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ABSTRACT

Objective: The present study sought to determine if among a sample of firearm owning suicide decedents, the type and number of firearms owned was associated with dying by suicide using a firearm compared to another method.

Method: Data were collected as part of a larger online study that gathered information on suicide decedents and the context surrounding their death from family members and friends. The present study used data from those who owned at least one firearm ($n = 121$). Participants in the present study were mostly male and white.

Results: Among firearm owners, handgun ownership was significantly associated with dying by suicide using a firearm compared to using another method. The number of firearms owned was inversely associated with using a firearm compared to another method in a suicide death. The average number of firearms owned was higher among those who owned shotguns compared to handguns.

Conclusions: Handgun ownership, not shotgun ownership, was associated with having died from a self-inflicted gunshot wound. The finding regarding number of firearms should be interpreted with caution. Overall, findings provide insight into what differentiates firearm owners who die by suicide using a firearm compared to another method.

KEYWORDS

Firearm ownership; handguns; means safety; number of firearms; suicide prevention

INTRODUCTION

Over the last 18 years, the United States (US) has seen a 33% increase in suicide deaths (Center for Disease Control & Prevention, 2018). The increasing rates have led researchers to consider different avenues for preventing suicide. One avenue is means safety, which refers to efforts to make specific suicide methods less deadly or less available for a suicide attempt. Means safety has been associated with a reduction in suicide rates. For example, the Israeli Defense Force saw a 40% decrease in suicide rates among young service members after enacting a policy change that prevented service members from taking their firearms with them on leave (Lubin et al., 2010). Although means safety has been shown to be advantageous abroad, the impact on firearm suicide within the US could potentially be increased by further understanding what variables effect the choice between using a firearm verses another method.

The present study builds upon previous research with the same data set. Anestis, Khazem, and Anestis (2017) examined demographic and firearm storage differences between firearm owners who died by suicide using a firearm verses another method.

The study found that, among firearm owners, men were significantly more likely to use a firearm in their suicide death (Anestis et al., 2017); which is consistent with other research findings (Denning, Conwell, King, & Cox, 2010). Additionally, Anestis and colleagues (2017) found that those who stored their firearm at home and in a non-secure location were more likely to use their firearm to die by suicide. These findings indicate that male firearm owners and those who store their firearms in an unsecure manner were more likely to die by suicide using a firearm than by another method.

The present study seeks to determine what other firearm specific variables differentiate firearm owners who died by suicide with a firearm compared to another method. Previous research has found handgun ownership to predict future suicidal behavior and to be associated with risk for suicide (Houtsma & Anestis, 2017; Studdert et al., 2020). Additionally, rates of handgun suicides, but not long gun suicides, increased from 2005 to 2015 (Hanlon, Barber, Azrael, & Miller, 2019). Given that owning a handgun increases risk for suicide, it is expected that handgun, but not long gun, ownership will be associated with using a firearm compared to another method. A majority of the research on suicide and firearms examines if owning a firearm increases risk. It remains unclear, however, whether accumulating a larger number of firearms may be indicative of risk for suicide or whether the impact of ownership is best understood by simply differentiating between those who do and do not own one or more. On one hand, the number of firearms one owns may suggest a higher practical capability (Klonsky & May, 2015), more access to a highly lethal suicide method, as well as higher acquired capability (Anestis & Capron, 2018). On the other hand, owning one firearm may be the factor that drives both practical and acquired capability; if this is the case, the number of firearms one owns would not impact risk. Furthermore, research has not clearly identified if owning more of one type of firearms (e.g., handguns) impacts risk differently than owning other types of firearms (e.g., long guns). The present study will examine if the type and number of firearms owned was associated with the method used in a sample of firearm owning suicide decedents. Findings from the present study can be leveraged to further refine our understanding of who among those at elevated risk (e.g., those with firearm access) are most likely to use their firearms in a suicide attempt, and can inform future means safety efforts.

