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Alcohol-Related Crimes And Risk Of Arrest For Intimate Partner Violence Among California Handgun Purchasers

DOI: 10.1377/hlthaff.2019.00608
HEALTH AFFAIRS 38,
NO. 10 (2019): 1719–1726

ABSTRACT **Intimate partner violence is a major public health problem in the US. Both firearms and alcohol have been documented to contribute to the risk and severity of this violence. Yet there has been little research examining the nexus of the two risk factors. This study sought to determine whether alcohol-related problems, as indicated by a history of conviction for offenses such as driving under the influence (DUI), were associated with risk for future intimate partner violence among authorized purchasers of handguns in California. Using a longitudinal cohort design, we found that purchasers with prior DUI convictions (and no other criminal history) had close to three times the risk of subsequent arrest for an intimate partner violence offense than did those with no criminal history at the time of the index firearm purchase. The regulation of firearm ownership among people with alcohol use problems may represent an important opportunity to reduce intimate partner violence and the escalation of firearm-related harm.**

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Intimate partner violence—physical, sexual, or psychological harm by an intimate partner—is a major public health problem in the United States.[1] Nearly one in four women report having experienced violence at the hands of their domestic partners,[2] and more than half of female homicides are related to intimate partner violence.[3,4] Apart from the direct and acute harm caused by this violence, it is also associated with a range of physical and mental health problems arising from prolonged stress.[5]

Firearms And Intimate Partner Violence

Firearms figure prominently in the risk and severity of intimate partner violence. Its victims are more than five times as likely to be killed if their abuser has access to firearms,[6] and over half of all intimate partner homicides in the US are committed with firearms.[7] It has also been linked to mass violence: The majority of mass shootings (defined as events in which four or more people are fatally shot) and one in five public mass shootings (events in which four or more people are fatally shot in a public location) are precipitated by a domestic dispute.[8]

Firearms also cause pervasive nonfatal intimate partner injury and psychological harm. Firearm ownership is associated with an increased likelihood that an abuser will threaten a partner with a gun,[9] and a firearm in the home is associated with an increased likelihood that an abuser will use the gun against a partner. Survey estimates suggest that close to 1.0 million US women have been shot at by an intimate partner at some point in their lives, and approximately 4.5 million women in the US have been bullied or coerced with a firearm by an intimate partner.[10,11]

Alcohol Use And Intimate Partner Violence

It is also well established that alcohol use, particularly heavy use and binge drinking, contributes to the risk and severity of violence in general and intimate partner violence in particular. Studies suggest that over a third of abusive partners have significant alcohol problems,[12] and US female victims of intimate partner violence report their partner to have been drinking before an assault in close to 30 percent of reported incidents.[13] Alcohol-consuming perpetrators are significantly more likely to cause substantial physical injury to their partners, relative to sober perpetrators.[12] Indeed, in the majority of documented intimate partner homicides, the perpetrators were identified as having been under the influence of substances (including alcohol) when the crime occurred.[14] Studies have also documented a population-level relationship between alcohol availability and use and intimate partner violence, finding that the price of alcohol is negatively associated with the risk of violence against female intimate partners: A 1 percent increase in the price of alcohol is estimated to decrease the probability of being a female victim of spousal abuse by 5 percent.[15]

Federal And State Regulation

Federal law prohibits firearm ownership by people convicted of domestic violence misdemeanors or subject to final domestic violence restraining orders (DVROs), and many states have adopted laws to more comprehensively restrict access to firearms among domestic abusers.[16,17] However, there is no federal restriction on firearm purchase or possession by people who abuse alcohol. Thirty-seven states have enacted some express firearm prohibition for people who abuse alcohol,[18] yet in many cases, the statutes do not include precise disqualifying criteria that would allow authorities to operationalize enforcement.[19] The most common restrictions involve prohibiting firearm access while intoxicated, restricting the sale or transfer of firearms to an intoxicated person, or prohibiting carrying or using firearms while intoxicated.[20] The criteria for determining "intoxication" vary, with some jurisdictions stating explicit blood alcohol thresholds, for example, and others leaving the definition vague.[18,20] A handful of states (Indiana, Maryland, and Pennsylvania) and the District of Columbia use previous alcohol-related offenses, the subject of this article, as a criterion for identifying people with a serious alcohol problem.[19]

