

Firearm Perceptions in a cohort of Women Exposed to Intimate Partner Violence (IPV)

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Abstract:

Background: Almost one-half of American women will experience intimate partner violence (IPV), defined as physical, sexual, or psychological harm by a current or former partner. IPV is associated with an increased risk of homicide, with firearms as the most commonly used weapon. We designed this study to better understand the impact of interpersonal trauma exposure and demographic factors on firearm perceptions among a cohort of IPV-exposed women.

Methods: 267 women in central Pennsylvania with exposure to IPV were surveyed about perceptions of gun access, safety, and gun presence in the home. Trauma variables included IPV type, IPV recency, unwanted sexual exposure, and adverse childhood experiences (ACEs). Multivariable analyses examined each of the three firearm perception questions controlling for trauma exposures and demographics.

Results:

Ease of firearm acquisition: Women who reported physical IPV ($aOR 2.40$, 95%CI 1.20,4.81), women who reported past year unwanted sexual exposure ($aOR 4.01$, 95% CI 1.00,16.03), and women of ages 47-54 ($aOR 3.57$ 95%CI 1.49,8.55) reported that guns were easy to acquire, compared to women ages 19-34.

Perceived safety in the proximity of a gun: Women with the highest ACE score were less likely to feel safe with a gun nearby ($aOR 0.41$, 95%CI 0.21,0.84). Rural women ($aOR 4.13$, 95%CI 1.55,11.01), and women ages 35-46 had increased odds ($aOR 2.88$, 95%CI 1.35,6.12) of reporting that guns made them feel safer.

Odds of guns in the home: Women who were divorced or separated ($aOR 0.22$, 95%CI 0.09,0.54) and women were widowed or single ($aOR 0.22$, 95%CI 0.07,0.68) had lower odds of having a gun in the home, compared to married women. Rural women had higher odds of living in a home with a gun ($aOR 3.30$, 95%CI 1.04,10.49). There was no significant effect of the trauma variables on the odds of having a gun at home.

Conclusions: Trauma exposures, including physical IPV and past-year unwanted sexual exposure, were associated with women's perceptions that it was easier to acquire guns in their community. Women with more severe childhood trauma felt less safe around firearms, but trauma exposures did not predict gun ownership. Instead, demographics of being married and rural residence were associated with gun ownership.

Key Words:

Partner abuse, abuse, violence, domestic violence, gun violence, battered women, homicide

Background

Nearly half (48%) of American women experience intimate partner violence (IPV) -- “physical violence, sexual violence, stalking and psychological aggression by a current or former intimate partner” (1). One-quarter of women exposed to IPV sustain an injury from a partner, and IPV is the most common cause of nonfatal injury among women (2, 3). Furthermore, women with a history of IPV are more likely to be homicide victims. Forty percent of femicides are perpetrated by an intimate partner, the majority with a firearm (4). Research has consistently shown that the presence of guns increases the risk of a woman being murdered (4, 5), despite the political expediency of a popular narrative, promoted by the firearm industry, citing guns to be empowering for women’s self-defense (6).

In times of personal stress and natural disasters, intimate partner violence rates increase, as do those of intimate partner homicide (7). Most recently, the stresses posed by the COVID-19 (novel coronavirus) pandemic, are bearing out preliminary data concerning for increasing rates of intimate partner violence and homicide (8). As the world attempts to slow the spread of this virus, movements to “Stay Home” are predicated on “home” being a safe place.

Despite the risks posed by firearms to IPV-exposed women, little is known about gun ownership and access in this population. Qualitative research on the topic has explored how women with a history of exposure to IPV feel, noting a diversity of opinions. Some women reported feeling danger when a partner had a gun, reporting that the firearm could be a constant threat within the relationship. Other women perceived that a gun might protect them from an abuser (9, 10). While there are demographics factors known to correlate to gun ownership, such as marriage and rurality (11), it is not known if these same factors are associated with proximity

to a gun in high risk women, or if trauma exposures in these women affect their perceptions of guns.

In the US context, gun prevalence in a community correlates to higher rates of intimate partner violence, although this association is confounded by regional and state variability. It has been shown that rates of firearm related intimate partner violence are highest in the states with highest firearm prevalence. Overall, there is a trend toward excess female mortality in states with high availability of firearms (12).

