Published in final edited form as:
Partner Abuse. 2013 October 1; 4(4): 419–443. doi:10.1891/1946-6560.4.4.419.

Intimate Partner Violence among California Couples: Multilevel Analysis of Environmental and Partner Risk Factors

Carol B. Cunradi, MPH, PhD[1], **Michael Todd, PhD**[1], **Christina Mair, MPH, PhD**[1,2], and **Lillian Remer, MA**[1]

[1]Prevention Research Center, Pacific Institute for Research and Evaluation, Berkeley, CA 94704

[2]School of Public Health, University of California, Berkeley, 94720

Abstract

This study assessed the extent to which environmental (Census block-group alcohol outlet density, neighborhood demographic characteristics) and partner risk factors (e.g., hazardous drinking, psychosocial characteristics) contribute to the likelihood of intimate partner violence among 1,753 couples residing in 50 medium-to-large California cities. Multilevel logistic regression models were used to analyze the role of alcohol outlets (off-premise outlets, bars/pubs and restaurants), neighborhood demographic characteristics, and partner risk factors in relation to male-to-female partner violence (MFPV) and female-to-male partner violence (FMPV) risk. Approximately 12% of couples reported past-year partner violence. Results showed that none of the environmental measures were related to MFPV or FMPV. Male partner's impulsivity and each partner's adverse childhood experiences were associated with MFPV risk. Risk factors for FMPV were male partner's impulsivity and frequency of intoxication and female partner's adverse childhood experiences. Individual/couple characteristics appear to be the most salient IPV risk factors. The male partner's heavy drinking may lead to negative partner/spousal interactions that result in FMPV. The male partner's impulsivity, and each partner's adverse childhood experiences, may potentiate couple conflict and result in aggression. Interventions that target prevention of family dysfunction during childhood may help reduce interpersonal violence in adulthood.

Keywords

Intimate partner violence; couples; neighborhood; alcohol outlets; multilevel

Physical aggression between romantic partners, also known as intimate partner violence (IPV), remains a pervasive public health problem. Among married/cohabiting couples in the general household population, annual prevalence estimates for any dyadic physical aggression (i.e., male-to-female or female-to-male) ranged from 7.8% to 21.5% (Schafer, Caetano, & Clark, 1998). Based on Wave II National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), of respondents who were married, dating, or those who reported being in a relationship, 6.9% of females and 4.0% of males reported past-year IPV perpetration; 5.0% of females and 5.6% of males reported IPV victimization (Smith,

Corresponding Author: Carol B. Cunradi Prevention Research Center Pacific Institute for Research and Evaluation 1995 University Avenue, Suite 450 Berkeley, CA 94704 510-883-5771 Cunradi@prev.org.

Homish, Leonard, & Cornelius, 2011). Younger couples are consistently found to have higher rates of IPV than older couples (Breiding, Black, & Ryan, 2008; Cunradi, 2007; Magdol et al., 1997; Schumacher, Homish, Leonard, Quigley, & Kearns-Bodkin, 2008). For example, among a sample of newlywed couples in New York, 37.4% reported husband-to wife aggression, and 48.1% reported wife-to-husband aggression (Schumacher et al., 2008). Higher rates of IPV are also found among racial/ethnic minorities and among lower-income households (Cunradi, 2007; Cunradi, Todd, Duke, & Ames, 2009; Field & Caetano, 2004; Sorenson, Upchurch, & Shen, 1996). There is evidence that women are as likely or more likely than men to engage in physical aggression (Archer, 2000; Cunradi, Ames, & Duke, 2011; Jain, Buka, Subramanian, & Molnar, 2010; Schafer et al., 1998; Whitaker, Haileyesus, Swahn, & Saltzman, 2007), although women are more likely to be injured than men as a result of IPV (Archer, 2000). Because IPV is an interaction that occurs between two people, understanding how the characteristics of both partners may contribute to IPV risk is optimal for IPV screening, prevention and treatment programs.

IPV can have acute, chronic, and long-term consequences. For example, IPV-involved men and women are more likely than those not exposed to IPV to have poorer mental health (e.g., depression) and physical health problems (Plichta, 2004; Reid et al., 2008; Rhodes et al., 2009; H. Straus et al., 2009). Annual IPV-related medical and mental health care utilization costs $4.1 billion (National Center for Injury Prevention and Control, 2003). In addition, children exposed to their parents' marital aggression are at risk for a range of adverse mental health, behavioral and somatic problems (Kaufman et al., 2006; Klostermann & Kelley, 2009; McFarlane, Groff, O'Brien, & Watson, 2005; O'Campo, Caughy, & Nettles, 2010; Tolan, Gorman-Smith, & Henry, 2006). Moreover, adults who were exposed to IPV and other forms of family dysfunction during childhood are more likely to experience mental health disturbances (e.g., depression, anxiety), somatic disturbances (e.g., sleep problems, obesity), and substance use problems (smoking, alcoholism, illicit drug use), and are at greater risk for IPV (Anda et al., 2006). Given these devastating impacts, it is important to monitor IPV prevalence and identify risk factors associated with male-to-female partner violence (MFPV) and female-to-male partner violence (FMPV) in order to inform IPV intervention and prevention programs and strategies.

Heavy or hazardous drinking has been identified as a key risk factor for IPV (Cunradi, 2007; Klostermann & Fals-Stewart, 2006; Leonard, 2005), with associations influenced by and partially explained through putative moderating and mediating factors, respectively. For example, based on four years of longitudinal follow-up with a sample of newlywed couples (*n*=634), Schumacher et al. (2008) found that excessive alcohol use was predictive of husband-to-wife violence among hostile men with high levels of avoidance coping. Wives' heavy drinking did not predict their husband's violence, although husbands' heavy drinking predicted wife-to-husband violence. Schafer et al. (2004) conducted multigroup path analysis among a national sample of white, black, and Hispanic couples and found that childhood physical abuse was associated with impulsivity and drinking problems in adulthood, all of which were associated with IPV. The pattern of these associations varied as a function of gender and racial/ethnic identity. For example, black women's drinking problems had a stronger effect on reported levels of IPV perpetration than the same paths

among Hispanic and white women (Schafer et al., 2004). Cunradi et al. (2011) analyzed the association between men's and women's alcohol problems (as measured by the AUDIT, a screener for hazardous drinking; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) and risk for unidirectional and bidirectional IPV in a sample of blue-collar couples. The results showed that the women's alcohol problems were not associated with unidirectional or bidirectional (reciprocal) IPV. The men's alcohol problems, however, were associated with increased risk for unidirectional male-to-female partner violence as well as bidirectional (reciprocal) IPV. Across a range of countries, drinking during an IPV event on the part of one or both partners is associated with severity of aggression (Graham, Bernards, Wilsnack, & Gmel, 2011).

The conceptual framework of the current study is based upon the developmental, social-ecological model for the primary prevention of IPV proposed by Whitaker, Hall and Coker (2009). This model includes the early precursors of IPV, such as childhood maltreatment, and also incorporates the interaction of IPV risk and protective factors at multiple levels of influence, including individual, family, couple, and community (Whitaker et al., 2009). Previous research findings provide empirical support for the social-ecological model of IPV. For example, a number of studies have shown that couples who live in neighborhoods with high rates of poverty or unemployment (measured at the Census tract or block-group level) are at greater risk for IPV compared to couples who live in low poverty or unemployment neighborhoods (O'Campo et al., 1995; Miles-Doan & Kelly, 1997; Cunradi, Caetano, Clark, & Schafer, 2000; Cunradi, Caetano, & Schafer, 2002). Other studies have found that perceived neighborhood social disorder (crime, graffiti, etc.) is significantly associated with IPV, even after accounting for individual-level risk factors (Cunradi, 2007, 2009). While these findings do not demonstrate a causal association, they indicate that IPV risk and protective factors are not limited to individual characteristics; environmental factors also need to be considered.

