Published in final edited form as:
Psychol Addict Behav. 2014 September ; 28(3): 734–742. doi:10.1037/a0037302.

Couples' marijuana use is inversely related to their intimate partner violence over the first nine years of marriage

Philip H. Smith,
Department of Community Health and Health Behavior, University at Buffalo, SUNY

Epidemiology and Public Health, Yale University

Gregory G. Homish,
Department of Community Health and Health Behavior, University at Buffalo, SUNY

R. Lorraine Collins,
Department of Community Health and Health Behavior, University at Buffalo, SUNY

Gary A. Giovino,
Department of Community Health and Health Behavior, University at Buffalo, SUNY

Helene R. White, and
Center of Alcohol Studies, Rutgers University

Kenneth E. Leonard
Research Institute on Addictions, University at Buffalo, SUNY

Abstract

Research on the association between marijuana use and IPV has generated inconsistent findings, and has been primarily based on cross-sectional data. We examined whether husbands' and wives' marijuana use predicted both husbands' and wives' IPV perpetration over the first 9 years of marriage (wave 1, n = 634 couples). We also examined moderation by antisocial behavior, the spouse's marijuana use, and whether IPV was reported during the year prior to marriage. These predictive associations were calculated using a time-lagged multivariate generalized multilevel model, simultaneously estimating predictors of husband and wife IPV. In fully adjusted models, we found that more frequent marijuana use by husbands and wives predicted less frequent IPV perpetration by husbands. Husbands' marijuana use also predicted less frequent IPV perpetration by wives. Moderation analyses demonstrated that couples in which both spouses used marijuana frequently reported the least frequent IPV perpetration. There was a significant positive association between wives' marijuana use and wives' IPV perpetration, but only among wives who had already reported IPV perpetration during the year prior to marriage. These findings suggest there may be an overall inverse association between marijuana use and IPV perpetration in newly married couples, although use may be associated with greater risk of perpetration among women with a history of IPV perpetration.

Correspondence regarding this manuscript should be addressed to Philip H. Smith, 2 Church St. South, Suite 109, New Haven, CT 06519. Phone: (203) 737-3554. Fax: (203) 737-4243. philip.h.smith@yale.edu.

Keywords

marijuana; intimate partner violence; marriage; substance use; drug use

Substance abuse and intimate partner violence (IPV) both tend to decline over the transition to marriage (Duncan, Wilkerson, & England, 2006; O'Leary, et al., 1989; Quigley & Leonard, 1996; Thompson & Petrovic, 2009). However, both remain substantially prevalent among married adults (Homish, Leonard, & Cornelius, 2008; Homish, Leonard, & Kearns-Bodkin, 2006; Lawrence & Bradbury, 2007). Further, substance use and IPV are inter-related, with previous research having demonstrated that substance use is both a robust risk factor for, and consequence of, IPV (Chermack & Giancola, 1997; Coker, et al., 2002; El-Bassel, Gilbert, Wu, Go, & Hill, 2005; Leonard & Senchak, 1996; Moore, et al., 2008; Smith, Homish, Leonard, & Cornelius, 2012; Stuart, et al., 2008).

The majority of studies on substance use and IPV over the transition to marriage have focused on alcohol (Heyman, O'Leary, & Jouriles, 1995; Leonard & Senchak, 1996; Quigley & Leonard, 1999; Schumacher, Homish, Leonard, Quigley, & Kearns-Bodkin, 2008) and have not included other commonly used substances, such as marijuana. Research on associations between marijuana use and IPV among general samples of adults has generally been supportive of a significant link (Moore, et al., 2008; Smith, et al., 2012; Stuart, et al., 2008) [see Moore et al. (2005) for a review]. For example, Smith et al. (2012a) found evidence that for adult women in a nationally representative sample, a marijuana use disorder diagnosis was positively associated with IPV perpetration. This association remained significant after adjusting for antisocial behavior and other substance use disorders.

A major limitation of previous research on marijuana use and IPV is that the majority of studies have been cross-sectional (Smith, et al., 2012; Stuart, et al., 2008). When significant associations have been detected, the primary alternative explanation is that perpetrators of IPV in community samples are frequently also victims of IPV (Johnson, 2006; Kelly & Johnson, 2008; Smith, et al., 2012; Whitaker, Haileyesus, Swahn, & Saltzman, 2007), and that substance use, including marijuana use, may be a coping mechanism for victims of IPV (Coker, et al., 2002; El-Bassel, et al., 2005). Thus, it is important to test whether marijuana use is predictive of subsequent IPV. One previous study used longitudinal data from the National Longitudinal Study of Adolescent Health to examine whether marijuana use predicted IPV, and found that consistent marijuana use during the age period of 15–21 years significantly predicted IPV perpetration at age 26, regardless of whether the respondent was also a victim of IPV (Reingle, Staras, Jennings, Branchini, & Maldonado-Molina, 2012). However, this study did not include some potentially important confounding covariates, such as general antisocial behavior.

A second limitation of previous research on marijuana use and IPV is that few studies have assessed moderator variables. Testing only main effect associations may mask significant findings for particular sub-groups. One potentially important moderator is antisocial behavior. Smith et al. (2013) found that marijuana withdrawal was only associated with IPV among those with a history of general (i.e., non-partner) aggression, an important dimension

of antisocial behavior. It is important to point out that a large portion of IPV perpetrated in community samples is likely rooted in factors other than antisocial behavior, such as conflict, and this may be particularly true for women (Johnson, 2006; Kelly & Johnson, 2008). Thus, apart from general antisocial behavior, marijuana use may be differentially associated with IPV perpetration in community samples based on whether the individual has a history of partner aggression, specifically. A third potentially important moderator is the partner's marijuana use. The inter-relation between couples' substance use and its effect on marital functioning has been given attention in the alcohol field (Homish & Leonard, 2007; Leadley, Clark, & Caetano, 2000; Testa, et al., 2012), but has not been extensively studied with regard to marijuana use.