Given the increased mortality risk firearms pose to women who have a history of IPV, this study seeks to understand how this high-risk cohort perceives guns. To help to understand these questions, we examined a cohort of IPV-exposed women with respect to perceptions of accessibility to firearms in their communities, perceptions of safety with a gun nearby, and the presence of firearms in the home. IPV victims' perceptions were the focus of our analysis because victims are uniquely qualified to assess their own risk of lethality; that is, women who believe they are at increased risk of violence, are, in fact, at increased risk (5, 13). We designed this study to contribute to a better understanding how victims of IPV and other trauma exposures feel about firearms, in hopes that clinicians may use this data to better counsel women regarding these risks.

Methods

Sample Selection

The sample identification protocols for this study have been previously published (14). The cohort was recruited between Fall 2013 and Spring 2014 in south central Pennsylvania, USA. Women were eligible for inclusion if they screened positive for a lifetime history of IPV

based on the humiliation-afraid-rape-kick (HARK) screening instrument, a validated 4-item screen to identify IPV in healthcare settings (15), and left their contact information after completing the screening questionnaire. Data collection for the one year follow up took place between Fall 2014 and Spring 2015.

Briefly, we identified a sample of 24,338 women ages 18-64 in south central Pennsylvania with least one primary care visit in the past year. A randomly selected subset of 2,500 women were invited to participate; surveys were received from 1,191 women from the clinical sample. The sample was stratified for rural residence using the zip-code based approximation of the Rural-Urban Commuting Area codes, a classification system based on city size and commuting practices (16). Rural-residing women were oversampled to achieve appropriate numbers for analysis. To augment the ambulatory cohort, posters were also displayed at 26 domestic violence shelters in Central Pennsylvania, inviting women to participate in the survey online, by phone, or by mail. From this population, an additional 73 women were recruited to participate in response to these posters, yielding the final sample size of 1264 women who completed the screening survey.

Among this sample, those women who screened positive for lifetime exposure to IPV based on the humiliation-afraid-rape-kick (HARK) screening instrument, a validated 4-item screen to identify IPV in healthcare settings (Sohal, Eldridge, and Feder 2007) and who left their contact information were contacted with an invitation to participate in a longitudinal study, requiring completion of a survey at baseline and one year later.

From the ambulatory sample, 500 women screened positive for IPV, and 270 participated in the baseline survey. From the shelter sample, 60 women screened positive for IPV, and 38 participated in the baseline survey. After one year, the women who completed the baseline

survey were contacted, and asked to complete the follow up survey. Among these women, 239 from the ambulatory cohort and 28 shelter participants (total 267) participated in the one-year follow-up survey. These 267 women form the analytic cohort for this analysis.

Study data were entered and managed within REDCap (Research Electronic Data Capture), a secure, web-based application designed to support data capture for research studies, hosted by Pennsylvania State University (17). This study was conducted with approval from the Institutional Review Board (IRB) for all study protocol and study documents. All women reviewed a written or verbal informed consent and consented to participate in this research. To protect participants further, and due to the sensitive nature of this study, a Certificate of Confidentiality (CC-MH-12-204) was obtained from the National Institutes of Health for this research.

Variables of Interest

The follow up cohort of 267 women was assessed for the primary outcomes surrounding firearms, of 1) perceptions of access (“How easy is it for people who live near you to get a gun?”), 2) perceptions of safety (“Does having a gun around make you feel safer or less safe?”), and 3) firearm proximity (“Are any firearms kept in or around your home?”) (18, 19). We hypothesized that trauma exposures would affect perceptions of firearm safety, in that women with a history of trauma would feel less safe around guns, be less likely to have guns in the home, and perceive guns to be readily available in their community.

Our primary independent variables were demographics and trauma exposures. To assess prior history of trauma, participants were screened for IPV recency (past year vs. lifetime) and IPV type (physical vs nonphysical) using HARK (15). Nonphysical IPV (“HA,” humiliate-

afraid) and physical IPV (“RK,” rape-kick) were mutually exclusive categories, and participants were stratified into the physical IPV category if they had ever experienced this severe type of IPV. The HARK question stem was modified to determine whether they had experienced IPV in their lifetimes compared to the past year. Additional interpersonal trauma exposures were unwanted sexual exposure (20) and adverse childhood experiences (21). “Unwanted sexual exposure” was categorized as never, lifetime, or past year (20). “Adverse childhood experiences” (ACEs) were taken from the ACE study (a collaborative research endeavor funded by the CDC and Kaiser Permanente (21) and stratified by tertile.