To expand knowledge in this area, the current study builds upon prior multilevel (McKinney, Caetano, Harris, & Ebama, 2009) and ecological analyses of IPV (Cunradi, Mair, Ponicki, & Remer, 2011, in press; Livingston, 2011) showing that alcohol outlet density (i.e., geographic distribution of bars/pubs, restaurants serving alcohol, and off-premise outlets) is linked to increased risk for IPV-related outcomes, even after accounting for other neighborhood characteristics (e.g., poverty, unemployment, high racial/ethnic minority density). Based on a national sample of couples whose survey data was linked with Census and alcohol outlet data, McKinney et al. (2009) found that on-premise alcohol outlet density (bars and restaurants) was associated with a 1.03-fold increased risk of MFPV at the zip code level. There was no association between off-premise outlet density and MFPV, nor was there any association between alcohol outlet density and FMPV. Moreover, they found that the association between alcohol outlet density and MFPV is stronger among couples who reported alcohol-related problems compared to couples who did not report alcohol-related problems.

Livingston (2011) analyzed aggregated data on IPV-related police crime reports and alcohol outlet density at the postcode (zip code equivalent) level within the metropolitan Melbourne, Australia area from 1996 to 2005. He found a positive relationship between alcohol outlet

density and rates of IPV over time, with a large effect for packaged liquor (off-premise) outlets. Similarly, Cunradi et al. (2011) analyzed the association between alcohol outlet density within Sacramento, California, and rates of IPV-related police calls from 2006 to 2009, and IPV-related crime reports from 2001 to 2009. They found that each additional off-premise outlet is associated with an approximate 4% increase in IPV-related police calls and an approximate 3% increase in IPV-related crime reports at the electronic data processing (EDP) level (a police-defined geographic unit averaging 0.17 square miles). Cunradi et al. (in press) analyzed the association between alcohol outlet density and IPV-related Emergency Department (ED) visits throughout California from 2005 to 2008. Their findings indicated that an increase of one bar per square mile is associated with a 3% increased likelihood of IPV-related ED visits in a given zip code. They also found a small but significant negative association between off-premise outlets and IPV-related ED visits.

Several potential mechanisms may underlie the association between an environmental characteristic such as alcohol outlet density and a private interaction between intimate partners such as IPV. First, alcohol outlets, especially off-premise liquor stores, are often surrounded by signs of physical disorder (e.g., broken bottles, loiterers, publicly intoxicated patrons). Together with other signs of neighborhood distress (e.g., abandoned buildings), the presence of such outlets may signal to residents that the mechanisms of informal social control are not working (Gorman, Speer, Gruenewald, & Labouvie, 2001; Sampson & Raudenbush, 1999). Lack of informal social control, in turn, may decrease the likelihood that residents would intervene directly or call the police if they witnessed or heard a couple having an IPV-related altercation. Low informal social control may lead residents of such areas to be less concerned about engaging in IPV and thus less constrained in their behavior toward their intimate partner. Second, alcohol availability theory (Stockwell & Gruenewald, 2004) proposes that as the physical availability of alcohol increases, so too will the level of alcohol use at the individual level. Outlet density may thus promote problem drinking among at-risk couples by offering increased opportunities to purchase and consume liquor, thereafter increasing the likelihood that alcohol-fueled aggression may occur. Third, certain outlets (e.g., bars, off-premise) may provide environments where groups of persons at risk for IPV may form and mutually reinforce IPV-related attitudes, norms, and problem behaviors (Cunradi, 2010). Barriers to aggression, for example, may be lowered not only by excessive drinking, but by drinking in a context or setting that poorly regulates aggressive behavior (Gruenewald, 2007).

The purpose of this study is to estimate the prevalence of MFPV and FMPV among married/cohabiting couples sampled from 50 medium-to-large California cities, and to analyze the contribution of environmental and partner characteristics in relation to risk for IPV. In terms of environmental factors, we hypothesized that (1) alcohol outlet density, especially bars/pubs and off-premise outlets, would be associated with greater likelihood of MFPV and FMPV; and (2) Census-based neighborhood characteristics (e.g., minority population density, poverty) previously shown to be associated with IPV (Cunradi et al., 2002; Cunradi, Mair, et al., 2011) would be significantly related to the IPV outcome measures. Regarding partner characteristics, we hypothesized that the following factors would be positively associated with elevated IPV risk: (1) each partner's heavy alcohol use (Cunradi, 2007; Stuart et al., 2006); (2) each partner's perceived level of neighborhood social disorganization

(Cunradi, 2007, 2009); (3) the couple's level of financial strain (Fox & Benson, 2006); and (4) each partner's level of impulsivity (Cunradi, Ames, et al., 2011; Shorey, Brasfield, Febres, & Stuart, 2011) and adverse childhood experiences, such as childhood maltreatment and family dysfunction (Anda et al., 2006; Cunradi, Ames, et al., 2011).

Methods

Sample and Procedure

All procedures were approved by the Institutional Review Board (IRB) of the Pacific Institute for Research and Evaluation. In addition, a Certificate of Confidentiality was obtained from the National Institute on Alcohol Abuse and Alcoholism. As a first step, the geographic framework for selecting the sample was restricted to 138 California cities with 2000 Census population between 50,000 and 500,000. From this group, we sampled 50 cities that are geographically distinct. The sample of 50 cities is not a simple random sample of these places, but rather a purposive sample of cities intended to maximize validity with regard to the geography and ecology of the state. Selection began by randomly choosing a "seed" city. Once chosen, all cities adjacent to, within two lags of, or within 1 mile of the selected city were excluded from the sample. The next city was then randomly selected from the remaining cities. The procedure was repeated until a sample of 50 cities was obtained (Lipperman-Kreda, Grube, & Friend, in press). Selected cities tended on average to have smaller populations (104,000 vs. 108,000), less ethnic diversity (e.g., 64% vs. 59% White), smaller households (2.82 vs. 2.93 persons), lower median household incomes ($50,000 vs. $52,000), and higher alcohol outlet densities (e.g., 1.38 vs. 1.15 on-premise outlets per 1,000 residents) relative to the entire 138-city sampling frame, but none of these differences were statistically significant.

Beginning in February 2010, and prior to telephone recruitment, we mailed a letter announcing the Community Health Study of Couples to all listed sample points (addresses) in a purchased sample of addresses and telephone numbers of households drawn from credit card records, utility company records, and magazine subscription lists (with overlapping/duplicate records removed). The letter explained (in English and Spanish) that the goal of the study "is to improve the health and well-being of couples within communities such as yours throughout California." The letter also included details about the study procedures and the incentives for participating. Potential respondents were contacted via telephone 3 to 7 days after receiving the mailing. When a residence within a targeted city was reached, we asked to speak with an adult aged 18 or older to ascertain household composition (i.e., numbers of and relationships among adults living in the household). Households with couples who (a) were married or cohabiting, (b) had lived together for at least 12 months at the time of the survey interview, (c) were at least 18 years old, and (d) were fluent in English or Spanish were considered to be eligible for inclusion. If the potential respondent expressed interest in the study, informed consent was then obtained. The consent procedure involved emphasizing the confidential nature of the interview and the voluntary nature of participation. Potential respondents who wished to continue were allowed to participate during the initial telephone contact or to schedule the interview for a more convenient time

when privacy could be assured. A toll-free number was provided to respondents who wished to call back at their own convenience or from a location other than their home.