The purpose of the current study was to examine whether frequency of marijuana use by both husbands and wives was predictive of IPV perpetration over the transition to marriage and throughout the early years of marriage. We analyzed data from a community sample of newly married couples, simultaneously assessing both husband and wife marijuana use as predictors of both husband and wife IPV. Further, we examined interactions with antisocial behavior, partner marijuana use, and IPV perpetration during the year prior to marriage. Based on previous findings on general aggression (Reingle, et al., 2012; Smith, et al., 2012; White, Loeber, Stouthamer-Loeber, & Farrington, 1999), we tested the following three hypotheses: 1) that more frequent marijuana use will predict more frequent IPV for the overall sample, prior to and after adjusting for antisocial behavior and other important covariates; 2) that couples in which marijuana use is discordant (i.e., one spouse used marijuana frequently while the other used infrequently), will be at greater risk for IPV perpetration than couples in which marijuana use is concordant (i.e., both spouses used with similar frequency or both did not use); and 3) that marijuana use will predict IPV among those at greatest risk for IPV; namely, those who reported IPV at wave 1, and those with higher scores on antisocial behavior.

Method

Sampling procedure

Details of the study's sampling methodology can be found elsewhere (Leonard & Mudar, 2003). Briefly, participants were recruited as they applied for their marriage license in Buffalo, New York, beginning in 1996 and concluding in 1999. Only those marrying for the first time were invited to participate. Couples were first asked to complete a 5 – 10 minute paid ($10) interview, which assessed sociodemographic characteristics and substance use. A total of 970 couples completed this initial phase. Of these, 70 (7.2%) refused to participate, and 13 did not get married. The remaining 887 couples were given consent forms and identical questionnaires to be completed at home and returned by mail. Each individual was given $40 for participation. Both spouses of 634 couples (71.4%) completed this in-home questionnaire and provided informed consent (wave 1). These couples were also asked to complete follow-up interviews at their first, second, fourth, seventh, and ninth wedding anniversaries (waves 2 through 6), and were given $40 per person for participation at each wave. Follow-up surveys were distributed by mail, separately for husbands and wives. When couples failed to complete a wave of data collection, they were re-contacted at subsequent

waves in order to maximize sample size. All procedures for this study were approved by the Institutional Review Board of the University at Buffalo, SUNY.

Participants

Demographic information for the sample at wave 1 (n = 634) is displayed in Table 1. We maintained 90%, 86%, 84%, 79%, and 71% of the wave 1 couples at waves 2, 3, 4, 5, and 6, respectively. Fifty-six percent of the 634 wives at wave 1 completed all 6 waves of data collection, 21% completed 5 waves, 11% completed 4 waves, 8% completed 3 waves, 5% completed 2 waves, and 5% completed only 1 wave. For husbands, these corresponding figures were: 41%, 17%, 15%, 12%, 6%, and 9%. Among those with non-missing data, the percentages of couples that stayed married at waves 2 through 6 were as follows: 95%, 88%, 78%, 70%, and 65%. For the current investigation, participants who reported any marital status other than married (e.g., divorced, separated) at any given time point (t), were removed from analyses for all times ≥ t. Thus, at each wave only couples who remained married were included and findings from this investigation apply only to those married to their original spouse. Wives who were lost to attrition were younger and less likely to be European American ($p < 0.05$). Husbands lost to attrition were also less likely to be European American ($p < 0.05$). Both husbands and wives who were lost to attrition reported consuming six or more drinks per drinking occasion more frequently during the year prior to marriage than those who remained in the study ($p < 0.05$), although these differences were small. There were no other significant differences between those retained and those lost to attrition.

Measures

Intimate Partner Violence—IPV was measured using the physical assault and injury subscales of the *Conflict Tactics Scale-Revised (CTS-2)* (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). These subscales assess the frequency of specific acts of physical aggression, as well as whether injury occurred during the acts. To identify respondents who reported any IPV perpetration during the year prior to marriage (wave 1), we considered an affirmative response to any of the CTS-2 injury or acts items as evidence of IPV. This was done to capture as many individuals who engaged in IPV as possible. For our measure of IPV frequency, we only included the 12 items assessing specific acts of aggression. These items captured a range of IPV severity; for example, items assessed slapping, beating up, and choking. Given that frequency of IPV was the outcome of interest, including the injury items would have likely resulted in substantial overestimation of IPV frequency.

Participants were first asked how frequently during the past year they engaged in each of the IPV items towards their spouse. Six response options ranged from “zero” to “twenty or more” times. Participants were then asked how frequently they were victims of each of these items. Consistent with previous research (Schumacher, et al., 2008; Straus, 1979; Testa, et al., 2012), responses were recoded to the mean of the range for each category. For example, the category “three to five times during the past year” was re-coded to four. The exception was the category “twenty or more,” which was recoded to twenty-five (to be consistent with Straus, 1979). The values for the 12 items were then summed. Similar to other research (Schumacher, et al., 2008), the variables for husband to wife and wife to husband aggression

were calculated from the maximum frequency reported by either spouse. We reduced the impact of extreme values by Winsor-transforming the IPV outcome variable. This procedure iteratively replaces the most extreme value of a variable with the next most extreme value, up to a proportion of values set by the user. We conducted this procedure for the most extreme 2.5% of values.

Marijuana use—Frequency of marijuana use was assessed at all waves with the following question: "In the past year, how often have you used marijuana or hashish (e.g., pot, weed, reefer, hash, hash oil, grass)?" This question was included in a section that asked about the use of drugs "to get high" and included questions regarding sedatives/tranquilizers, stimulants, hallucinogens, cocaine, and heroin/methadone. Response options ranged from zero to six, representing the following categories: "Not at all," "Once," "A few times," "About once a month," "2–3 times a month," "Once a week," and "More than once a week." Similar to our procedures for the intimate partner violence measure, these responses were re-coded to generate a continuous variable in the units of times per month. This allowed for greater interpretability of modeling estimates for the variable, as each unit increase represented an equal increase of frequency of use (i.e., one time per month). Each category was re-coded as follows: "Not at all" = 0; "Once [per year]" = 1/12 = 0.08, "A few times [per year]" = 3/12 = 0.25; "About once a month" = 12/12 = 1; "2–3 times a month" = 2.5 × 1 month = 2.5; "Once a week" = 1 time per week × 4 weeks per month = 4; "More than once a week" = 3.5 times per week (half-way between one day per week and daily use) × 4 weeks per month = 14.