To control for variation in the sample by demographics, we evaluated our cohort for age, marital status, rurality, poverty, and race/ethnicity. These variables were chosen because of their relevance to IPV, as well as their role in gun ownership trends and demographic variables that predict health. The National Gun Policy Survey of the National Opinion Research Center has shown that the possession of a firearm is strongly associated with living in a rural area as well as with being married (11, 22). Furthermore, gun ownership appears to vary by race (11). Age has been shown as a correlate of gun ownership, as Americans under 35 years old were less likely to own a gun than adults over 65 years old (11). Increased household income correlated positively with ownership in the literature (Smith, Son et al. 2014), so we considered whether our patients were near poverty (defined as 125% of the national poverty line) or not near poverty. Gun ownership also varies with region of the country, but our cohort is from within the same regional area, so we were unable to account for this variation.

Data Analysis

All variables were summarized with frequencies and percentages. Binomial or ordinal logistic regression, depending on the format of the outcome variable, was used to determine any unadjusted bivariate associations between each of the demographic, health and trauma exposure variables and each of the three firearm perception questions. Covariates were selected and retained for inclusion in the model based on their relationship to the outcomes variables as seen in the literature. As noted above, significant data exists on the demographic variables associated with gun ownership, especially surrounding age, race/ethnicity, rurality, marital status, and income. Given that our outcomes variables included questions of guns in the home and also gun perceptions, we reasonably considered that these variables were likely confounders of our outcome variables to be included in our analyses. To assess the relationship to types of interpersonal trauma, we looked at different types of IPV, recency of IPV, unwanted sexual exposure, and ACEs to evaluate if these traumas were related to our outcomes variables, as well. Interactions were not specifically tested in this model. Multivariable analyses examined the associations of these exposure variables collectively with each of the three firearm perception questions while controlling for the demographic variables. All of the independent variables were tested for multicollinearity prior to inclusion in the model using variance inflation factor (VIF) statistics, and the fit of the multivariable models was assessed using the Hosmer and Lemeshow goodness-of-fit test. All analyses used a significance level of $p < 0.05$ and were performed using SAS version 9.4 (SAS Institute, Cary, NC).

Results:

As seen in Table 1, among the 267 respondents, median age was 46 years, with 89% identifying as white, non-Hispanic. Only 17% of this cohort were at or near poverty (income less

than 150% the US poverty line). The cohort was 54% rural-residing, and 48% were married. Sixty-five percent experienced physical IPV; 21% reported IPV within the past year. For unwanted sexual exposure, 58% had been exposed in their lifetime. Almost one third of this cohort (32%) had experienced 4-10 Adverse Childhood Experiences.

Multivariable analyses are shown in Table 2. For ease of gun acquisition showed that women who reported physical IPV (versus nonphysical, aOR 2.04, 95%CI 1.08-3.86), women who reported past year unwanted sexual exposure (versus none, aOR 4.25, 95% CI 1.13-15.96), and women of ages 47-54 (versus women ages 19-34, aOR 2.34 95% CI 1.03-5.28) were more likely to report easy acquisition of guns in their communities.

Analysis of perceived safety in the proximity of a gun showed that women with the highest ACE score, indicating a high level of childhood trauma, were less likely to feel safe with a gun nearby (versus those with the lowest ACE score, aOR 0.40, 95% CI 0.20-0.79). Women with unwanted sexual exposure (past year aOR 0.35, 95% CI 0.10-1.22 and lifetime aOR 0.62, 95% CI 0.33-1.15) and IPV exposure within the past year (aOR 0.59, 95% CI 0.31-1.11) had trends toward feeling less safe around a gun, although this was not statistically significant. Rural women (versus urban women, aOR 3.57, 95% CI 1.37-9.29) and women ages 35-46 (versus women ages 19-34, aOR 2.46, 95% CI 1.18-5.10) had increased odds of reporting that the presence of guns made them feel safer.

Multivariable analysis showed no significant association between any of the trauma exposure variables and having a gun at home. However, women who were divorced or separated (aOR 0.22, 95% CI 0.09-0.54), women who were partnered (aOR 0.42, 95% CI 0.19-0.92), and women who were widowed or single (aOR 0.22, 95% CI 0.08-0.63) had lower odds of having a gun in the home, compared to married women.

Discussion

This study used quantitative analyses of survey data to explore how demographics and interpersonal traumas relate to IPV-exposed women's perceptions of firearms. These analytic targets were chosen because women with a history of IPV are at high risk for violent injury. Our major findings were that a) women with a history of physical IPV or more recent unwanted sexual exposure perceived guns to be more accessible in their community, b) women with a high level of childhood trauma were less likely to feel safe with a gun nearby, and c) there was no association between trauma exposure and presence of a gun in the home.