In 2013 California legislators passed SB-755, a ten-year prohibition on firearm purchase or possession by people who had accrued two or more driving under the influence (DUI) convictions within a three-year period. However, the bill was vetoed by Gov. Jerry Brown (D), who cited a lack of evidence linking "crimes that are non-felonies, nonviolent and do not involve misuse of a firearm" to subsequent violent and firearm crime.[21] New legislation was introduced in January 2019 (SB-55) that would apply the same ten-year prohibition to people "convicted of 3 or more specified offenses in a 10-year period related to driving under the influence of alcohol."[22] The bill's champion, Hannah-Beth Jackson (D–Santa Barbara),[23] cited a 2018 study from the UC Davis Violence Prevention Research Program that examined a sample of approximately 4,000 handgun purchasers in California in 1977 and found that those with prepurchase alcohol-related convictions had elevated risks of subsequent violent crime arrests.[18] While this research provides preliminary evidence linking DUI history with subsequent violence, the study had a relatively small sample size, relied on purchase data that were more than forty years old, and did not examine intimate partner violence specifically.

In the present study, using a longitudinal design with a cohort population of more than 75,000, we aimed to determine whether and to what extent alcohol-related problems, as indicated by a history of convictions for alcohol-related offenses such as DUI, are associated with risk for future intimate partner violence among authorized handgun purchasers in California. Given evidence that people who consume alcohol are at increased risk of violence, and intimate partner violence in particular, regulating firearm access may afford an important public health opportunity to reduce the risk and severity of that violence.

Study Data And Methods

Details of the study design and methods can be found in our study protocol[24] and forthcoming work[25] examining the association between alcohol-related offenses and subsequent firearm crime and violent crime broadly. This article builds on the work of Rose Kagawa and colleagues[25] by examining intimate partner violence specifically. We summarize key elements of the study design and methods below.

STUDY POPULATION We employed a retrospective longitudinal design based on a cohort of 79,988 people ages 21–49 who legally purchased a handgun in California in 2001. The legal age of purchase is 21; the upper age bound was selected based on the well-documented finding that criminal behavior declines with age, even among

the criminally active—with the most pronounced drop occurring after age 50.[26,27] A cohort of 2001 handgun purchasers was chosen to allow for an extended postpurchase observation period. Sales volume in 2001 was comparable to that in the years before and after (1996–2006), as was the demographic composition of the purchaser group.[24] The cohort of handgun purchasers was identified using the California Department of Justice Dealer's Record of Sale database, which retains information on all legal handgun transfers in the state dating back to 1996.

Importantly, the cohort comprised authorized handgun purchasers and therefore did not include people who were prohibited by federal or state law from purchasing a firearm in 2001. California prohibits people convicted of violent misdemeanors from purchasing firearms for ten years following the conviction and prohibits firearm purchase among people with temporary DVROs. Relevant federal bans include prohibitions on purchase by people convicted of domestic violence misdemeanors or subject to final DVROs.

We captured outcome events beginning ten days after the recorded purchase date (the first day on which the handgun could have been acquired by the purchaser, given California's ten-day waiting period). For people with more than one purchase in the year, we took the first purchase as the "index" purchase. We followed the cohort through December 31, 2013, or until a date when public records indicated that the subject was deceased or we could no longer identify the subject as a California resident. We chose a study end date of 2013, two years prior to when we began to acquire data, to ensure reliability in the criminal records.

We used California Death Statistical Master File records to identify deaths. We relied on California voter registration and California Automated Firearms System records to verify residence in state after the 2001 index purchase and LexisNexis Public Records, which aggregate a number of public sources such as tax assessor records, to locate people unaccounted for in the death and voter registration files.

EXPOSURE Our primary exposure of interest was whether the purchaser had a DUI conviction before the 2001 index purchase. While both arrests and convictions for alcohol-related offenses serve as indicators of risky alcohol use, we focused on convictions because of their potential to operate as a criterion for policy aiming to restrict firearm access among people with a history of risky alcohol use. Secondary exposures included DUI arrest and arrest, conviction, or both for other alcohol-related offenses such as public drunkenness. We also examined the number of DUI convictions (one versus two or more).