Antisocial behavior—Antisocial behavior was conceptualized as time-invariant, due to stability over time, and was measured at wave 1 using 28 items from Zucker and Noll's (1980) *Antisocial Behavior Checklist*. This scale measures the frequency of both childhood and adult antisocial behaviors on a four-point scale (1= never, 4 = often or more than ten times). Respondents were prompted to respond whether they had ever done any of a list of activities, and asked how often these activities occurred. Examples of activities included skipping school, taking part in a gang fight, lying to parents, and taking part in a robbery. These items demonstrated good internal consistency (Cronbach's alpha = 0.90 for husbands and 0.86 for wives) in our sample.

Covariates—Our selection of covariates included variables associated with IPV and marijuana use in previous studies. Given previous research linking alcohol use to IPV (Leonard & Senchak, 1996), and the common co-abuse of alcohol and marijuana (Stinson, Ruan, Pickering, & Grant, 2006), we included the *Alcohol Dependence Scale* in our analyses (Skinner & Allen, 1982). This is a 25-item measure that addressed loss of behavioral control, psycho-perceptual withdrawal symptoms, psychophysical withdrawal symptoms, and obsessive drinking style – four key dimensions of problematic drinking (alpha = 0.82–0.98 for wives; 0.79–0.99 for husbands). We also included household income, current employment status, and education in our models because of correlation of both marijuana use and IPV with SES (Cunradi, Caetano, & Schafer, 2002; Stinson, et al., 2006). We coded education based on whether (coded 1) or not (coded 0) the respondent had education beyond high school. Household income was broken down into 7 categories, ranging from less than

$10,000 per year to $75,000 or more per year. We entered this ordinal variable into models as continuous. Employment status was entered into the models as a binary variable, coded to whether the respondent was employed at least part time (coded1) or not (coded 0). The correlations among these SES variables were not high enough to indicate that multicollinearity would be a problem (maximum r = 0.58). We also included age in models when adjusting for covariates. Alcohol Dependence, household income, and current employment status were entered into models as time-varying, while education and age were entered as time-invariant, based on wave 1 data.

Overview of Analyses

We conducted all analyses using Stata version 12.1 (StataCorp, 2011). For modeling, we used a generalized multilevel framework (Hox, 2002; Raudenbush & Bryk, 2002). We selected this approach to account for non-independence in the data, which resulted from correlation within individuals over time as well as within couples. This approach is also valid for data in which measurement intervals vary (in this study, from 1 to 3 years; Kwok, et al., 2008). We utilized a two-level multivariate model, as this approach was most parsimonious (Raudenbush, Brennan, & Barnett, 1995). Importantly, this model allowed us to examine both husband and wife predictors and outcomes within the same model (Cook & Kenny, 2005). We specified a Poisson family distribution and a log link function, accounting for the count distribution of the IPV frequency outcome (Table 1). This decision was based on previous evidence suggesting that the generalized Poisson model is well-suited for handling count data with a heavily right-skewed distribution (Joe & Zhu, 2005). The variable for husbands' IPV perpetration at wave 1, for example, ranged from 0 to 181 times per year, with a mean of 4.0 and SD of 13.7 (62.9% zeros). We used full-maximum likelihood estimation, which allows participants with data from at least one time-point (waves 1 through 6; n = 634 couples) to remain in the model.

All time-varying predictor variables were lagged by one time-point. In other words, models were set up so that marijuana use at time = t_j was predicting IPV at time = t_{j+1}. The frequency of marijuana use variables and the antisocial behavior variables were standardized prior to analyses. All adjustment variables were mean centered to improve the interpretability of model intercepts. We calculated a series of three models. The first model estimated associations between husband and wife marijuana use and husband and wife IPV perpetration frequency, adjusted only for time. In the second model we added all adjustment variables to the model. In the third model we added the following interaction terms, for the prediction of husband to wife IPV perpetration: 1) husband marijuana use X husband antisocial behavior, 2) husband marijuana use X wife marijuana use, and 3) husband marijuana use X husband wave 1 IPV perpetration. We also added the following interactions for the prediction of wife to husband IPV: 1) wife marijuana use X wife antisocial behavior, 2) wife marijuana use X husband marijuana use, and 3) wife marijuana use X wife wave 1 IPV. We eliminated non-significant interaction terms from our final model, based on a Sidak-corrected p-value cut-off of 0.017. We made a final selection of adjustment variables based on a p-value cut-off of 0.05. We probed significant interactions by examining simple slopes for the variable of interest at low and high values of the moderator. When examining spousal marijuana use and antisocial behavior as moderators, due to the skewed distribution

of these variables, we probed significant interactions at the mean (low frequency of use and low antisocial behavior), and mean + 3 or 2 SD for frequency of use and antisocial behavior, respectively (based on the extent of skewness for each variable).

Results

At wave 1, 37.1% of husbands perpetrated IPV, with an average frequency of 4.0 times per year (SD = 13.7) for the overall sample (Table 1). Wives were more likely to report any IPV perpetration (43.1%), and reported doing so significantly more frequently than husbands (mean = 5.1 times per year; SD = 14.4; $p < 0.001$). Twenty-eight percent of husbands reported any marijuana use during the past year, with an average frequency of 0.4 times per month (SD = 1.1). Wives were significantly less likely than husbands to report marijuana use, and used significantly less frequently (22.7% used at all, mean = 0.2 times per month, SD = 0.8; $p < 0.001$).

Hypothesis 1: More frequent marijuana use will predict more frequent IPV perpetration

Multilevel modeling results for husband to wife IPV are displayed in Table 2. We estimated the prediction of both husbands' and wives' IPV perpetration simultaneously in a multivariate model; however, we elected to present results for these two outcomes separately due to table size limitations. Prior to adjusting for covariates, neither husbands' nor wives' marijuana use significantly predicted husbands' frequency of IPV perpetration. After adjusting for covariates, both husbands' and wives' more frequent marijuana use predicted less frequent husband-to-wife IPV perpetration ($p < 0.05$). A 1 SD increase in husbands' frequency of marijuana use predicted 5% lower frequency of IPV perpetration, and every 1 SD increase in wives' frequency of use predicted 6% lower frequency of perpetration. As displayed in Table 3, more frequent marijuana use by husbands also predicted less frequent IPV perpetration by wives, both before and after adjusting for covariates ($p < 0.05$). After adjusting for covariates, a 1 SD increase in husbands' marijuana use frequency predicted 8% fewer incidents of wives' past-year IPV perpetration. The association between wives' frequency of marijuana use and wives' IPV perpetration was non-significant, both before and after adjusting for covariates. Thus, hypothesis 1 was not supported. We found that more frequent marijuana use generally predicted less (rather than more) frequent perpetration of IPV.