METHOD

The present study uses a subset of data from a larger, online study that recruited loss survivors in order to better understand factors surrounding suicide deaths (Anestis et al., 2017). Study procedure were approved by the necessary Institutional Review Board. Recruitment of loss survivors occurred through email-based listservs and online communities. Data collection occurred through Qualtrics and all participants consented to the study. Participants were asked questions about the individual they knew who died by suicide and the situations surrounding the death.

Participants

The present study utilized a subset of data from a larger data set containing information on suicide decedents ($N = 267$). Loss survivors provided information to the best of their

TABLE 1. Sample characteristics.

	Overall sample *N* (%)	Firearm decedents *N* (%)	Other method decedents *N* (%)
Sample Size	121	93	28
Age			
Mean (SD)	40.85 (16.43)	39.91 (16.92)	43.93 (14.53)
Range	14–80 years old	14–80 years old	15–67 years old
Sex			
Male	110 (91.7%)	88 (95.7%)	22 (78.6%)
Female	10 (8.3%)	4 (4.3%)	6 (21.4%)
Race/Ethnicity			
White	113 (93.4%)	86 (92.5%)	27 (96.4%)
Other	8 (6.6%)	7 (7.5%)	1 (3.6%)
Employment Status			
Unemployed	50 (41.3%)	36 (38.7%)	14 (50.0%)
Employed	71 (58.7%)	57 (61.3%)	14 (50.0%)
Marital Status			
Never Married	41 (33.9%)	31 (33.3%)	10 (35.7%)
Previously/currently Married	80 (66.1%)	62 (66.7%)	18 (64.3%)
Method			
Firearm	93 (76.9%)	—	—
Other	28 (23.1%)	—	—
Number of firearms			
Original Mean (SD)	2.67 (2.96)	2.24 (1.83)	4.04 (4.90)
Original Range	1–20	1–9	1–20
Recoded Mean (SD)	2.48 (2.20)	2.24 (1.83)	3.25 (3.00)
Recoded Range	1–9	1–9	1–9
Handgun Ownership			
No	32 (26.4%)	21 (22.6%)	11 (39.3%)
Yes, multiple types of firearms	44 (36.4%)	29 (31.2%)	12 (42.8%)
Yes, handgun only	48 (18.0%)	43 (46.2%)	5 (17.9%)
Shotgun Ownership			
No	57 (47.1%)	45 (48.4%)	12 (42.9%)
Yes, multiple types of firearms	42 (44.7%)	30 (32.2%)	12 (42.9%)
Yes, shotgun only	22 (8.2%)	18 (19.4%)	4 (14.3%)

knowledge and had the option to skip questions or select "unknown." The current sample ($n = 121$) includes decedents who were reported to have owned at least one firearm. Demographic characteristics of the sample can be found in Table 1.

Measures and Data Analysis

Measures assessing type and number of firearms were created by the Suicide and Emotion Dysregulation Laboratory. Type of firearm owned was coded as handgun or shotgun. An additional item assessing "other," with a space for text entry was included; however, too few individuals endorsed this item to allow for comparisons. Number of firearms was assessed using a text entry box, and responses ranges from one to 20 ($M = 2.67$; $SD = 2.96$). Outliers ($n = 6$) were handled by bringing them down to two standard deviations above the mean and rounding to the nearest whole number. Specifically, outliers ranging from 9 to 20 were recoded as 9. Method used in suicide death was coded as firearm or other (all other methods combined), as our sample size did not allow for comparisons between firearm deaths and other individual suicide methods. One logistic regression was run to examine the relationship between type of firearm, number of firearms, and method used in suicide death.

TABLE 2. Logistic regressions differentiating between suicide decedents who died by firearm and those who died by other methods.

	p value	OR	95% CI Lower	95% CI Upper
Handgun Ownership	.006	4.822	1.568	14.827
Shotgun Ownership	.161	2.244	.725	6.952
Number of Firearms Owned	.003	.695	.547	.883

TABLE 3. Exploratory logistic regressions differentiating between decedents who died by firearms and those who died by other methods.

	p value	OR	95% CI Lower	95% CI Upper
Handguns Only vs Shotgun Only	.334	.492	.117	2.077

Given that many firearm owners in our sample owned both handguns and shotguns, we opted to run an additional exploratory logistic regression. In this analysis, decedents who only owned handguns ($n = 48$) and decedents who only owned shotguns ($n = 23$) were included. A new variable was then created allowing us to examine the extent to which handgun owners were more or less likely than shotgun owners to have died by suicide using a firearm. Given the low cell count in both groups, these results should be considered exploratory and interpreted with caution (Tables 2 and 3).