Our finding that women with exposure to physical IPV and more recent unwanted sexual exposure perceived guns to be more readily available was concordant with our hypothesis. Women exposed to violent forms of IPV may have heightened awareness of physical threats, such as those posed by ready access to firearms in their communities.

We also found that women with a high level of childhood trauma felt less safe near a gun, suggesting that a heightened perception of risk after trauma may extend from childhood to adulthood. Of note, firearms have never been shown to have a protective effect for women in violent intimate partner relationships (4); indeed, the opposite is true. Despite this, 57% of our sample of IPV-exposed women felt having a gun around made them feel at least somewhat safer, this is similar to the 58% of American women (compared to 67% of American men) who think a gun makes them feel "safer" in 2015 (23, 24).

Regarding guns in the home, the various trauma exposure variables (IPV type, recency, unwanted sexual exposure and childhood adverse events) did not correlate with the presence of a gun in the home. Nationally, 30-40% of households in the US report having a firearm (11), so

our cohort has a higher rate of gun ownership (44%) than the national average. Consistent with national trends, gun ownership was most correlated with demographic variables (11). The high rate of firearms at home among IPV exposed women may represent an area for intervention among professionals who encounter IPV exposed women.

Together, our findings suggest that trauma exposures likely impact how safe IPV-exposed women feel around guns, and yet are not reflected in whether or not they live in a home with a gun. Other influences govern gun ownership, which may prevent women from controlling their safety at home. Addressing this disconnect is important for public health education and interventions.

Compared to other studies on this topic and in this population, a strength of this study is its size, and a sampling strategy that expanded the population of IPV victims from exclusively recruiting at shelters, to investigating the experiences of those seeking care from primary healthcare settings. Given the prevalence of IPV, this sampling method likely represents more diverse experiences among IPV exposed women. Most other studies on this topic have recruited from only domestic violence shelters, which may represent a subset of women with a different pattern of violence than other IPV victims (25). A weakness in this analysis is that the specific owner of the guns at home were unknown and could be the survey participant, a partner, or housemate. Further study should be done to better characterize gun ownership in this population. We were also limited by our regional cohort, as gun opinions and ownership vary with geographic region of residence. However, we were able to stratify by rurality, giving us insight that may not have otherwise been apparent.

These issues are important to understand in an American context to help us to better drive policy. Firearms are the most common form of weapon for intimate partner homicide in the US,

but not in other high income countries (26). International data of these high income countries, shows that overall female homicide and gun availability cluster together, with the US being an extreme outlier in both (27). An abusive partner's access to a firearm in the home is associated with more severe IPV (26). Understanding the risks that firearms pose in unsafe homes may be increasingly important as the ongoing personal, political, and economic stresses wrought by the 2020 pandemic are unlikely to resolve in the near future.

This novel study examined the perceptions of guns and risk by IPV-exposed women. Women with a trauma history are at an elevated risk for mortality from firearms, and can only be appropriately counselled if the risks are known. This data should inform public policy surrounding counseling women about intimate partner violence and gun ownership.

By understanding this, we hope to inform the debates surrounding intimate partner violence and gun ownership. Evidence suggests that limiting gun access of abusers decreases the number of intimate partner homicides (28). Furthermore, it is important to understand the risks faced by these women, so they can be counselled appropriately to reduce these risks. The physician's office is a place where women may seek help, perhaps an opening for intervention and prevention; IPV exposed women have higher healthcare utilization than non IPV exposed women (29, 30). As such, strategies to engage women in their risks, and to understand their perspectives, would be valuable resources to decrease the risk of intimate partner violence, and ultimately intimate partner homicide.

Table 1**Demographics**

	Category	N (%)
Age (years)	19 - 34	67 (25%)
	35-46	70 (26%)
	47-54	62 (23%)
	55-64	67 (25%)
Race/Ethnicity	Non-white, Hispanic	28 (11%)
	White, Non-Hispanic	236 (89%)
Near Poverty	Not Near Poverty	210 (83%)
	Near Poverty vs Not Near Poverty	42 (17%)
Rurality	Urban	121 (46%)
	Micropolitan/Large Rural	121 (46%)
	Small Rural/Isolated Rural	23 (8%)
Marital Status	Married	127 (48%)
	Divorced/Separated	47 (18%)
	Partnered	60 (22%)
	Widowed/Single	32 (12%)
Livetime IPV Exposure Type	Non Physical (Humiliate-Afraid)	93 (35%)
	Physical (Rape-Kick)	174 (65%)
Past year exposure to IPV	No	211 (79%)
	Yes	56 (21%)
Unwanted Sexual Exposure	Never	94 (37%)
	Past year	14 (5%)
	Lifetime	149 (58%)
Adverse childhood Events	0-1 Events	96 (38%)
	2-3 Events	78 (30%)
	4-10 Events	82 (32%)