Hypothesis 2: Couples with concordant use patterns will be at lower risk for IPV than couples with discordant use patterns

We hypothesized that discordant marijuana use patterns (couples in which one spouse used more frequently than the other), would predict IPV perpetration more strongly than concordant use patterns (couples in which frequency of use was similar between spouses). This was examined by testing interactions between husbands' and wives' reported frequency of marijuana use (times per month), in the prediction of IPV perpetration, and using simple slope analyses to examine frequency of IPV perpetration at the mean for one spouse and mean + 3SD for the corresponding spouse. Results from these moderation analyses are presented in Table 2 (for husbands' IPV perpetration) and Table 3 (for wives' IPV perpetration).

Husbands' and wives' marijuana use significantly interacted to predict husbands' IPV perpetration [$p < 0.017$ (Sidak-corrected critical p-value)]. This interaction is depicted in Figure 1. As the frequency of wives' marijuana use increased, the protective association between husbands' marijuana use and IPV perpetration became stronger, such that couples in which both spouses used marijuana frequently were at the lowest risk for subsequent husband-to-wife IPV.

Husbands' and wives' marijuana use also significantly interacted to predict wives' IPV perpetration ($p < 0.017$). This interaction is displayed in Figure 2. The interpretation is the same as that for husbands' IPV perpetration. The negative association between wives' marijuana use and their IPV perpetration was strongest when husbands used marijuana frequently. Thus, the couples at lowest risk for wife-to-husband IPV perpetration were those in which both spouses used marijuana frequently. Overall, our second hypothesis was partially supported. Couples in which both spouses used marijuana frequently (i.e., the couple was concordant for use) were at the lowest risk for IPV perpetration, which supported the hypothesis. However, more frequent marijuana use by husbands and wives predicted less frequent IPV perpetration, even when the spouse used infrequently (i.e., the couple was discordant for use), which did not support the hypothesis.

Hypothesis 3: More frequent marijuana use will be most strongly associated with IPV perpetration among those at greatest risk

We predicted that marijuana use will be most strongly associated with IPV perpetration for the following groups: 1) those who perpetrated IPV during the year prior to marriage, and 2) those with high antisocial behavior scores. The results from these moderation analyses are displayed in Table 2 (for husbands' IPV perpetration) and Table 3 (for wives' IPV perpetration). Regarding husbands' IPV perpetration, neither interaction was statistically significant ($p > 0.017$). When predicting wives' IPV perpetration, wives' marijuana use frequency significantly interacted with both their wave 1 IPV perpetration and their antisocial behavior score. These interactions are depicted in Figure 3 (wave 1 IPV perpetration) and Figure 4 (antisocial behavior). Wave 1 IPV perpetration moderated the association, such that greater frequency of marijuana use was inversely associated with IPV perpetration among women with who did not commit IPV at wave 1 (in the year prior to marriage), but positively predicted perpetration among women who did perpetrate IPV at wave 1. When examining moderation by antisocial behavior, results showed an inverse association between marijuana use frequency and IPV perpetration regardless of antisocial behavior, with the strongest association among those who scored low on antisocial behavior. Thus, hypothesis 3 was only supported for women, when considering moderation by wave 1 IPV perpetration. Otherwise, more frequent marijuana use predicted less frequent IPV perpetration.

Discussion

In this community sample of newly married couples, more frequent marijuana use generally predicted less frequent IPV perpetration, for both men and women, over the first 9 years of marriage. Moderation analyses provided evidence that couples in which both spouses used

marijuana frequently were at the lowest risk for IPV perpetration, regardless of the perpetrator's gender. There was one exception to this general pattern: wives' marijuana use predicted more frequent wife-to-husband IPV perpetration among wives who had perpetrated IPV during the year prior to marriage.

There has been little previous research on this topic with which to compare these findings. Further, previous studies have been conducted using widely varying samples and methods, making cross-study comparisons difficult. For example, using data from a nationally representative sample of adolescents, Reingle et al. (2012) found that marijuana use during adolescence predicted IPV perpetration during adulthood (approximately 10 years later). These findings run contrary to the current investigation; however, this may be entirely due to differences in sampling and methodologies. For example, there was a substantially greater lapse of time between surveys in Reingle et al. (10 years), compared to 1–3 years in the current study, and marijuana use was measured in adolescence in the Reingle et al. study vs. young adulthood in this study.

There are several possible reasons why we may have observed a protective association between marijuana use and IPV perpetration in the current investigation. Among experienced users, marijuana may enhance positive affect (Hart, et al., 2010), which in turn could reduce the likelihood of conflict and aggression. In addition, previous research has found that chronic users exhibit blunted emotional reaction to threat stimuli, which may also decrease the likelihood of aggressive behavior (Gruber, Rogowska, & Yurgelun-Todd, 2009). However, it should be noted that data were not collected at the event-level, and we did not have information on the context of marijuana use. As a result, while our study would be consistent with this effect, it does not address it directly. The fact that we found the strongest protective effect among couples in which both spouses used marijuana frequently, is of interest. This, too, may reflect an acute effect. However, it is possible that, similar to a drinking partnership, couples who use marijuana together may share similar values and social circles, and it is this similarity that is responsible for reducing the likelihood of conflict. These explanations are speculative, and further research is needed to elucidate whether associations between marijuana use and IPV perpetration are driven by cultural factors, relationship-dynamics, altered affective responses, or other factors.

It is important to note that even "frequent" marijuana use in this sample was relatively infrequent – participants reported a maximum usage of once per week. It is unclear how findings may have differed in a sample in which marijuana use is more frequent (e.g., multiple times per week/day). More attention is also needed to examine if and why marijuana use may be a risk factor for continued IPV perpetration among women who act aggressively towards their partners prior to marriage. One previous study found a stronger association between marijuana use and IPV perpetration among women than men (Smith, et al., 2012). However, the study was cross-sectional and did not examine prior IPV perpetration as a moderator, making it difficult to draw conclusions about whether findings from the current investigation are replicable.