Pre- and postpurchase criminal histories, including DUI events, were obtained via deterministic and probabilistic linking between the Dealer's Record of Sale and California's Criminal History Information System records. Both databases include each person's full name, date of birth, California driver's license number, sex, city, and ZIP code. We used probabilistic linking via Link Plus, version 2.0, to address partial matches given misspellings, hyphenations, typographical errors, and so on. After identifying Link Plus scores in the data at or above which all linkages had a high probability of being correct (the upper threshold for manual review) and at or below which all linkages had a high probability of being incorrect (the lower threshold), multiple reviewers (research analysts) manually examined these interthreshold cases. Further details of the linking approach and data sources can be found in the work of Kagawa and coauthors.[25]

OUTCOMES Our outcome of interest was an arrest or criminal charge for intimate partner violence. Though it is possible for a criminal charge to differ from the initial arrest charge, we refer to these as arrests throughout for simplicity. We focused on arrests or criminal charges rather than convictions to more inclusively capture intimate partner violence events. Data from the National Crime Victimization Survey suggest that police were notified in 56 percent of nonfatal domestic violence victimizations in the period 2005–16 and the perpetrator was arrested in 40 percent of these cases.[28] Research has also long suggested that the prosecution and conviction of intimate partner violence cases is typically low, relative to other offenses.[29,30] More generally, there is evidence to suggest that the final dispositions of arrests are not always reported in state criminal history databases,[31] and thus using arrests rather than convictions would minimize the risk of a false negative—that is, failing to capture an intimate partner event.

The online appendix provides more detail on the criminal activity categorized as intimate partner violence.[32] Such activity includes battery or rape of a spouse or partner, as well as violations of domestic violence protection orders.

COVARIATES We controlled for individual variables including demographic characteristics (sex, age, and race/ethnicity) as reported in the handgun Dealer's Record of Sale. We also controlled for the number of handguns (0, 1–3, or 4 or more) purchased from 1985, the first year recorded in the state's Automated Firearms System, until the index purchase in 2001.

Community-level characteristics included census-tract demographics from the American

Community Survey: population size; the proportion of people ages 20–24 among the population ages 20–44; and the percentages male, black, and Latino. We adjusted for socioeconomic status using a census tract–level index that combined standard education, wealth, and employment indicators. We also included measures of census-tract alcohol outlet densities per square mile, using four separate license types: bar/pub/tavern, restaurant beer wine, restaurant spirits, and off-premise (a store where alcoholic beverages may be purchased but consumed only off of the licensed premises).[33] Finally, we controlled for county violent crime and property crime rates[34] and firearm suicides as a proportion of total suicides, a commonly used proxy for county firearm ownership prevalence.[35,36]

In our forthcoming work,[25] we found that including time-varying covariates to account for subject relocation and changes within a community over time did not substantively change our estimates. We therefore simply included the community covariates as recorded at baseline.

STATISTICAL APPROACH We used Cox proportional hazards regression models to estimate the hazard of arrest for an intimate partner violence offense associated with a DUI conviction history before the 2001 index handgun purchase. We included DUI history as a three-level variable, categorizing purchasers as having had at least one DUI conviction at the time of purchase, at least one arrest but no conviction, or neither (the reference group). We also included an indicator variable to identify people with a history of any arrest or conviction for other (non-DUI) criminal offenses and interaction terms between those with a DUI history and other criminal history, to test for the cumulative effect. We conducted additional analyses that estimated the same set of models for people with a prior history of any alcohol-related offenses. We adjusted for the individual- and community-level variables described above. We also tested for a dose-response relationship between the number of DUI convictions and risk of an arrest. All analyses were conducted using R statistical software.

LIMITATIONS This study had several limitations that should be noted. First, insofar as we aimed to understand the relationship between intimate partner violence and risky alcohol use among firearm owners, we studied only alcohol-related offenses. We were unable to measure and study other forms of risky alcohol use, such as binge drinking. Research shows that DUI offenders tend to have a history of acute alcohol intoxication and reckless behavior.[37,38] However, DUIs are obviously only one indicator of risky alcohol use, and DUI convictions are rare relative to self-reported rates of alcohol-impaired driving.[39] DUI offenders are estimated to drive impaired 200–2,000 times before their first arrest.[40] At the same time, because arrests and convictions are measured in administrative data, using them makes large longitudinal cohort analyses such as ours possible. Furthermore, DUI conviction provides an operational definition for jurisdictions aiming to bar firearm transfers to people who engage in risky use of alcohol.[19]

Second, we similarly used intimate partner violence arrests to measure the incidence of this violence. This obviously captures only a subset of events.