In all cases, trained, professional survey interviewers first spoke with the female partner in the couple using computer-assisted telephone interviewing (CATI) procedures. If the female partner reported that she had experienced severe IPV (e.g., had been beaten up by her partner), the interviewer asked her permission before contacting her male partner for his interview (in which no questions about IPV were asked). Otherwise, the male partner was contacted for the full interview following completion of the female's interview. Sixteen women reported that they had experienced severe IPV; all gave permission for their male partners to be interviewed. Each respondent was sent a $40.00 check as compensation for his or her participation, along with a bilingual fact sheet on the 2-1-1 information system for connecting individuals with a variety of social service agencies and organizations. Interviews were obtained from 1,950 couples. On average, interviews lasted 31 minutes for female respondents and 29 minutes for male respondents. All addresses were independently geocoded and masked to a randomly selected location from among the nearest 100 households. The vendor then attached the XY coordinates of the masked location to the sample and actual address information was destroyed to insure anonymity for respondents. To our knowledge, no adverse events occurred during or following survey data collection as a result of participation in the study. Data collection activities concluded in September 2010. While the full CASRO (Council of American Survey Research Organizations) or ISER (Institute for Social and Economic Research) response rate was 59.5%, the Cooperation Rate was 78.3% (Lynn, Beerten, Laiho, & Martin, 2001)

Measures

Intimate partner violence—Separate dependent variables were created for MFPV and FMPV. Past-12 month IPV was measured with the physical assault subscale of the revised Conflict Tactics Scales (CTS2). Straus and colleagues (1996) reported the internal consistency reliability (alpha) for this subscale is .86. The subscale asks about the occurrence of 12 behaviors (e.g., pushing or shoving; grabbing; slapping; beating up) that the respondent may have perpetrated against their spouse/partner, and that their spouse/partner may have perpetrated against them. For each behavior in the subscale, aggression was considered to have occurred if at least one partner reported a violent incident in the past year, regardless of whether the incident was corroborated by the other partner. For example, if the male partner reported that he grabbed his spouse/partner at least once, regardless of whether she concurred, the couple would be scored positively for this act of MFPV. Similarly, if the male partner reported that his spouse/partner slapped him at least once, regardless of whether she concurred, the couple would be scored positively for this act of FMPV. Taking both partners' reports of aggression into account allows for the correction of under-reporting of violence common in one partner data (Caetano, Cunradi, Schafer, & Clark, 2000).

Block-group level environmental measures

Demographics—Neighborhood-level demographic measures included the percent of residents within each respondent's block group who reported being Black/African-American,

percent reporting Hispanic/Latino ethnicity, and the percent reporting a household income below 150% of the federal poverty line. These measures were obtained from GeoLytics Estimates Premium 2009 (Geolytics, East Brunswick, NJ).

Alcohol outlet density—Based on 2009 data from the California Alcoholic Beverage Control Commission, addresses of licensed off-premise outlets (e.g., liquor, grocery, and convenience stores), bars and pubs, and restaurants were geocoded and associated with corresponding Census block groups. Block group-level counts of outlets and land area for each block group were used to compute the geographic density of each outlet type as number of outlets per square kilometer. The outlet densities were matched to block group of the masked residential address of each respondent household residence.

Partner characteristics

Mean partner age—Because partner ages were strongly correlated (r = .79), using them as separate predictors proved to be problematic due to high collinearity. Accordingly, we used a couple-level average of partners' ages (i.e., sum of female partner age and male partner age, divided by 2).

Unemployment status—Respondents were asked to report on their employment status, by selecting one of the following options: employed, unemployed, student, homemaker, retired, or disabled. We used a dichotomous indicator for each partner's report of her or his *un*employment status, such that anyone reporting being unemployed received a score of 1, and anyone reporting any other status received a score of 0. Separate indicators were used for female and male partners.

Educational attainment—Educational attainment consisted of four categories: (1) did not graduate from high school or obtain a General Equivalency Diploma (GED), (2) graduated from high school or obtained GED, (3) enrolled in or completed some post-high school education/training (vocational training, some college, or AA degree), and (4) graduated with bachelor's degree or completed some post-graduate education. In the analyses, this measure was treated as a nominal variable, with the bachelor's degree or higher category serving as the reference category.

Race and ethnicity—For each partner, we created a five-category measure of race/ethnicity comprising the following categories: (1) Hispanic/Latino, (2) non-Hispanic Black/African-American, (3) Asian/Asian-American/Pacific Islander, (4) multi-racial/other, and (5) non-Hispanic White/Caucasian. Non-Hispanic White was treated as the reference category.

Hypothesized partner and couple IPV risk factors

Frequency of intoxication—We used a continuous variable reflecting each respondent's report of how many times during the past 12 months he or she drank “enough to feel intoxicated or drunk.” This question was asked in open-ended format, after reminding respondents that frequency of “every day would be 365 days, once a week would be 52 days, and once a month would be 12 days.”

Mean financial strain score—A composite score was created for each partner using seven items drawn from the Financial Strain Index (FSI) used in the main adult survey of the Welfare, Children and Families study (Johns Hopkins University). Examples of FSI items include, “How often does your household have to borrow money to pay bills?” and “Does your household have enough money to afford the kind of housing, food and clothing you feel you should have?” Response scales varied widely across the seven items. To compensate for these differences, we transformed raw item scores to z-scores (i.e., mean 0, standard deviation 1) and then computed a composite score for each partner using these transformed item scores (Cronbach's αs = .82 and .79 for females and males, respectively). Because of high collinearity between partners' scores (r = .61), we computed an average financial strain composite score for the couple.

Perceived social disorganization—Hill and Angel's (2005) perceived neighborhood disorder scale was used to measure respondent perceptions of crime and other social problems. Respondents were asked to rate “how much of a problem” each of 10 potential neighborhood problems were on a 3-point scale (e.g., assaults and muggings; drug dealing in the open; gangs). A separate score (a mean of the 10 item scores) was computed for each partner (Cronbach's αs = .87 for females and .84 for males, respectively).

Impulsivity—We measured impulsivity with a set of 3 questions that originated in the National Alcohol Survey and were used in previous IPV studies (e.g., Caetano et al., 2000). Respondents were asked to describe how well each of the following statements described them: (1) I often act on the spur-of-the-moment without stopping to think; (2) You might say I act impulsively; and (3) Many of my actions seem to be hasty. Response options ranged from 1 (“quite a lot”) to 4 (“not at all”). Items were reverse-coded prior to computing separate composite scores for each partner (Cronbach's αs = .76 and .78 for females and males, respectively).

Adverse childhood experiences—Childhood exposure to violence, alcoholism, and other adverse events was measured with a modified version of the Adverse Childhood Experiences (ACE) scale (Felitti et al., 1998). The 6-item modified ACE (Cabrera, Hoge, Bliese, Castro, & Messer, 2007) covers six categories of experiences respondents may have experienced while they were growing up. Two items (alcoholism or problem drinking by a household member; depression or mental illness of a household member) were scored dichotomously (yes/no). The following four items were scored on a 5-point scale (never; once or twice; sometimes; often; very often), with responses in parentheses scored as `exposed': (1) parent/caregiver-perpetrated physical abuse (often or very often), (2) psychological abuse (often or very often) or (3) sexual abuse (ever); and (4) domestic violence toward mother or caregiver (sometimes, often, or very often). A score ranging from 0 – 6 was created for each respondent by summing the number of positive responses to each of the six items (Cronbach's αs = .66 and .59 for females and males, respectively).

Analytic strategy—We calculated the prevalence of moderate male-to-female partner violence based on couple report of the male's aggression towards the female for the following: throwing something that could hurt, twisting arm or hair, pushing or shoving,

grabbing, and slapping. Severe male-to-female partner violence was based on couple report of the male's aggression towards the female involving using a knife or gun, punching or hitting with something that could hurt, choking, slamming against a wall, beating up, burning or scalding on purpose, and kicking. If a couple reported both moderate and severe MFPV, they were categorized as severe. To calculate the prevalence of moderate female-to-male partner violence and severe female-to-male partner violence, we used the same procedures based on the couple's report of the female's aggression towards the male. Because of the small number of couples reporting either type of severe IPV, we could not conduct separate comparative analyses of moderate and severe MFPV and FMPV. Instead, two dichotomous outcomes (i.e., any MFPV; any FMPV) served as the dependent variables.