Limitations

There were important limitations in this study, which should be taken into account when interpreting findings. The measure of marijuana use was based on a single frequency item. This measure did not include other potentially important dimensions of use, including abuse, dependence, withdrawal, or usual quantity. This is potentially important given that previous studies have found associations between marijuana abuse/dependence and IPV perpetration, as well as marijuana withdrawal and IPV perpetration (Smith, Homish, Leonard, & Collins, 2013; Smith, et al., 2012). Nevertheless, previous studies of marijuana use and aggression have been based on a single frequency measure (e.g., Wei et al., 2004; White et al., 1999). There are also limitations to the generalizability of the findings as a result of sampling newly married, heterosexual couples who were marrying for the first time. It is unclear whether these results would be replicated in same-sex couples, re-married couples, dating couples, or couples who had been married for a longer time period. Furthermore, with the trend toward marijuana decriminalization in the U.S. and potentially more positive attitudes toward its use, more research is needed to determine whether these results would hold in a sample of current newlyweds.

Conclusions

Despite these limitations, this investigation utilized longitudinal data collected over 9 years, from both members of the couples, and is thus strong in methodology relative to existing research on this topic. The finding that couples' marijuana use generally predicted less frequent IPV perpetration, and that couples in which both spouses frequently used marijuana were at the lowest risk for IPV perpetration, has potentially important public health implications. However, replication and elaboration of this finding is needed before drawing more substantive conclusions.

Acknowledgments

The research for this article was supported the National Institute on Drug Abuse (R36-DA031996; PI: Smith), and the National Institute on Alcohol Abuse and Alcoholism (R37-AA09922; PI: Leonard).

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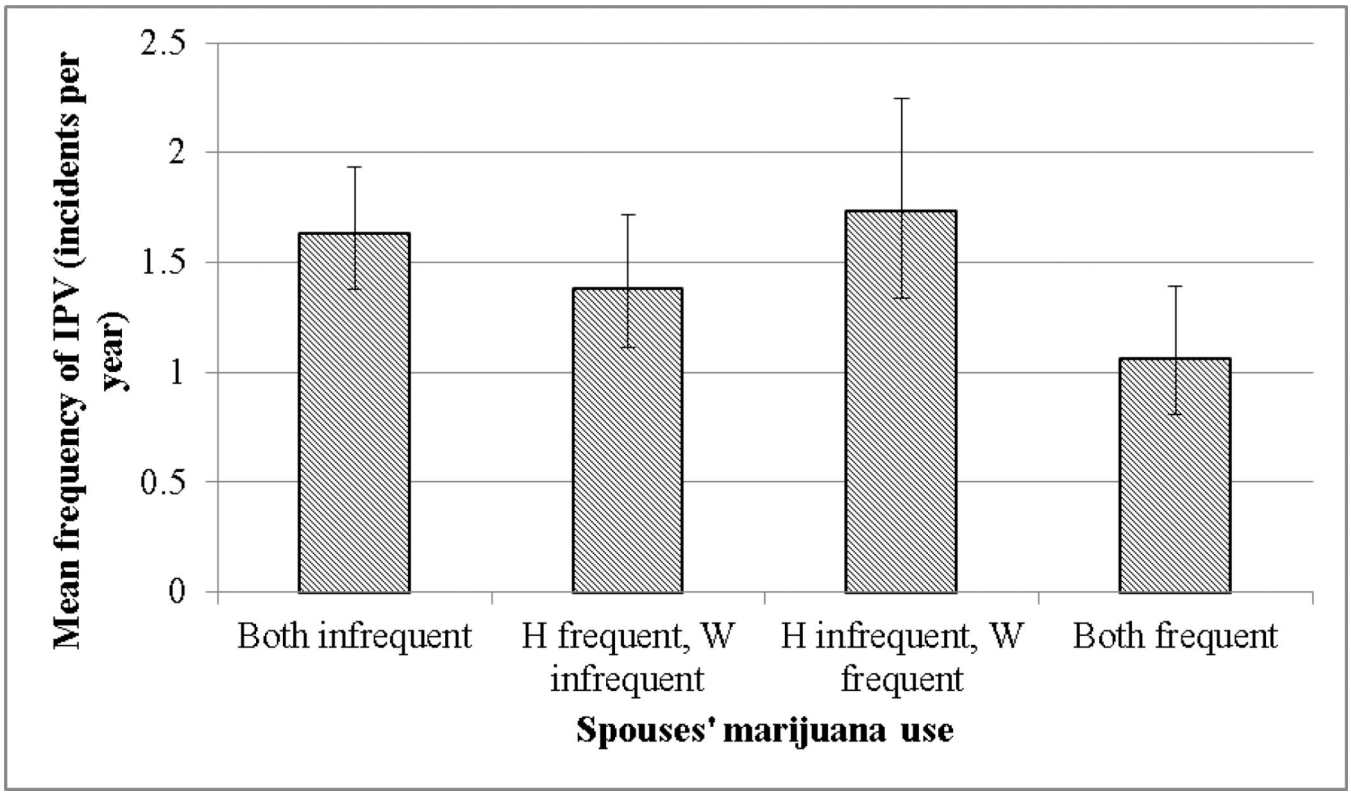

Figure 1.

The interaction between husbands' (H) and wives' (W) marijuana use in the prediction of husbands' IPV perpetration. Intercepts and slopes were calculated using a generalized multivariate multilevel model, specifying a Poisson distribution and log link function. Estimates were adjusted for time, income, education, age, and race. All covariates were mean centered. Infrequent marijuana use = mean, frequent marijuana use = mean + 3SD. Error bars represent 95% confidence intervals.