RESULTS

The logistic regression indicated that owning a handgun was significantly associated with using a firearm compared to another method (OR = 4.822; $p = .006$; 95% CI [1.568, 14.827]). 77.4% of those who died using a firearm owned a handgun, and 60.7% of those who died using another method owned a handgun. Shotguns were not significantly associated with choosing one method over another (OR = 2.244; $p = .161$; 95% CI [.725, 6.952]). The number of firearms owned by the suicide decedent was inversely associated with method selection. The more firearms one owned, the less likely they were to use a firearm in their death (OR = .695; $p = .003$; 95% CI [.547, .883]).[1] Among individuals who owned shotguns the average number of firearms owned was 3.50 (SD = 2.547, range = 1–9) whereas among those who owned handguns, the average number of firearms owned was 2.84 (SD = 2.419, range = 1–9). Because a substantial number of individuals endorsed owning both types of firearms, these means could not be statistically compared to one another.

The exploratory binary logistic regression indicated that individuals who owned handguns were not significantly more or less likely to have died by suicide using a firearm (vs another method) than were individuals who owned only shotguns (OR = .492; $p = .334$; [CI .117, 2.077]). 88.8% (40 out of 45) of individuals who only owned handguns died by suicide using a firearm; and 81.8% (18 out of 22) of individual who only owned shotguns died by suicide using a firearm. As anticipated given the low sample size, the confidence interval for this analysis was quite large and, as such, the result should be interpreted with caution.

DISCUSSION

The primary aim of this study was to explore aspects of firearm ownership that may distinguish firearm owning suicide decedents who died by self-inflicted gunshot wound from those who died using other methods. Firearm ownership is a well-established risk factor for death by suicide (e.g., Anestis & Houtsma, 2018; Studdert et al., 2020); however, less is known regarding why some firearm owners use firearms in a suicide attempt whereas others use other methods. Prior research has highlighted that storage practices differentiate these groups (Anestis et al., 2017); however, we anticipated that the number and type of firearms may also prove useful in making this distinction.

Our results largely supported our hypotheses. Among all firearm owning suicide decedents, handgun ownership, but not shotgun ownership, was associated with greater odds of having died from self-inflicted gunshot wound. Handguns are more frequently used in suicide attempts than are shotguns or other long guns. It is important to highlight the value in considering what type of firearm an individual has access to rather than simply assessing access more broadly. One explanation for this finding may be that the size and shape of handguns likely render them physically easier to use in a suicide attempt. In this sense, logistical considerations may be the principle issue.

We did not find a significant association between only owning one type of firearm (i.e., handguns or shotguns) and method selection. Our data did not allow us to examine the mechanisms driving the results of our analyses, but reason for ownership may be an important consideration. It may be that, when individuals owned both type of firearms (i.e., handguns and shotguns), shotguns were owned primarily for hunting and other recreational purposes and therefore may be stored in hunting lodges or with locking devices since ready access was not required; whereas handguns may have been owned primarily for protection at or away from home and therefore may be stored loaded and unlocked, in order for the individual to have ready access to the firearm. Protection itself is not a motivation that is synonymous with suicide risk; however, it may be representative of an underlying propensity toward anxiety and other risk factors for suicidal thoughts. Indeed, recent data have indicated that individuals who own firearms for protection exhibit elevated threat expectancies and view the world and other people with greater skepticism and as more dangerous than do other firearm owners (Bryan, Bryan, & Anestis, 2020). Future research able to directly test this possibility would represent a meaningful advance beyond our findings. Lastly, it may simply be that any firearm in the home bestows risk of using a firearm as a suicide method, but that when multiple types of firearms are owned, an individual is likely to default to handguns due to logistical issues, ease of access, or some other reason. In this sense, it would not be that individuals who only own shotguns own them for different reasons than other shotgun owners, but rather that such individuals are more inclined to use their shotgun in a suicide attempt because it is the only accessible firearm. Therefore, it is important to continue to promote safe firearm storage and determine ways to increase adherence with safe storage suggestions.