Given the inherently nested nature of the sampling design and the data structure (couples sampled from cities), we used multilevel logistic regression models to examine associations between covariates and IPV measures. In these models, we included a random (between-city) component for the intercepts and for overdispersion at the couple level. We examined a sequence of four models where four blocks of covariates were considered: couple- and partner-level demographic measures (mean age, unemployment, education, race/ethnicity) only (Model 1); covariates from Model 1 plus block group-level demographic measures (Model 2); covariates from Model 2 plus couple- and hypothesized partner-level IPV risk factors (Model 3); and covariates from Model 3 plus block group-level measures of alcohol outlet density (Model 4). Each of these four covariate combinations was used in modeling MFPV and FMPV separately, yielding a total of eight models. Significant results of the full multilevel models (i.e., Model 4) of MFPV and FMPV are summarized in Tables 4 and 5, respectively. Analyses were conducted using PROC GLIMMIX in SAS version 9.2.

Results

Descriptive statistics for model covariates are presented in Table 1. Among the 1,753 couples with complete data for the analyses presented here, 6.6% reported any past-12 month MFPV, and 9.8% reported any past-12 month FMPV. Among couples that reported any MFPV, 88.2% (n=105) reported only moderate MFPV, and 11.8% (n=14) reported severe MFPV. Regarding couples that reported any FMPV, 78.6% (n=136) reported only moderate FMPV, and 21.4% (n=37) reported severe FMPV. Chi-square analyses (data not shown) revealed that couples with incomplete data on the model covariates (n=175) were no more or less likely to report MFPV or FMPV than couples with complete data on the covariates (both ps < .65). Correlations among block group-level and couple- and partner-level predictor variables (excluding education and race/ethnicity dummy variables) are presented in Tables 2 and 3, respectively. Bivariate correlations between block group-level demographic and alcohol outlet density measures and block group-level means for male and female partner's frequency of intoxication were quite small in magnitude (−.03 to .03) and not statistically significant (all ps > .30).

Table 4 shows the relationship between partner- and block-group level coefficients and MFPV. The couple's mean financial strain score, and each partner's perceived level of neighborhood social disorganization, were not associated with MFPV. Couples with a non-Hispanic African-American male partner were more likely to report MFPV than couples

with White/non-Hispanic male partners (OR = 4.11; i.e., the odds of reporting any MFPV were 4.11 times greater for couples with African-American male partners than for couples with a White/non-Hispanic partner). In addition, the male partner's impulsivity (OR = 2.03; i.e., for each unit increase in male partner's impulsivity score, the odds of reporting any MFPV increased by 2.03), the female partner's ACE score, and the male partner's ACE score were all positively associated with the likelihood of reporting any past-year MFPV. Block group-level demographic variables and measures of alcohol outlet density were not related to past-year MFPV.

As shown in Table 5, couples in which the female partner was Asian or Asian-American were more likely to report FMPV than couples with White/non-Hispanic female partners. Among the partner- and couple-level IPV risk factors, male partner's impulsivity, female partner's ACE total score, and male partner's frequency of drinking to intoxication were all positively associated with the likelihood of reporting any past-year FMPV. As with the MFPV model results, the couple's mean financial strain score, and each partner's perceived level of neighborhood social disorganization, were not associated with FMPV. Similarly, block group-level demographic variables and measures of alcohol outlet density were not related to past-year FMPV.

Discussion

The rates of IPV (MFPV= 6.6%; FMPV= 9.8%) reported by couples in this study fall within the range of prevalence estimates obtained from other surveys based on adult Californians. Methodological differences between surveys may account for differences in IPV prevalence rates. For example, nearly 10% of women interviewed in the 2003–2004 California Women's Health Survey (CWHS) reported past-12 month MFPV (Timko, Sutkowi, Pavao, & Kimerling, 2008). The CWHS was a population-based survey of women age 18 or older sampled through random digit dialing, with population estimates weighted to the age and race/ethnicity of the 2000 California adult female population. Respondents included those who were married or cohabitating, as well as those single, separated, and divorced. Measurement of IPV included acts of aggression committed by current as well as former partners. In contrast, Cunradi et al. (2009) found elevated rates of IPV among an occupational sample of unionized construction workers and their spouses/partners in Northern California. In that study, approximately 20% of couples reported past-12 month MFPV, and 24% reported past-12 month FMPV. As with the current study, reports were obtained from both partners in the couple concerning past-12 month IPV perpetration and victimization. Obtaining reports from both partners in the dyad is important as agreement between partners about the occurrence of IPV is low, and single-point estimates tend to underestimate IPV prevalence (Cunradi, Bersamin, & Ames, 2009; Schafer et al., 1998).

Contrary to our hypotheses, none of the alcohol outlet densities were significantly associated with increased IPV risk, nor were any of the Census-based neighborhood characteristics linked to elevated risk for IPV. Several ecological studies have found that alcohol outlet densities increase risk for police-reported IPV (Cunradi, Mair, et al., 2011; Livingston, 2011) and Emergency Department IPV cases (Cunradi et al., in press). The absence of a significant association between outlet density and IPV in the current study may indicate that

outlets are likely to increase risk for more severe types of IPV (i.e., aggression that results in police calls or Emergency Department visits), but do not have an impact on the types of moderate aggression (e.g., pushing, shoving, grabbing) typically seen in population-based studies of IPV.

To date, only one other multilevel analysis of IPV and alcohol outlet density (McKinney et al., 2009) found a significant association between outlet densities and MFPV (but not FMPV). Methodological differences might account for the lack of consistent findings between the McKinney et al. (2009) study and the current study. For example, the McKinney et al. (2009) study was based on a national sample that was obtained in 1995; the sample for the current study was obtained from a geographic sample within 50 medium-to-large California cities in 2010. Their classification of on-premise outlets included bars and restaurants. In contrast, the current study had separate measures for bars and restaurants. In addition, the McKinney et al. study calculated the density of alcohol outlets by dividing the number of outlets by the total population size for each zip code based on 1990 Census estimates to create a measure of density per 10,000 persons. The current study was able to obtain addresses of licensed alcohol outlets from the California Alcoholic Beverage Control Commission, and compute the geographic density of each outlet type as number of outlets per square kilometer. Outlet densities were matched to the block group of the masked residential address of each couple's residence. While both approaches are valid, denominating by square kilometer approximates spatial density (or spatial proximity) to an alcohol outlet within a zip, and acts as a representation of access to outlets in zip codes.

Additional research is needed to clarify the association between alcohol outlets and IPV. The lack of association between Census block group-level demographic factors (percent African America, Hispanic, and below poverty line) and both IPV outcomes may reflect the relatively small number of racial/ethnic minorities in the study sample. In contrast to the current findings, a study based on a national sample of married/cohabiting couples, which included over-samples of Blacks and Hispanics, found that neighborhood poverty at the Census tract level was associated with MFPV among Black couples only; neighborhood poverty was associated with FMPV among Black and White couples, but not Hispanic couples (Cunradi et al., 2000). Our results are consistent with those reported by Caetano et al. (2010); based on follow-up with a national sample of married/cohabiting couples, neighborhood poverty measured at the Census tract level was not associated with MFPV or FMPV.

In terms of drinking, our hypothesis concerning IPV and each partner's heavy alcohol use was only partially confirmed. Specifically, male frequency of intoxication was significantly associated with risk for FMPV, but not MFPV. Schumacher et al. (2008) also found that the husband's heavy drinking predicted the wife's aggression over time. One explanation is that the male's problem drinking may itself become a source of conflict for the couple which can escalate into female-to-male aggression. The absence of an association between the male partner's frequency of intoxication and MFPV may reflect the relatively low levels of problem drinking and IPV severity among married/cohabiting couples in community settings. For example, among a national sample of White, Black and Hispanic married/cohabiting couples, no association was found between the male partner's frequent heavy

drinking and risk for MFPV (Caetano et al., 2000). Among the same sample, however, the association between the male partner's alcohol-related problems (i.e., alcohol dependence symptoms or drinking social consequences) and risk for MFPV varied by the couple's racial/ethnic identity; a significant relationship was seen among Black couples, but not among White or Hispanic couples (Cunradi, Caetano, Clark, & Schafer, 1999), suggesting the importance of considering moderator variables. Foran and O'Leary (2008), in a meta-analysis of alcohol and IPV, found that drinking consequences measures tended to be more strongly associated with MFPV than did consumption measures, and that measures of more severe drinking problems (e.g., abuse, dependence) were more closely associated with MFPV than were frequency measures.