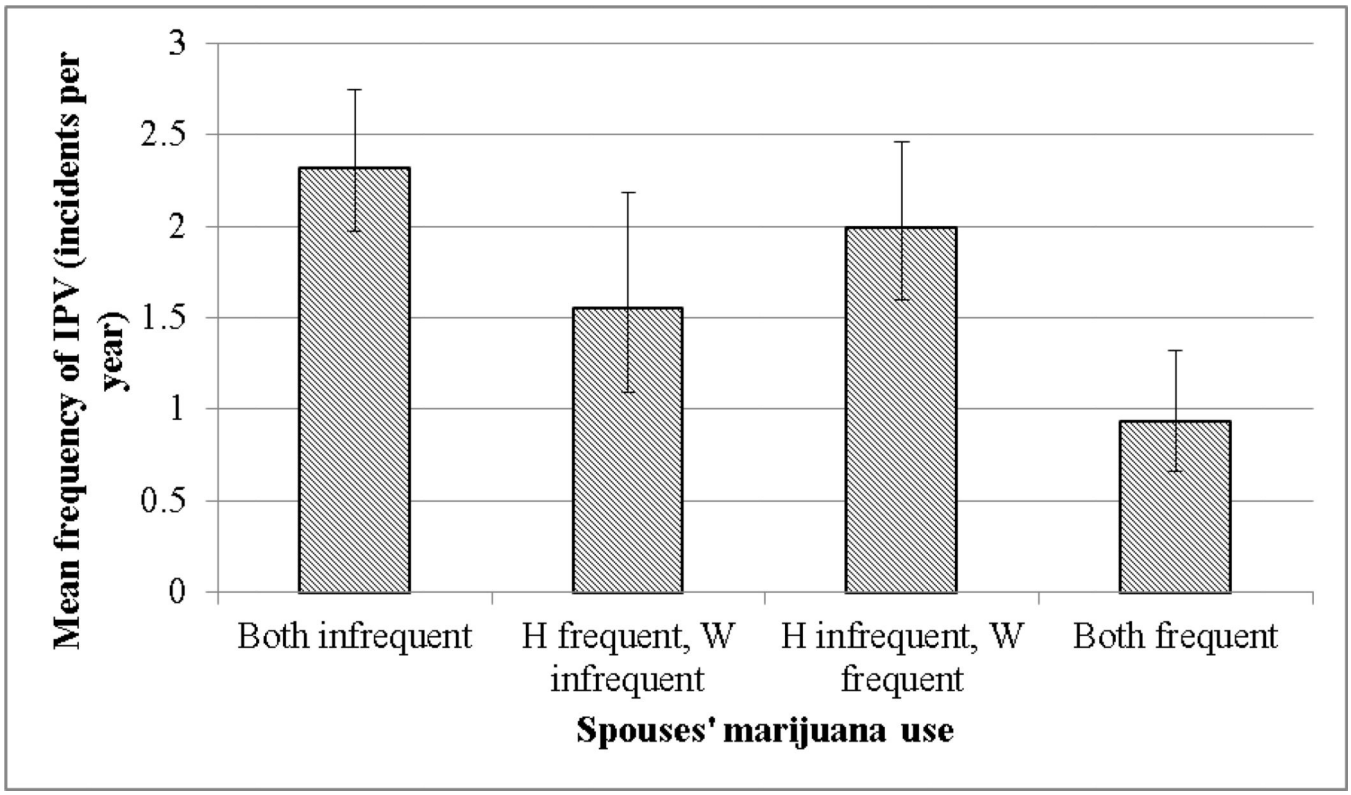

Figure 2.

The interaction between husbands' (H) and wives' (W) marijuana use in the prediction of wives' IPV perpetration. Intercepts and slopes were calculated using a generalized multivariate multilevel model, specifying a Poisson distribution and log link function. Estimates were adjusted for time, employment status, education, age, race, the interaction between wives' marijuana use and wives' antisocial behavior, and the interaction between wives' marijuana use and wives' IPV perpetration at wave 1. All covariates were mean centered. Infrequent marijuana use = mean, frequent marijuana use = mean + 3SD. Error bars represent 95% confidence intervals.