Finally, the nature of our California-based study population may lead to an underestimate of the risk of intimate partner violence among legal firearm purchasers in the US more broadly, given that the majority of states have less restrictive purchasing criteria than California does.[41] In particular, as noted above, California prohibits people convicted of violent misdemeanors from purchasing firearms for ten years following the conviction and prohibits people with temporary DVROs from purchasing firearms. This means that people with such a demonstrated propensity to commit violence, including intimate partner violence, were excluded from the study cohort, but they would not have been excluded in similar studies of many other US states.

Study Results

STUDY POPULATION After we removed people with no follow-up information, those with no evidence of California residency on the date they were eligible to obtain their handgun, and those with missing covariate information, the analytic sample consisted of 76,311 purchasers. During the observation period, 1,997 purchasers died, and 9,105 moved to another state. Those with complete follow-up information were comparable to those who died or left the state with respect to relevant covariates—for example, any prior criminal history (15 percent versus 16 percent) and DUI conviction (1.9 percent among both groups).

Over 90 percent of the study population were male, and 69 percent were white. Seventeen percent had some criminal history (at least one arrest or conviction) at the time of their 2001 index handgun purchase. Also at the time of purchase, 1.9 percent had one or more DUI convictions, and 2.7 percent had one or more DUI arrests. Eighty-four percent of those with a prepurchase DUI conviction had only one such conviction (1.6 percent of the study population). An additional 0.1 percent of the full study cohort had a prepurchase conviction for an alcohol-related offense that was not a DUI.

Subjects with and without prior DUI convictions had similar prior handgun ownership. Just over half of the study cohort were first-time handgun purchasers (53 percent of those with no DUI conviction and 52 percent of those with such a conviction). Approximately one-third had one to three prior handgun purchases, and one-sixth had purchased four or more handguns prior to the index purchase.

HISTORY OF DRIVING UNDER THE INFLUENCE AND SUBSEQUENT INTIMATE PARTNER VIOLENCE ARRESTS Two percent of the study population were arrested during the study period for an intimate partner violence offense after their 2001 index purchase, and of those, 96 percent were male (data not shown). Among those with a DUI conviction before the 2001 index handgun purchase, 6 percent were subsequently arrested for an intimate partner violence offense, compared to 1 percent of purchasers with no prior criminal history and 5 percent of purchasers who had any non-DUI arrest or conviction (including other alcohol-related and non-alcohol-related events) at the time of the index purchase.

Exhibit 1 presents Kaplan-Meier curves,[42] which show the "survival" probability (the number of participants remaining free of an intimate partner violence arrest divided by the number of participants at risk) over the twelve-year study period, stratified by criminal history: those with a DUI conviction (and no other criminal history) before the index purchase, those with a DUI arrest (and no other criminal history), those with other arrests or convictions (non–alcohol related), and those with no arrest or conviction history.