Regarding other hypothesized partner risk factors, no significant associations were seen between financial strain and IPV or between perceived neighborhood social disorganization and IPV. This is in contrast to results from the 1994 National Survey on Families and Households in which economically vulnerable couples were at greater risk for IPV compared to couples who were economically secure (Fox & Benson, 2006) and findings from the 2000 National Household Survey on Drug Abuse which found that perceived neighborhood disorder was significantly associated with risk for mutual and reciprocal IPV among married/cohabiting male respondents. Our hypotheses concerning impulsivity and adverse childhood experiences (ACE) were supported by our findings. Regarding the former, the male partner's level of impulsivity was a significant predictor of MFPV and FMPV. This finding is consistent with a growing body of research that has identified one or both partner's level of impulsivity as an important correlate of IPV (Cunradi et al., 2002; Cunradi et al., 2009; Schafer et al., 2004; Shorey et al., 2011). In terms of ACE, our results show that both the men's and women's ACE scores were positively associated with MFPV, and the women's ACE score was positively associated with FMPV. This, too, is consistent with other research showing that one or both partner's ACE are linked to greater likelihood of IPV (e.g., Anda et al., 2006; Cunradi, Ames, et al., 2011; McKinney, Caetano, Ramisetty-Mikler, & Nelson, 2009; Timko et al., 2008).

Our findings regarding race/ethnicity indicate that couples in which the male partner is African American are at greater risk for MFPV compared to couples in which the male partner is White. A similar finding was observed in the California-based sample reported by Cunradi et al. (2009). Results from national surveys also indicate that African American couples are at elevated risk for IPV, even after adjusting for other demographic factors (Cunradi, 2007; Field & Caetano, 2003; Sorenson et al., 1996). Although a full discussion is beyond the scope of this paper, Hampton and colleagues (2003) suggest that exposure to structural factors, such as institutional racism, may precipitate negative emotions (e.g., anger, hatred) among African American males. These feelings, in turn, are displaced onto female partners, resulting in partner aggression. Lastly, our findings show that couples in which the female partner is Asian/Asian American are at elevated risk for FMPV compared to couples in which the female partner is white. To date, most IPV surveys have not included enough Asians or Asian Americans respondents to allow for comparisons with other racial/ethnic groups (Chang, Shen, & Takeuchi, 2009). One study that included a representative sample of Asians and Asian Americans found that U.S.-born female respondents were at greater risk for FMPV than foreign-born females (Chang et al., 2009).

Future studies should monitor IPV prevalence and risk factors among Asians and Asian Americans.

This study has a number of strengths. For example, this is the first multilevel study of IPV that examines the role of alcohol outlet density and other neighborhood factors at the Census block-group level among a sample of married/cohabiting California couples residing in medium-to-large cities. Thus, the study was focused on couples in a state containing over 10% of the U.S. population. Second, this study obtained reports about MFPV and FMPV from both partners in the dyad. This approach allows the calculation of upper-bound estimates of IPV prevalence, and helps to minimize bias associated with single-person accounts of IPV. Third, the analysis modeled a broad range of demographic and psychosocial factors in relation to MFPV and FMPV, and took into account the past-12 month frequency of intoxication of both partners.

The study's cross-sectional study design precludes making causal inferences from the findings. While it is plausible that the male partner's frequency of intoxication precipitates couple conflict, and in turn, FMPV, it is also plausible that the female partner's aggression could lead to increased frequency of intoxication among male partners experiencing FMPV. Longitudinal designs are needed to sort out these issues, including the use of diary methods that would provide information about the temporal ordering of drinking and IPV events. Another limitation of the study is the relatively small number of the youngest couples (ages 18–29) who participated in the study. One possible explanation for this is that young adults are increasingly living in households without landline telephones (Blumberg et al., 2011), the sole mode used for recruiting this study's sample. Because this age group has been shown to have the highest rates of both IPV and heavy drinking, it is plausible that our findings represent an underestimation of the association between frequency of intoxication and IPV. Also, due to time constraints, no data were collected on a number of important IPV correlates, including level of anger, hostility, and psychological aggression, all of which have been shown to be directly related to likelihood of IPV or to act as mediators or moderators of other associations (Frye & Karney, 2006; Schumacher et al., 2008; Shorey et al., 2011). Finally, due to survey time constraints, brief measures of impulsivity and adverse childhood experiences were used; in the case of the latter, reliability did not reach the conventional .70 threshold.

In conclusion, this study shows that IPV is prevalent among married/cohabiting couples residing in medium- to large California cities, with 12% of the couples reporting at least one act of either MFPV or FMPV in the past 12 months. Block group level alcohol outlet densities and neighborhood characteristics were not associated with either outcome. The findings suggest that the male partner's heavy drinking may lead to negative partner/spousal interactions that result in FMPV. Moreover, the male partner's impulsivity, and each partner's adverse childhood experiences, may potentiate couple conflict and result in partner aggression. For couples at risk for IPV, prevention efforts should focus on reducing heavy drinking and promoting non-escalatory conflict resolution tactics (Hamby, 2006). Interventions that target prevention of family dysfunction during childhood may also help to reduce interpersonal violence in adulthood.

Acknowledgments

This project was supported by Grant Number 1 R01AA017705-3 from the National Institute on Alcohol Abuse and Alcoholism; Carol Cunradi, Principal Investigator. The content is solely the responsibility of the authors and does not necessarily represent the National Institute on Alcohol Abuse and Alcoholism or the National Institutes of Health.

References

Anda RF, Felitti VJ, Bremner JD, Walker JD, Whitfield CL, Perry BD, et al. The enduring effects of abuse and related adverse experiences in childhood: A convergence of evidence from neurobiology and epidemiology. European Archives of Psychiatry and Clinical Neuroscience. 2006; 256:174–186. [PubMed: 16311898]

Archer J. Sex differences in aggression between heterosexual partners: A meta-analytic review. Psychological Bulletin. 2000; 126:651–680. [PubMed: 10989615]

Babor, TF.; Higgins-Biddle, JC.; Saunders, JB.; Monteiro, MG. AUDIT: The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care. Second Edition. World Health Organization; Geneva: 2001. Available at http://www.unicri.it/min.san.bollettino/dati/auditbro.pdf

Blumberg, SJ.; Luke, JV.; Ganesh, N.; Davern, ME.; Bordreaux, MH.; Soderberg, K. Wireless Substittution: State-level estimates from the National Health Interview Survey, January 2007–June 2010. 2011. Available at http://www.cdc.gov/nchs/data/nhsr/nhsr039.pdf

Breiding MJ, Black MC, Ryan GW. Prevalence and Risk Factors of Intimate Partner Violence in Eighteen U.S. States/Territories, 2005. American Journal of Preventive Medicine. 2008; 34(2):112–118. [PubMed: 18201640]

Cabrera OA, Hoge CW, Bliese PD, Castro CA, Messer SC. Childhood adversity and combat as predictors of depression and post-traumatic stress in deployed troops. American Journal of Preventive Medicine. 2007; 33(2):77–82. [PubMed: 17673093]

Caetano R, Cunradi CB, Schafer J, Clark CL. Intimate partner violence and drinking among white, black and Hispanic couples in the U.S. Journal of Substance Abuse. 2000; 11(2):123–138. [PubMed: 10989773]

Caetano R, Ramisetty-Mikler S, Harris TR. Neighborhood characteristics as predictors of male to female and female to male partner violence. Journal of Interpersonal Violence. 2010; 25(11):1986–2009. [PubMed: 20040713]

Chang DF, Shen B-J, Takeuchi DT. Prevalence and demographic correlates of intimate partner violence in Asian Americans. International Journal of Law and Psychiatry. 2009; 32:167–175. [PubMed: 19303638]

Cunradi CB. Drinking level, neighborhood social disorder, and mutual intimate partner violence. Alcoholism: Clinical and Experimental Research. 2007; 31(6):1012–1019.