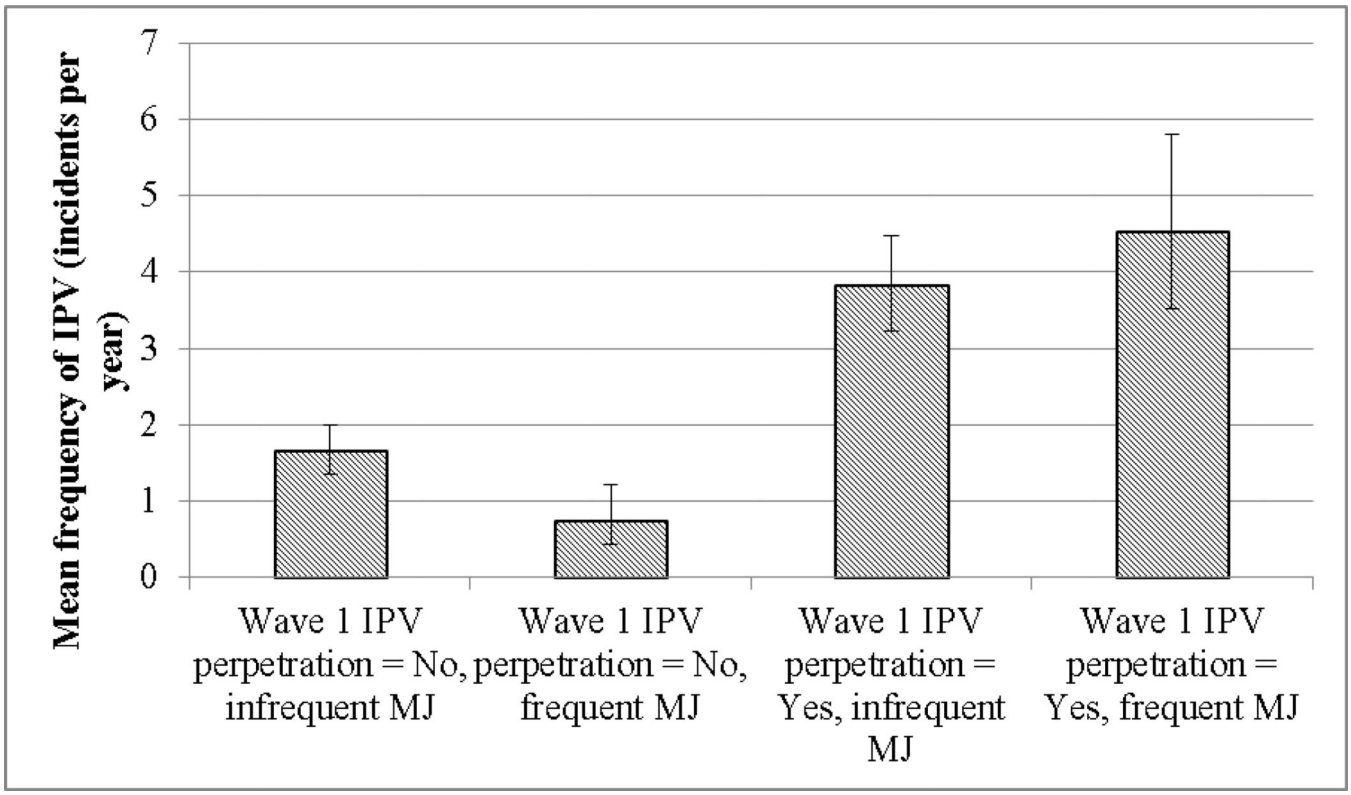

Figure 3.

The interaction between wives' marijuana use and whether wives' perpetrated IPV during the year prior to marriage in the prediction of wives' IPV perpetration. Intercepts and slopes were calculated using a generalized multivariate multilevel model, specifying a Poisson distribution and log link function. Estimates were adjusted for time, employment status, education, age, race, the interaction between husbands' and wives' marijuana use, and the interaction between wives' marijuana use and wives' antisocial behavior. All covariates were mean centered. Infrequent marijuana use = mean, frequent marijuana use = mean + 3SD. Error bars represent 95% confidence intervals.

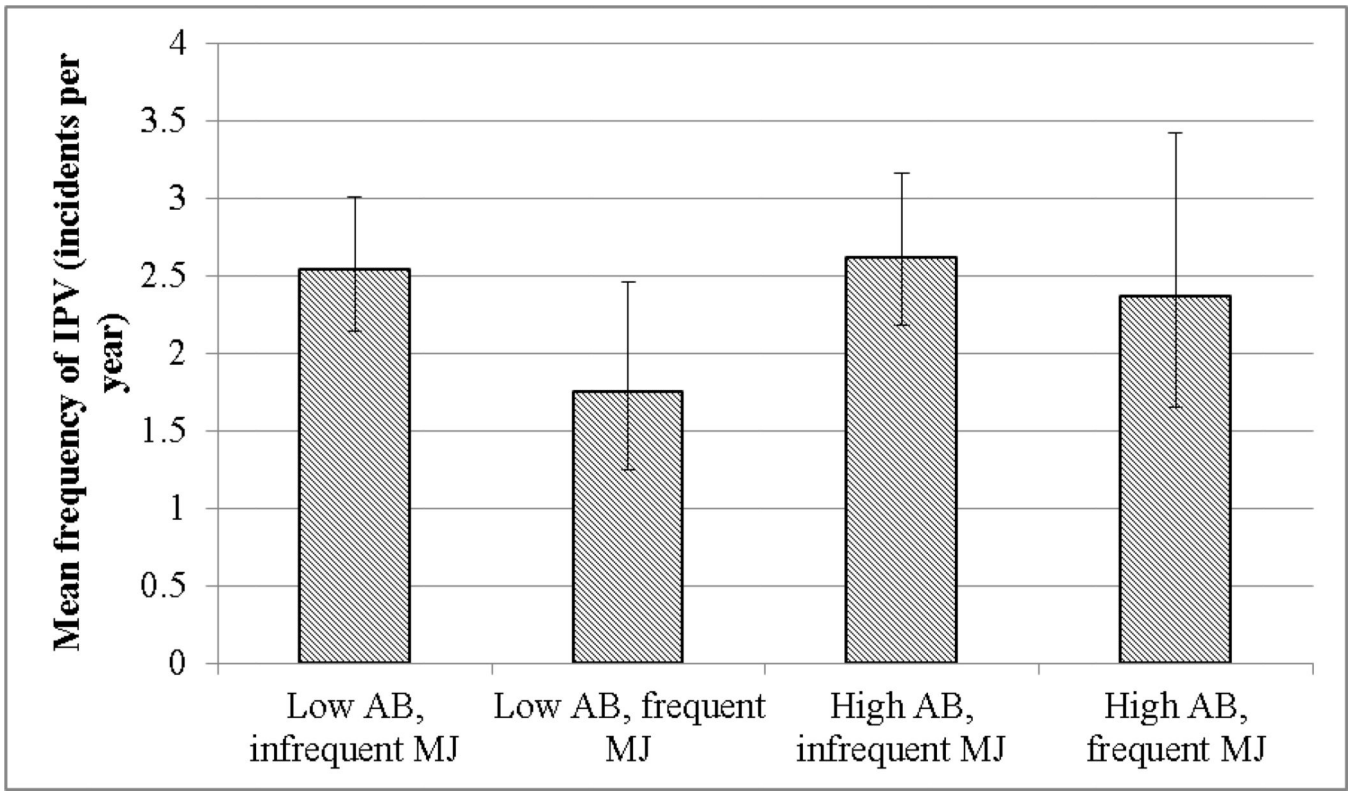

Figure 4.

The interaction between wives' marijuana use frequency (MJ) and antisocial behavior (AB) in the prediction of wives' IPV perpetration. Intercepts and slopes were calculated using a generalized multivariate multilevel model, specifying a Poisson distribution and log link function. Estimates were adjusted for time, employment status, education, age, race, the interaction between husbands' and wives' marijuana use, and the interaction between wives' marijuana use and wives' IPV perpetration at wave 1. All covariates were mean centered. Infrequent marijuana use = mean, frequent marijuana use = mean + 3SD. Low AB = mean, High AB = mean + 2SD. Error bars represent 95% confidence intervals.