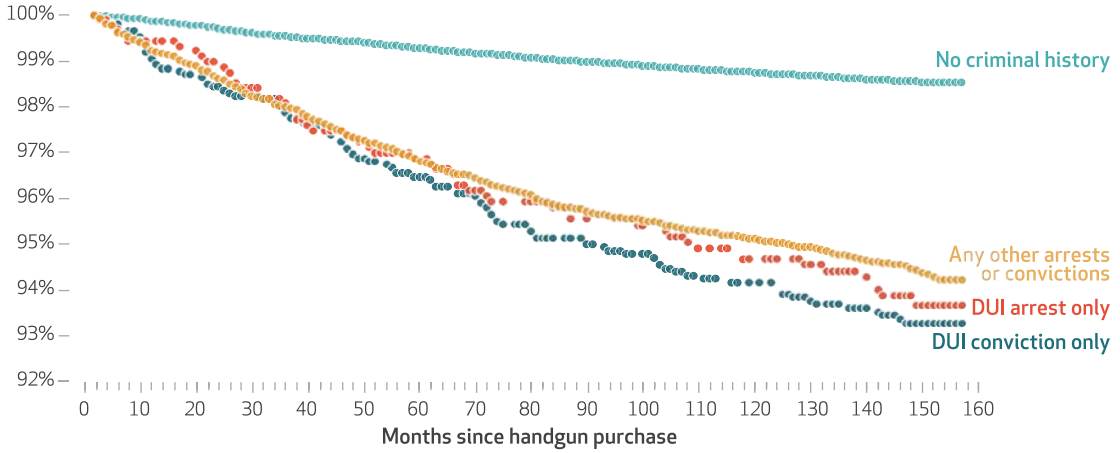
Notably, among those in the study cohort who were arrested for any type of violent crime during the follow-up period (15 percent of those with a prepurchase DUI conviction and 5 percent of the total study population), intimate partner violence—specifically, corporal injury to a spouse or cohabitating partner—was the most common violent offense category (exhibit 2). It was also the most common category of violent arrest among those with no prepurchase criminal history who were arrested for a violent crime after the index purchase. Appendix exhibit A2 shows the ten most frequent categories of violent arrest charges for purchasers with no criminal history before the index purchase.[32]

TIME TO EVENT ANALYSIS After adjusting for key individual and community characteristics, we found that purchasers with a prior DUI conviction (and no other arrest or conviction history) had close to three times the risk of arrest for a subsequent intimate partner violence offense, compared with purchasers who had no criminal history at the time of purchase (adjusted hazard ratio: 2.7) (exhibit 3). This point estimate is slightly smaller but similar in magnitude to the estimate for purchasers who had any arrest or conviction other than DUI at the time of purchase, compared to those with no criminal history (AHR: 3.5).

The combination of preexisting DUI convictions and non-DUI criminal history was associated with the greatest hazard of subsequent arrest for intimate partner violence (AHR: 5.5). Risk for intimate partner violence arrest re-

EXHIBIT 1

Months to arrest for intimate partner violence, by criminal history at the time of purchase.



SOURCE Kaplan-Meier survival curve estimates for cohort data set of 76,311 people ages 21–49 who legally purchased a handgun in California in 2001. **NOTES** Survival curve estimates were calculated using the R survival package. Estimates of survival probabilities are calculated at each time point at which the curve has a step (a change in the number at risk). DUI is driving under the influence.

EXHIBIT 2

Ten most frequent categories of violent arrest charges after legally purchasing a handgun in California in 2001 among those who had a driving under the influence (DUI) conviction at the time of their purchase

Offense description	Arrest charges	Percent of total violent arrest charges
Battery of spouse, ex-spouse, or date; inflict corporal injury on spouse or cohabitating partner	136	30.0
Threaten crime with intent to terrorize	62	13.7
Obstructs or resists public officer	50	11.0
Battery (general)	28	6.2
Assault with a deadly weapon (other than a firearm), with great bodily injury likely	27	6.0
Assault with a firearm on a person	22	4.9
Child cruelty, with injury or death possible	20	4.4
Robbery	17	3.7
Exhibit deadly weapon (other than a firearm)	11	2.4
Murder or attempted murder	10	2.2

SOURCE Authors' analysis of cohort data set. **NOTES** $N = 1,437$. People could be counted more than once if they had more than one violent arrest charge (explained in the text). There were a total of 454 violent arrest charges.

mained elevated among purchasers with a DUI conviction in addition to other arrests and convictions, compared to those with only arrests or convictions for non-DUI crimes (AHR: 1.4).

The models did not change substantively when we expanded the exposure to any alcohol-related offense. We found no evidence of a dose-response relationship between the number of prior DUI convictions and the hazard of arrest for an intimate partner violence offense.