Cunradi CB. Intimate partner violence among Hispanic men and women: The role of drinking, neighborhood disorder, and acculturation-related factors. Violence and Victims. 2009; 24(1):83–98. [PubMed: 19297887]

Cunradi CB. Neighborhoods, alcohol outlets and intimate partner violence: Addressing research gaps in exploratory mechanisms. International Journal of Environmental Research and Public Health. 2010; 7:799–813. doi: 10.3390/ijerph7030799. [PubMed: 20617004]

Cunradi CB, Ames GM, Duke M. The relationship of alcohol problems to the risk of unidirectional and bidirectional intimate partner violence among a sample of blue-collar couples. Violence and Victims. 2011; 26(2):147–158. [PubMed: 21780531]

Cunradi CB, Bersamin M, Ames G. Agreement on intimate partner violence among a sample of blue-collar couples. Journal of Interpersonal Violence. 2009; 24(4):551–568. [PubMed: 18430971]

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(5):297–308. [PubMed: 10942878]

Cunradi CB, Caetano R, Clark CL, Schafer J. Alcohol-related problems and intimate partner violence among white, black, and Hispanic couples in the U.S. Alcoholism: Clinical and Experimental Research. 1999; 23(9):1492–1501.

Cunradi CB, Caetano R, Schafer J. Alcohol-related problems, drug use, and male intimate partner violence severity among US couples. Alcoholism: Clinical and Experimental Research. 2002; 26(4):493–500.

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. 2011; 88(2): 191–200. [PubMed: 21347557]

Cunradi, CB.; Mair, C.; Ponicki, W.; Remer, L. Alcoholism: Clinical and Experimental Research. Alcohol outlet density and intimate partner violence-related Emergency Department visits. in press

Cunradi CB, Todd M, Duke M, Ames G. Problem drinking, unemployment, and intimate partner violence among a sample of construction industry workers and their partners. Journal of Family Violence. 2009; 24:63–74. [PubMed: 22096270]

Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, Marks JS. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. American Journal of Preventive Medicine. 1998; 14(4):245–258. [PubMed: 9635069]

Field CA, Caetano R. Longitudinal Model Predicting Partner Violence Among White, Black, and Hispanic Couples in the United States. Alcoholism: Clinical and Experimental Research. 2003; 27(9):1451–1458.

Field CA, Caetano R. Ethnic differences in intimate partner violence in the U.S. general population. Trauma, Violence, & Abuse. 2004; 5(4):303–317.

Foran H, O'Leary KD. Alcohol and intimate partner violence: A meta-analytic review. Clinical Psychology Review. 2008; 28:1222–1234. [PubMed: 18550239]

Fox GL, Benson ML. Household and neighborhood contexts of intimate partner violence. Public Health Reports. 2006; 121:419–427. [PubMed: 16827443]

Frye NE, Karney BR. The context of aggressive behavior in marriage: A longitudinal study of newlyweds. Journal of Family Psychology. 2006; 20(1):12–20. [PubMed: 16569085]

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. [PubMed: 11702802]

Graham K, Bernards S, Wilsnack SC, Gmel G. Alcohol May Not Cause Partner Violence but It Seems to Make It Worse: A Cross National Comparison of the Relationship Between Alcohol and Severity of Partner Violence. Journal of Interpersonal Violence. 2011; 26(8):1503–1523. [PubMed: 20522883]

Gruenewald PJ. The spatial ecology of alcohol problems: niche theory and assortative drinking. Addiction. 2007; 102:870–878. [PubMed: 17523980]

Hamby SL. The Who, What, When, Where, and How of Partner Violence Prevention Research. Journal of Aggression, Maltreatment & Trauma. 2006; 13(3–4):179–201.

Hampton R, Oliver W, Magarian L. Domestic Violence in the African American Community An Analysis of Social and Structural Factors. Violence Against Women. 2003; 9(5):533–557.

Hill TD, Angel RJ. Neighborhood disorder, psychological distress, and heavy drinking. Social Science & Medicine. 2005; 61:965–975. [PubMed: 15955398]

Jain S, Buka SL, Subramanian SV, Molnar BE. Neighborhood Predictors of Dating Violence Victimization and Perpetration in Young Adulthood: A Multilevel Study. American Journal of Public Health. 2010; 100(9):1737–1744. [PubMed: 20634470]

Johns Hopkins University; http:/web.jhu.edu/threecitystudy/images/mainadlt.doc; [accessed August 1, 2011]

Kaufman JS, Crusto CA, Quan M, Ross E, Friedman SR, O'Rielly K, et al. Utilizing program evaluation as a strategy to promote community change: Evaluation of a comprehensive, community-based, family violence initiative. American Journal of Community Psychology. 2006; 38(3–4):191–200. [PubMed: 17086485]

Klostermann KC, Fals-Stewart W. Intimate partner violence and alcohol use: Exploring the role of drinking in partner violence and its implications for intervention. Aggression and Violent Behavior. 2006; 11:587–597.

Klostermann KC, Kelley ML. Alcoholism and intimate partner violence: Effects on children's psychosocial adjustment. International Journal of Environmental Research and Public Health. 2009; 6:3156–3168. [PubMed: 20049253]

Leonard KE. Alcohol and intimate partner violence: When can we say that heavy drinking is a contributing cause of violence? Addiction. 2005; 100:422–425. [PubMed: 15784050]

Lipperman-Kreda S, Grube JW, Friend KB. Local Tobacco Policy and Tobacco Outlet Density: Associations with Youth Smoking. Journal of Adolescent Health. in press.

Livingston M. A longitudinal analysis of alcohol outlet density and domestic violence. Addiction. 2011; 106(5):919–925. [PubMed: 21205052]

Lynn, P.; Beerten, R.; Laiho, J.; Martin, J. Working papers of the Institute for Social and Economic Research. Colchester University of Essex; 2001. Recommended Standards Final Outcome Categories and Standard Definitions of Response Rates for Social Surveys. Paper 2001–23. Downloadable from http://www.iser.essex.ac.uk/publications/working-papers/iser/2001-23.pdf

Magdol L, Moffitt TE, Caspi A, Newman DL, Fagan J, Silva PA. Gender differences in partner violence in a birth cohort of 21 year olds: Bridging the gap between clinical and epidemiological approaches. J Consult Clinical Psych. 1997; 65(1):68–78.

McFarlane JM, Groff JY, O'Brien JA, Watson K. Prevalence of partner violence against 7,443 African American, white, and Hispanic women receiving care at urban public primary care clinics. Public Health Nursing. 2005; 22(2):98–107. [PubMed: 15860065]

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.

McKinney CM, Caetano R, Ramisetty-Mikler S, Nelson S. Childhood family violence and perpetration and victimization of intimate partner violence: Findings from a national population-based study of couples. Ann Epidemiol. 2009; 19(1):25–32. [PubMed: 18835525]

Miles-Doan R, Kelly S. Geographic concentration of violence between intimate partners. Public Health Reports. 1997; 112:135–141. [PubMed: 9071275]

National Center for Injury Prevention and Control. Costs of Intimate Partner Violence Against Women in the United States. Centers for Disease Control and Prevention; Atlanta, GA: 2003.