Table 1

Husbands' and wives' IPV, marijuana use, antisocial behavior, and alcohol dependence at Wave 1 (n = 634 couples)

	Wives					Husbands					P-value[b]
	%	Mean	SD	Range	% Zero	%	Mean	SD	Range	% Zero	
Age	---	26.8	5.8	17, 50	---	---	28.7	6.3	18,69	---	< 0.001
Race		---	---	---	---		---	---	---	---	0.617
European American	62.0					59.3					
African American	31.2					33.3					
Other	6.8					7.4					
Education		---	---	---	---		---	---	---	---	< 0.05
≤ HS	30.9					36.5					
> HS	69.1					63.5					
Current employment											<0.001
Unemployed	24.8					10.6					
Employed part or full time	75.2					89.4					
Income	---	2.8	1.5	1, 9	---	---	2.2	1.3	1, 9	---	< 0.001
Frequency of IPV perpetration (times per year)		4.0	13.7	0, 181	62.9		5.14	14.4	0, 147.5	52.9	< 0.001
Frequency of marijuana use (times per month)[a]		0.23	0.81	0, 4	77.3		0.41	1.09	0,4	71.6	< 0.01
AB Checklist Score (lifetime behaviors)		0.4	0.3	0, 2.8	---[a]		0.5	0.4	0, 2.6	---[a]	< 0.001
Alcohol Dependence Scale score (past year symptoms)		2.5	3.4	0, 32	32.2		3.3	4.2	0, 36	26.0	< 0.001

Note: AB = Antisocial Behavior, HS = High school, IPV = intimate partner violence.

[a] Not applicable – non-count continuous variable

[b] Significance for difference between husbands and wives calculated using chi-square tests for categorical variables, t-tests for continuous variables, and Wilcoxon rank sum tests for count variables.

Table 2

Unadjusted and adjusted predictive associations between husband and wife marijuana use and husband perpetrated IPV, including interaction effects

	Model adjusted for time only IRR (95% CI)	Fully adjusted model IRR (95% CI)	Fully adjusted model with interactions IRR (95% CI)
Intercept	3.09 (2.60, 3.67)***	1.37 (1.11, 1.68)**	1.39 (1.13, 1.70)**
Time	0.88 (3.48, 3.67)***	0.93 (0.89, 0.96)***	0.92 (0.89, 0.96)***
H Income	---	0.89 (0.86, 0.93)***	0.90 (0.86, 0.93)***
H Employment Status		NS	NS
Employed full/part time		---	---
Unemployed		---	---
H Alcohol dependence	---	NS	NS
H Education	---		
≤ HS		Ref.	Ref.
> HS		1.15 (1.04, 1.28)**	1.17 (1.05, 1.30)**
H age	---	0.99 (0.98, 1.00)**	0.98 (0.97, 0.99)**
H race			
European American		Ref.	Ref.
African American		1.32 (1.09, 1.60)**	1.32 (1.09, 1.59)**
Other		0.92 (0.74, 1.15)	
H frequency of marijuana use[a]	0.97 (0.93, 1.01)	0.95 (0.91, 0.99)*	0.94 (0.90, 0.99)*
W frequency of marijuana use[a]	0.97 (0.93, 1.01)	0.94 (0.90, 0.99)*	1.02 (0.96, 1.08)
H antisocial behavior[a]	---	1.14 (1.09, 1.20)***	1.16 (1.11, 1.22)***
H IPV perpetration at baseline	---		
No		Ref.	Ref.
Yes		2.15 (1.88, 2.44)***	2.16 (1.90, 2.46)***
H marijuana use X H antisocial behavior	---	---	NS
H marijuana use X W marijuana use	---	---	0.97 (0.94, 0.99)**
H marijuana use X H baseline IPV perpetration	---	---	NS

Note: H = Husband, W = Wife. NS = non-significant, removed from final model. For interaction terms, significance based on a Sidak adjusted critical p-value of 0.017. Estimates were calculated using a generalized multivariate multilevel model, specifying a Poisson distribution and log link function. Predictors of H and W IPV were assessed simultaneously in multivariate models; however, results are presented separately in Tables 2 and 3.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

All covariates were mean centered, with the exception of race.

[a] Estimates based on standardized variable

Table 3

Adjusted predictive associations between husband and wife marijuana use and wife perpetrated IPV, including interaction effects

	Model adjusted for time only IRR (95% CI)	Fully adjusted model IRR (95% CI)	Fully adjusted model with interactions IRR (95% CI)
Intercept	4.13 (3.48, 4.90)***	2.07 (1.67, 2.58)***	1.96 (1.59, 2.42)***
Time	0.86 (0.84, 0.89)***	0.82 (0.79, 0.84)***	0.85 (0.83, 0.96)***
W Income	---	1.05 (1.00, 1.10)*	NS
W Employment Status	---		
Employed full/part time		Ref.	Ref.
Unemployed		1.20 (1.09, 1.32)***	1.15 (1.05, 1.26)**
W Alcohol dependence	---	NS	NS
W Education	---		
≤ HS		Ref.	Ref.
> HS		1.26 (1.13, 1.41)***	1.30 (1.16, 1.44)***
W age	---	0.98 (0.97, 0.99)**	0.98 (0.97, 0.99)**
W race	---		
European American		Ref.	Ref.
African American		1.33 (1.10, 1.61)**	1.31 (1.08, 1.58)**
Other		1.10 (0.88, 1.37)	1.07 (0.86, 1.33)
W frequency of marijuana use[a]	1.01 (0.97, 1.05)	1.03 (0.98, 1.07)	0.77 (0.66, 0.89)***
H frequency of marijuana use[a]	0.92 (0.88, 0.96)***	0.92 (0.88, 0.96)***	0.95 (0.91, 0.99)*
W antisocial behavior[a]	---	0.98 (0.94, 1.02)	0.98 (0.94, 1.03)
W IPV perpetration at baseline	---		
No		Ref.	Ref.
Yes		2.26 (1.95, 2.62)***	2.31 (1.99, 2.67)***
W marijuana use X W antisocial behavior	---	---	1.05 (1.02, 1.08)**
W marijuana use X H marijuana use	---	---	0.96 (0.94, 0.98)**
W marijuana use X W baseline IPV perpetration	---	---	1.39 (1.20, 1.62)***

Note: H = Husband, W = Wife. NS = non-significant, removed from final model. For interaction terms, significance based on a Sidak adjusted critical p-value of 0.017. Estimates were calculated using a generalized multivariate multilevel model, specifying a Poisson distribution and log link function. Predictors of H and W IPV were assessed simultaneously in multivariate models; however, results are presented separately in Tables 2 and 3.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

All covariates were mean centered, with the exception of race.

[a] Estimates based on standardized variable