjusted for any other variable and with IPV perpetration as the dependent variable. RRR = relative risk ratio; CI = confidence interval.

^aCI was 1.001–1.010 before rounding.

^bCI was 1.001–1.053 before rounding.

* $p < .05$.

** $p < .01$.

 $p < .001$.

Table 4
Bivariate Associations Between Neighborhood Alcohol Outlet Density and Alcohol Use Among Young Women

Type of alcohol outlet density	Light drinker vs. abstainer RRR (95% CI)	Moderate drinker vs. abstainer RRR (95% CI)	Infrequent heavy drinker vs. abstainer RRR (95% CI)	Occasional heavy drinker vs. abstainer RRR (95% CI)	Frequent heavy drinker vs. abstainer RRR (95% CI)
One or more on-premise alcohol outlets per sq. kilometer in tract	0.94 (0.74–1.20)	0.87 (0.62–1.22)	0.96 (0.76–1.21)	1.19 (0.91–1.56)	1.46 (0.96–2.22)
One or more off-premise alcohol outlets per sq. kilometer in tract	0.99 (0.77–1.27)	1.09 (0.76–1.56)	0.93 (0.72–1.21)	1.01 (0.77–1.34)	1.18 (0.78–1.80)

Note. The analysis was conducted using multinomial logistic regression unadjusted for any other variable and with alcohol use as the dependent variable. RRR = relative risk ratio; CI = confidence interval.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 5

On-Premise Alcohol Outlet Density: Odds Ratios from Multinomial Logistic Regression Models of IPV Perpetration Among Young Women

Predictor variable	Model 1: Outlet density, alcohol use		Model 2: Outlet density, alcohol use, individual- and community-level control variables	
	Physical IPV only vs. no IPV (95% CI)	Sexual only or physical & sexual IPV vs. no IPV (95% CI)	Physical IPV only vs. no IPV (95% CI)	Sexual only or physical & sexual IPV vs. no IPV (95% CI)
One or more on-premise alcohol outlets per sq. kilometer in tract	1.16 (0.94–1.44)	1.21 (0.78–1.88)	1.26 (0.98–1.60)	1.36 (0.75–2.46)
Alcohol use (reference = abstainer)				
Light drinking	0.88 (0.64–1.20)	0.90 (0.46–1.76)	0.99 (0.69–1.42)	1.05 (0.51–2.16)
Moderate drinking	1.41 (0.88–2.24)	0.90 (0.36–2.22)	1.46 (0.94–2.25)	1.01 (0.42–3.43)
Infrequent heavy drinking	1.11 (0.83–1.50)	1.35 (0.72–2.54)	1.33 (0.95–1.86)	1.62 (0.82–3.20)
Occasional heavy drinking	0.99 (0.75–1.30)	0.74 (0.39–1.43)	1.46 (1.07–1.98)*	1.03 (0.52–2.04)
Frequent heavy drinking	1.13 (0.66–1.92)	2.02 (0.87–4.72)	1.79 (1.03–3.11)*	3.04 (1.19–7.78)*
Age in years				
			0.85 (0.80–0.90)***	0.90 (0.78–1.04)
Race/ethnicity (reference = Non-Hispanic white)				
Hispanic			1.81 (1.23–2.64)**	2.80 (1.32–5.95)**
Non-Hispanic black			2.48 (1.81–3.39)***	2.07 (1.08–3.99)*
Non-Hispanic Asian			2.05 (0.98–4.29)	1.98 (0.83–4.73)
Non-Hispanic Native American			2.64 (1.16–6.01)*	3.32 (0.93–11.82)
Marital status (reference = never married to partner)				
Cohabited with partner			4.52 (3.48–5.88)***	2.95 (1.64–5.32)***
Ever married to partner			3.27 (2.47–4.33)***	2.00 (0.98–4.11)
Neglect as child (yes vs. no)				
			1.09 (0.89–1.35)	1.59 (0.98–2.58)
Sexual abuse as child (yes vs. no)				
			1.29 (0.78–2.15)	0.91 (0.28–2.95)
Physical abuse as child (yes vs. no)				
			1.85 (1.44–2.36)***	1.85 (1.08–3.17)*
Neighborhood poverty				
			1.00 (1.00–1.01)	1.01 (1.00–1.02)
Neighborhood transience				
			0.99 (0.99–1.00 ^a)**	0.98 (0.97–1.00)
Neighborhood foreign-born				
			1.12 (0.37–3.40)	0.86 (0.14–5.38)
Neighborhood vacant housing				
			0.78 (0.19–3.27)	1.53 (0.03–88.88)
Neighborhood population density				
			0.97 (0.95–1.00)	1.02 (0.98–1.05)

Note. CI = confidence interval.