O'Campo P, Caughy MO, Nettles SM. Partner abuse or violence, parenting and neighborhood influences on children's behavioral problems. Social Science & Medicine. 2010; 70:1404–1415. [PubMed: 20163906]

O'Campo P, Gielen A, Faden R, Xue X, Kass N, Wang M-C. Violence by male partners against women during the childbearing year: A contextual analysis. Am J Public Health. 1995; 85(8): 1092–1097. [PubMed: 7625502]

Plichta SB. Intimate Partner Violence and Physical Health Consequences: Policy and Practice Implications. Journal of Interpersonal Violence. 2004; 19(11):1296–1323. [PubMed: 15534333]

Reid RJ, Bonomi AE, Rivara FP, Anderson ML, Fishman PA, Carrell DS, Thompson RS. Intimate Partner Violence Among Men: Prevalence, Chronicity, and Health Effects. American Journal of Preventive Medicine. 2008; 34(6):478–485. [PubMed: 18471583]

Rhodes KV, Houry D, Cerulli C, Straus H, Kaslow NJ, McNutt L-A. Intimate Partner Violence and Comorbid Mental Health Conditions Among Urban Male Patients. Ann Fam Med. 2009; 7:47–55. [PubMed: 19139449]

Sampson R, Raudenbush SW. Systematic social observation of public spaces: A new look at disorder in urban neighborhoods. American Journal of Sociology. 1999; 105:603–651.

Schafer J, Caetano R, Clark CL. Rates of intimate partner violence in the United States. Am J Public Health. 1998; 88(11):1702–1704. [PubMed: 9807541]

Schafer J, Caetano R, Cunradi CB. A Path Model of Risk Factors for Intimate Partner Violence Among Couples in the United States. Journal of Interpersonal Violence. 2004; 19(2):127–142. [PubMed: 15005998]

Schumacher JA, Homish GG, Leonard KE, Quigley BM, Kearns-Bodkin JN. Longitudinal moderators of the relationship between excessive drinking and intimate partner violence in the early years of marriage. Journal of Family Psychology. 2008; 22(6):894–904. [PubMed: 19102610]

Shorey R, Brasfield H, Febres J, Stuart G. The Association between Impulsivity, Trait Anger, and the Perpetration of Intimate Partner and General Violence Among Women Arrested for Domestic Violence. Journal of Interpersonal Violence. 2011; 26(13):2681–2697. [PubMed: 21118862]

Smith, PH.; Homish, GG.; Leonard, KE.; Cornelius, JR. Psychology of Addictive Behaviors. Aug 8. 2011 Intimate Partner Violence and Specific Substance Use Disorders: Findings From the National Epidemiologic Survey on Alcohol and Related Conditions. Online First Publication

Sorenson S, Upchurch D, Shen H. Violence and injury in marital arguments: risk patterns and gender differences. Am J Public Health. 1996; 86(1):35–40. [PubMed: 8561239]

Stockwell, T.; Gruenewald, PJ. Controls on the physical availability of alcohol. In: Stockwell, H., editor. The Essential Handbook of Treatment & Prevention of Alcohol Problems. John Wiley & Sons, Ltd; West Sussex, England: 2004.

Straus H, Cerulli C, McNutt LA, Rhodes KV, Conner KR, Kemball RS, Houry D. Intimate Partner Violence and Functional Health Status: Associations with Severity, Danger, and Self-Advocacy Behaviors. Journal of Women's Health. 2009; 18(5):625–631.

Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised Conflict Tactics Scale (CYS2): Development and preliminary psychometric data. Journal of Family Issues. 1996; 17(3):283–316.

Stuart GL, Meehan JC, Moore TM, Morean M, Hellmuth J, Follansbee K. Examining a conceptual framework of intimate partner violence in men and women arrested for domestic violence. Journal of Studies on Alcohol. 2006; 67:102–112. [PubMed: 16536134]

Timko C, Sutkowi A, Pavao J, Kimerling R. Women's childhood and adult adverse experiences, mental health, and binge drinking: The California Women's Health Survey. Substance Abuse Treatment, Prevention, and Policy. 2008; 3:15. doi:10.1186/1747-597X-3-15.

Tolan P, Gorman-Smith D, Henry D. Family violence. Annual Review of Psychology. 2006; 57:557–583.

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(5):941–947. [PubMed: 17395835]

Whitaker, DJ.; Hall, DM.; Coker, AL. Primary Prevention of Intimate Partner Violence: Toward a Developmental, Social-Ecological Model. In: Mitchell, C.; Anglin, D., editors. Initmate Partner Violence: A Health-Based Perspective. Oxford University Press; NY: 2009. p. 289-305.

Table 1

Descriptive statistics for couple, female (F) and male (M) partner, and block group covariates

Partner- and couple-level variables			
	M (SD) or *n* (%)	Min	Max
Couple mean age	41.89 (5.50)	20.50	52.50
Couple mean financial strain score	−0.02 (0.60)	−1.07	2.26
F-Perceived social disorganization	1.34 (0.38)	1.00	3.00
M-Perceived social disorganization	1.29 (0.34)	1.00	3.00
F-Impulsivity	1.46 (0.58)	1.00	4.00
M-Impulsivity	1.56 (0.63)	1.00	4.00
F-Adverse Childhood Experiences score	0.88 (1.26)	0.00	6.00
M-Adverse Childhood Experiences score	0.68 (1.05)	0.00	6.00
F-Intoxication frequency	1.90 (14.32)	0.00	365.00
M-Intoxication frequency	4.23 (20.24)	0.00	365.00
F-Unemployment	126 (7.1%)	-	-
M-Unemployment	122 (6.9%)	-	-
F-Education			
Less than high school	105 (5.9%)	-	-
High school/GED	232 (13.0%)	-	-
Some post-high school	531 (29.9%)	-	-
Bachelor's degree or higher	907 (51.1%)	-	-
M-Education			
Less than high school	103 (5.8%)	-	-
High school/GED	260 (14.6%)	-	-
Some post-high school	491 (27.7%)	-	-
Bachelor's degree or higher	921 (51.9%)	-	-
F-Race/Ethnicity			
Hispanic/Latina	342 (19.2%)	-	-
Black/African-American	44 (2.5%)	-	-
Asian	82 (4.6%)	-	-
Multiracial/Other	76 (4.3%)	-	-
White non-Hispanic	1232 (69.4%)	-	-
M-Race/Ethnicity			
Hispanic/Latino	318 (17.9%)	-	-
Black/African-American	55 (3.1%)	-	-
Asian	73 (4.1%)	-	-
Multiracial/Other	97 (5.5%)	-	-
White non-Hispanic	1233 (69.5%)	-	-

Block group-level predictors			
	M (SD)	**Min**	**Max**
Percent African-American	4.53 (7.16)	0.00	89.32

Block group-level predictors			
	M (SD)	**Min**	**Max**
Percent Hispanic/Latino	26.62 (21.45)	2.39	99.25
Percent in poverty	15.07 (12.55)	0.00	77.00
Off-premise outlet density[a]	1.59 (3.07)	0.00	27.74
Bar/pub density[a]	0.30 (1.26)	0.00	21.00
Licensed restaurant density[a]	1.92 (5.47)	0.00	98.00

Note.

[a] outlets per km^2.

Table 2

Correlations among block group-level predictor variables (N = 1,113 block groups)

Variable	1	2	3	4	5
1. Percent African-American	-				
2. Percent Hispanic/Latino	.04	-			
3. Percent in poverty	.20**	.65**	-		
4. Off-premise outlet density	.01	.30**	.28**	-	
5. Bar/pub density	.03	.13**	.13**	.44**	-
6. Licensed restaurant density	−.03	.04	.10**	.51**	.60**

Note.

** $p < .01$.

Partner Abuse. Author manuscript; available in PMC 2014 October 01.