Firearm Variables

"How easy is it for people who live near you to get a gun?"	very easy	74 (28%)
	easy	151 (58%)
	hard	24 (13%)
	impossible	1 (0.4%)
"Does having a gun around make you feel safer or less safe?"	very safe	33 (13%)
	somewhat safer	113 (44%)
	somewhat less safe	57 (22%)
	very unsafe	52 (20%)
"Are any firearms kept in or around your home?"	yes	117 (44%)
	no	150 (56%)

Table 2

	"How easy is it for people who live near you to get a gun?" Higher aOR indicates "easier"			"Does having a gun around make you feel safer or less safe?" Higher aOR indicates "safer"			"Are any firearms kept in or around your home?" Higher aOR indicates "Yes"		
	aOR	95% CI		aOR	95% CI		aOR	95% CI	
Age									
19 - 34	reference								
35-46	1.45	0.67	3.13	2.46	1.18	5.11	1.34	0.59	3.05
47-54	2.34	1.03	5.28	0.65	0.31	1.37	0.77	0.33	1.81
55-64	1.76	0.76	4.09	0.52	0.24	1.12	1.01	0.43	2.40
Race/Ethnicity									
Non-white, Hispanic	reference								
White, Non-Hispanic	0.45	0.19	1.10	1.44	0.63	3.29	1.31	0.49	3.53
Near Poverty									
Not Near Poverty	reference								
Near Poverty vs Not	0.88	0.41	1.94	1.24	0.61	2.52	0.88	0.37	2.10
Rurality									
Urban	reference								
Micropolitan/Large Rural	0.90	0.49	1.63	0.86	0.49	1.50	1.23	0.66	2.31
Small Rural/Isolated Rural	1.67	0.62	4.46	3.57	1.37	9.29	2.94	0.99	8.77
Marital Status									
Married	reference								
Divorced/Separated	1.40	0.66	3.00	0.85	0.41	1.74	0.22	0.09	0.54
Partnered	1.13	0.53	2.40	0.97	0.49	1.93	0.42	0.19	0.92
Widowed/Single	1.99	0.78	5.05	0.62	0.26	1.47	0.22	0.08	0.63
Livetime IPV Exposure Type									
Non Physical (Humiliate-Afraid)	reference								
Physical (Rape-Kick)	2.04	1.08	3.86	1.58	0.87	2.86	1.20	0.62	2.34
Past year exposure to IPV									
No	reference								
Yes	0.58	0.29	1.16	0.59	0.31	1.11	1.46	0.71	3.04
Unwanted Sexual Exposure									
Never	reference								
Past year	4.25	1.13	15.96	0.35	0.10	1.22	0.32	0.07	1.47
Lifetime	0.96	0.50	1.85	0.62	0.33	1.15	1.00	0.50	2.00
Adverse childhood Events									
0-1 Events	reference								
2-3 Events	0.75	0.38	1.47	1.07	0.57	2.03	0.77	0.38	1.56
4-10 Events	0.82	0.40	1.68	0.40	0.20	0.79	0.64	0.30	1.38

Abbreviations

ACE: Adverse Childhood Experiences

IPV: Intimate Partner Violence

Declarations

Ethics approval and consent to participate

This study was approved by the IRB at Penn State University, and due to the sensitive nature of this study, a Certificate of Confidentiality (CC-MH-12-204) was obtained from the National Institutes of Health for this research. All women reviewed a written or verbal informed consent and consented to participate in this research.

Consent for publication

Not applicable

Availability of data and Materials

At the time our data were collected, our Institutional Review Board required that all datasets remain confidential and locally located, due to the sensitive nature of the data collected. Our IRB further explicitly states that our dataset will be destroyed after final publication of analyses. Thus, we are disallowed from creating a dataset that can be analyzed in perpetuity. If dataset is requested prior to study closure, it will be made available by the senior author (jmccallhosenfeld@pennstatehealth.psu.edu) on reasonable request.

Competing interests

The authors declare that they do not have any competing interests.

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Authors contributions

LL worked to design the study, including background information collection, and study design; she also primarily wrote the manuscript. JMH created, designed, and collected the study data of the parent study, helped with study design for this study, and contributed to the writing of the manuscript. EL performed the statistical analysis and provided support throughout the study. All authors read and approved the final manuscript.

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