^aCI was 0.987–0.997 before rounding.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 6

Off-Premise Alcohol Outlet Density: Odds Ratios from Multinomial Logistic Regression Models of IPV Perpetration Among Young Women

Predictor variable	Model 1: Outlet density, alcohol use		Model 2: Outlet density, alcohol use, individual- and community-level control variables	
	Physical IPV only vs. no IPV (95% CI)	Sexual only or physical & sexual IPV vs. no IPV (95% CI)	Physical IPV only vs. no IPV (95% CI)	Sexual only or physical & sexual IPV vs. no IPV (95% CI)
One or more off-premise alcohol outlets per sq. kilometer in tract	1.30 (1.07–1.56)**	1.20 (0.78–1.84)	1.35 (1.07–1.70)*	1.17 (0.71–1.93)
Alcohol use (reference = abstainer)				
Light drinking	0.87 (0.64–1.19)	0.89 (0.45–1.75)	0.98 (0.69–1.40)	1.05 (0.51–2.15)
Moderate drinking	1.40 (0.88–2.22)	0.89 (0.36–2.21)	1.44 (0.93–2.23)	1.00 (0.42–2.42)
Infrequent heavy drinking	1.12 (0.83–1.51)	1.34 (0.71–2.54)	1.31 (0.93–1.84)	1.61 (0.82–3.16)
Occasional heavy drinking	0.99 (0.75–1.31)	0.75 (0.39–1.43)	1.45 (1.07–1.98)*	1.03 (0.52–2.03)
Frequent heavy drinking	1.13 (0.66–1.94)	2.04 (0.88–4.76)	1.79 (1.03–3.10)*	3.06 (1.20–7.82)*
Age in years				
			0.85 (0.80–0.90)***	0.90 (0.78–1.04)
Race/ethnicity (reference = Non-Hispanic white)				
Hispanic			1.79 (1.21–2.63)**	2.77 (1.30–5.89)**
Non-Hispanic black			2.49 (1.82–3.41)***	2.09 (1.09–4.01)*
Non-Hispanic Asian			2.00 (0.96–4.17)	1.96 (0.81–4.71)
Non-Hispanic Native American			2.65 (1.14–6.12)*	3.25 (0.91–11.64)
Marital status (reference = never married to partner)				
Cohabited with partner			4.54 (3.49–5.90)***	2.96 (1.65–5.34)***
Ever married to partner			3.27 (2.48–4.32)***	1.98 (0.97–4.05)
Neglect as child (yes vs. no)			1.09 (0.89–1.35)	1.59 (0.98–2.58)
Sexual abuse as child (yes vs. no)			1.31 (0.79–2.17)	0.91 (0.28–2.95)
Physical abuse as child (yes vs. no)			1.83 (1.43–2.35)***	1.86 (1.09–3.19)*
Neighborhood poverty			1.00 (1.00–1.01)	1.01 (1.00–1.02)
Neighborhood transience			0.99 (0.99–1.00 ^a)**	0.99 (0.97–1.00)
Neighborhood foreign-born			1.08 (0.36–3.29)	0.99 (0.17–5.82)
Neighborhood vacant housing			0.86 (0.20–3.67)	1.59 (0.03–91.19)
Neighborhood population density			0.97 (0.94–1.00 ^b)*	1.02 (0.98–1.05)

Note. CI=confidence interval.

^aCI was 0.987–0.998 before rounding.

^bCI was 0.942–0.997 before rounding.

* $p < .05$.

** $p < .01$.

 $p < .001$.