Table 3

Pooled within-city correlations among couple- and person-level predictor variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Couple mean age	-												
2 F-Unemployment	−.02	-											
3 M-Unemployment	−.01	.03	-										
4 Couple mean financial strain score	.00	.19**	.14**	-									
5 F-Perceived social disorganization	−.02	.06**	.05*	.27**	-								
6 M-Perceived social disorganization	−.06**	.06*	.07**	.24**	.45**	-							
7 F-Impulsivity	.00	.08**	.00	.07**	.11**	.08**	-						
8 M-Impulsivity	−.05*	.04	.07**	.13**	.06*	.09**	.04	-					
9 F-Adverse Childhood Experiences	.04	.05*	−.02	.08**	.12**	.06*	.14**	−.02	-				
10 M-Adverse Childhood Experiences	−.03	.04	.03	.10**	.05*	.11**	.06*	.09**	.09**	-			
11 F-Intoxication frequency	−.01	.03	.00	.04	.03	.01	.02	.02	.03	.07**	-		
12 M-Intoxication frequency	.01	.02	−.01	.05*	.05*	.03	.08**	.11**	.04	.09**	.28**	-	
13 Female to male violence	−.03	.04	.04	.06*	.02	.03	.03	.10**	.08**	.05*	.07**	.11**	-
14 Male to female violence	−.01	.08**	.04	.07**	.07**	.07**	.04	.15**	.07**	.10**	.03	.04	.55**

Note. As direct estimates of standard errors for the pooled correlations are not available, the *p*-values represented in mis table are based on the effective sample size of 1,753 couples.

* $p < .05$.

** $p < .01$.

Table 4

Multilevel logistic regression results for associations between male-to-female partner violence and couple-, female (F) and male (M) partner-, and block group-level factors (n = 1,753)

Couple- and partner-level predictors	Coefficient	Standard error	Odds ratio	95%C.I.[a]
Couple mean age	0.00	0.02	1.00	(0.97, 1.04)
F-Unemployment	0.58	0.32	1.79	(0.96, 3.34)
M-Unemployment	0.23	0.35	1.25	(0.63, 2.48)
F-Education[b]				
Less than high school	0.40	0.55	1.49	(0.51, 4.34)
High school/GED	−0.39	0.39	0.68	(0.32, 1.45)
Some post-high school	0.19	0.25	1.21	(0.74, 1.96)
M-Education[b]				
Less than high school	−0.61	0.57	0.54	(0.18, 1.67)
High school/GED	−0.16	0.35	0.85	(0.43, 1.69)
Some post-high school	0.20	0.26	1.23	(0.74, 2.03)
F-Race/Ethnicity[c]				
Hispanic/Latina	−0.66	0.38	0.52	(0.25, 1.09)
African American	−0.79	0.87	0.45	(0.08, 2.50)
Asian	0.66	0.51	1.93	(0.71, 5.29)
Multiracial/Other	0.25	0.49	1.29	(0.50, 3.34)
M-Race/Ethnicity[c]				
Hispanic/Latino	0.54	0.35	1.72	(0.86, 3.41)
African American	1.41*	0.63	4.11	(1.20, 14.05)
Asian	0.14	0.57	1.15	(0.37, 3.52)
Multiracial/Other	−0.21	0.47	0.81	(0.32, 2.04)
Couple mean financial strains	0.10	0.18	1.11	(0.78, 1.57)
F-Social disorganization	0.31	0.29	1.36	(0.77, 2.39)
M-Social disorganization	0.38	0.33	1.47	(0.77, 2.79)
F-Impulsivity	0.10	0.16	1.10	(0.80, 1.51)
M-Impulsivity	0.71**	0.14	2.03	(1.55, 2.65)
F-Adverse childhood experiences score	0.18*	0.07	1.19	(1.04, 1.38)
M-Adverse childhood experiences score	0.19*	0.08	1.21	(1.03, 1.43)
F-Intoxication frequency	0.00	0.01	1.00	(0.99, 1.02)
M-Intoxication frequency	0.00	0.01	1.00	(0.99, 1.01)

Block group-level predictors	Coefficient	Standard error	Odds ratio	95%C.I.[a]
Percent African American	−0.03	0.02	0.97	(0.94, 1.01)
Percent Hispanic/Latino	0.00	0.01	1.00	(0.99, 1.02)
Percent below 150% poverty line	0.01	0.01	1.01	(0.99, 1.03)
Off-premise outlet density	−0.06	0.05	0.94	(0.86, 1.03)

Block group-level predictors	Coefficient	Standard error	Odds ratio	95%C.I.[a]
Bar/pub density	−0.09	0.14	0.92	(0.70, 1.20)
Licensed restaurant density	0.01	0.03	1.01	(0.96, 1.07)

Note.

[a] 95% Confidence interval for odds ratio.

[b] Reference category is bachelor's degree or higher.

[c] Reference category is White/non-Hispanic.

* $p < .05$.

** $p < .01$.

Table 5

Multilevel logistic regression results for associations between female-to-male partner violence and couple-, female (F) and male (M) partner-, and block group-level factors (n = 1,753)

Couple- and partner-level predictors	Coefficient	Standard error	Odds ratio	95%C.I.[a]
Couple mean age	−0.02	0.01	0.98	(0.95, 1.01)
F-Unemployment	0.26	0.29	1.30	(0.73, 2.32)
M-Unemployment	0.28	0.29	1.33	(0.75, 2.35)
F-Education[b]				
Less than high school	0.76	0.46	2.14	(0.86, 5.31)
High school/GED	−0.34	0.33	0.71	(0.38, 1.36)
Some post-high school	0.10	0.20	1.10	(0.74, 1.64)
M-Education[b]				
Less than high school	−0.52	0.50	0.60	(0.22, 1.58)
High school/GED	−0.52	0.32	0.59	(0.32, 1.11)
Some post-high school	0.23	0.21	1.26	(0.83, 1.89)
F-Race/Ethnicity[c]				
Hispanic/Latina	−0.38	0.32	0.69	(0.36, 1.29)
African American	−0.01	0.69	1.01	(0.26, 3.92)
Asian	1.17**	0.39	3.22	(1.50, 6.90)
Multiracial/Other	0.56	0.37	1.76	(0.86, 3.61)
M-Race/Ethnicity[c]				
Hispanic/Latino	−0.33	0.34	0.72	(0.37, 1.41)
African American	0.66	0.59	1.93	(0.61, 6.15)
Asian	−0.75	0.52	0.47	(0.17, 1.31)
Multiracial/Other	0.26	0.32	1.30	(0.69, 2.45)
Couple mean financial strains	0.18	0.15	1.19	(0.89, 1.60)
F-Social disorganization	−0.12	0.26	0.89	(0.53, 1.48)
M-Social disorganization	0.07	0.29	1.08	(0.61, 1.90)
F-Impulsivity	0.01	0.14	1.01	(0.77, 1.33)
M-Impulsivity	0.37**	0.12	1.44	(1.14, 1.83)
F-Adverse childhood experiences score	0.20**	0.06	1.23	(1.09, 1.38)
M-Adverse childhood experiences score	0.05	0.08	1.05	(0.91, 1.22)
F-Intoxication frequency	0.01	0.00	1.01	(1.00, 1.01)
M-Intoxication frequency	0.01*	0.00	1.01	(1.00, 1.01)

Block group-level predictors	Coefficient	Standard error	Odds ratio	95%C.I.[a]
Percent African American	−0.02	0.02	0.98	(0.95, 1.01)
Percent Hispanic/Latino	0.00	0.01	1.00	(0.99, 1.02)
Percent below 150% poverty line	0.01	0.01	1.01	(0.99, 1.03)
Off-premise outlet density	−0.06	0.04	0.95	(0.88, 1.02)

Block group-level predictors	Coefficient	Standard error	Odds ratio	95%C.I.[a]
Bar/pub density	0.08	0.09	1.08	(0.91, 1.28)
Licensed restaurant density	0.00	0.02	1.00	(0.96, 1.04)

Note.

[a] 95% Confidence interval for odds ratio.

[b] Reference category is bachelor's degree or higher.

[c] Reference category is White/non-Hispanic.

* $p < .05$.

** $p < .01$.