Discussion

This study provides evidence that a history of DUI conviction (when no other arrests or convictions are present) is associated with an almost threefold increase in an authorized handgun purchaser's risk of subsequent arrest for an intimate partner violence offense, relative to purchasers with no criminal history. This is consistent with our forthcoming work that shows an association of comparable magnitude between a preexisting DUI conviction and risk for subsequent firearm-related crime, Violent Crime Index crime (homicide, rape, robbery, or aggravated assault), and violent crime broadly among this cohort of legal handgun purchasers,[25] as well as an earlier study that assessed the association between risky alcohol use and future violence among a sample of people who purchased a handgun in 1977.[18] Likewise, these findings are consistent with both cross-sectional and longitudinal studies that have been conducted in the general population (that is, not firearm owners specifically) and have shown that alcohol use is associated with increased risk of violence,[43–45] and intimate partner violence perpetration in particular.[11,13]

The purchasers at highest risk for an intimate partner violence offense were those with both a prior DUI conviction and additional arrests or convictions for other (nonprohibiting) offenses. This group accounted for the vast majority of subjects with at least one prepurchase DUI conviction: 81 percent of those with a prepurchase DUI who were subsequently arrested for an intimate partner violence offense also had other non-DUI arrests or convictions at the time of purchase, while 72 percent of those with a prepurchase DUI who were not subsequently arrested for an intimate partner violence offense had other non-DUI criminal histories. This finding is consistent with previous research in the general population showing that people with DUI convictions are more likely than others to

EXHIBIT 3

Risk of arrest for intimate partner violence associated with at least one prior driving under the influence (DUI) conviction, at least one DUI arrest, and other non-DUI criminal history as compared to purchasers with no criminal history at the time of handgun purchase in California in 2001

Having at least one or any:	Adjusted hazard ratio	95% CI
DUI conviction (no other arrests or convictions)	2.7	(1.6, 4.6)
DUI arrest (no conviction and no other arrests)	4.1	(2.3, 7.2)
Non-DUI arrest or conviction (and no DUI arrest or conviction)	3.5	(3.1, 3.9)
Criminal history (DUI related or non-DUI)	5.5	(4.5, 6.5)
DUI conviction if purchasers also had non-DUI arrest or conviction[a]	1.4	(1.2, 1.5)

SOURCE Authors' analysis. **NOTES** Analyses were conducted in R using the survival package. All adjusted hazard ratios were significant ($p < 0.001$). The variables adjusted for are provided in the text. Except where noted, the risk is compared to purchasers with no criminal history. CI is confidence interval. [a]Compared to those with only non-DUI arrests or convictions. There were a total of 454 violent arrest charges.

engage in criminal activity of other types.[46,47]

We did not find a dose-response relationship between the number of DUI convictions and subsequent arrests for intimate partner violence. This is likely because the majority of handgun purchasers in our study that had any prepurchase DUI convictions had only one. Future research might examine a larger cohort of firearm purchasers (for example, those who purchased over a three- or four-year period) to have greater statistical power to investigate a dose-response relationship and speak more directly to California's current SB 55, which would apply a ten-year purchase prohibition to people with three or more DUI convictions.

Conclusion

Research has clearly shown that both firearms and alcohol consumption are significant contributors to the risk and severity of intimate partner violence. This study is the first to determine the extent to which alcohol-related problems, as indicated by a history of alcohol-related offenses such as DUI, are associated with risk for future intimate partner violence among authorized handgun purchasers.

We found that having at least one prior DUI conviction was an indicator of increased risk for arrest related to intimate partner violence. The elevated risk of DUI remained present, although diminished, even among purchasers with a history of arrests or convictions for other (non-DUI) offenses.

This study, along with our forthcoming work that shows an association of comparable magnitude between a preexisting DUI conviction and risk for subsequent firearm-related crime and violent crime broadly,[25] contributes to the evidence base for policies intended to regulate firearm ownership among people with alcohol use problems. Given evidence that policies restricting firearm access among people with markers of elevated risk—for example, disqualifications for those with a felony conviction or DVRO and those adjudicated "mentally defective"—are effective at reducing firearm violence,[48] regulating firearm access among people with alcohol-related convictions may afford a critical opportunity to reduce firearm-related intimate partner violence and the escalation of firearm-related harms. ■

The authors gratefully acknowledge funding from the National Institute on Alcohol Abuse and Alcoholism (Grant No. 1R01AA023551-01A1), the California Wellness Foundation (Grant No. 2014-255), the Heising-Simons Foundation (Grant No. 2016-219), and the Robertson Fellowship in Violence Prevention Research. This work does not necessarily reflect the policies of the National Institutes of Health.

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