Our finding that the number of firearms owned was inversely associated with the likelihood of dying by suicide using a firearm (vs other methods) was more surprising. We did not put forth an a priori hypothesis for this relationship given the dearth of

prior relevant findings and, as such, we consider this result preliminary and as one that should be interpreted with caution. Nonetheless, we feel that several interpretations are worthy of consideration. This finding seems to indicate that risk is not more heavily weighted toward individuals who stockpile firearms. Although such stockpiling may increase the odds of other problematic outcomes (e.g., accidental firearm injury), it appears from our results that the risk for firearm suicide may actually be highest among those who own only one or a small number of firearms. This may be due to the distribution of stockpiles across owners of different types of firearms. In our sample, those who owned at least one shotgun were more likely to own a higher number of firearms than individuals who owned at least one handgun. In this sense, the finding mirrors the results linking handgun ownership but not shotgun ownership to increased odds of having died by self-inflicted gunshot wound.

Our results are supportive of a model that emphasizes handgun owners (vs shotgun owners) as the firearm owners most likely to utilize their firearms to die by suicide. It appears risk does not increase as an individual accumulates more firearms, although this point may simply reflect the distribution of firearms in this particular sample. Future research should examine the number of each type of firearm owned, to determine how owning a higher number of handguns or shotguns impacts suicide risk. If individuals rapidly stockpile firearms, perhaps due to anxiety, such behavior may be indicative of risk not represented within our results.

Although informative, our findings should be interpreted within the context of their limitations. First, our sample was relatively small and we relied upon the knowledge of third party informants. It is entirely possible that loss survivors were incorrect in their assessments of the number and type of firearms owned by the suicide decedents.

Additionally, the present study used convenience sampling to recruit loss survivors. Unlike probability-based sampling procedures that allow each member of a target population to have an equal chance of being included in a study sample and therefore allow more confidence in extrapolating information beyond the sample itself, our method undoubtedly introduced sampling bias that limited the representativeness of the sample to the population overall. However, given that a majority of the current published literature on suicide prevention and firearm suicide risk examines suicide attempt survivors or other groups highly unrepresentative of firearm suicide decedents, we believe that this study is incrementally valuable even as we consider the findings preliminary. Future work using probability-based sampling methods representative of diverse geographic and cultural groups will be vital to advance our understanding of this issue. Second, the present sample size was relatively small and therefore our power may have been limited, which may have affected our results. Third, our findings were cross-sectional and, as such, we cannot draw conclusions regarding directionality and causality. Recent prospective work (Studdert et al., 2020) highlighted the risk of handgun ownership with respect to suicide and our findings build upon that by comparing firearm owning suicide decedents; however, despite the conceptual overlap of our work, our data simply are not suited to directly test important components of our model. Lastly, the present study did not inquire about rifle ownership; given that those who own rifles may represent a unique subgroup of firearm owners we encourage future studies to examine the role of rifle ownership.

Despite these limitations, we believe these findings represent an incrementally valuable addition to the literature. Most importantly, our results provide some initial insights into what differentiates firearm owning suicide decedents who do and do not use their firearms in their fatal suicide attempts. Continuing to refine our understanding of which individuals are most prone to utilizing which methods for suicide attempts will allow for improvement of means safety efforts by creating a path toward interventions that target optimal subgroups of individuals. Rather than simply relying upon broad variables (e.g., firearm access), this type of work would allow us to allocate intervention resources more effectively by highlighting subgroups of individuals most likely to benefit from specific forms of prevention.

NOTES

1. Another logistic regression controlling for age, a demographic variable associated with method selection, was run. The findings did not change. Race and sex, two variables that are also associated with method selection and number of firearms owned could not be included in the analysis because <10% of the sample was reported to identify as a race other than white or as women.

AUTHOR NOTES

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