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PSYCHIATRY & BEHAVIORAL SCIENCE*Wendy C. Regoeczi,¹ Ph.D.; and Thomas Gilson,² M.D.***Homicide–Suicide in Cuyahoga County, Ohio,
1991–2016**

ABSTRACT: Research on homicides followed by suicides has relied heavily on small samples and relatively short time spans of data. This study helps to fill this gap by examining 26 years of homicide–suicide data from Cuyahoga County, Ohio, between 1991 and 2016. The main data source for the study is medical examiner files. Analyses of the data indicate the rate of homicide–suicide in Cuyahoga County is consistent with other studies but fluctuates considerably across years studied. The majority of victims are female while perpetrators are overwhelmingly male. Black people are overrepresented as victims and offenders. Use of drugs and/or alcohol leading up to the incident is common among perpetrators. Both the homicides and suicides were overwhelming committed with firearms. When comparing our results to the typology of murder–suicides developed by Marzuk, Tardiff, and Hirsch (*JAMA* 1992;267:3179), we find amorous jealousy is a significant motivating factor in many cases, including those involving nonintimate partners. Our findings underscore the importance of widespread use of lethality assessment instruments.

KEYWORDS: forensic science, homicide, murder, suicide, depression, toxicology

Homicide–suicides refer to acts of homicide that are followed shortly thereafter by the suicide of the perpetrator (1,2). These types of homicides have typically been studied as a distinct group of acts of lethal violence, even though they represent only a small proportion of all homicides (3). For example, Marzuk, Tardiff, and Hirsch (4) estimated between 1000 and 1500 deaths in the United States result from murder–suicides annually, which translates to a rate between 0.2 and 0.3 per 100,000. This rate is largely consistent with other studies on the subject (2,5–7) including more recent research using National Violent Death Reporting System data where the reported rate was 0.23 per 100,000 (8).

Existing research on homicide–suicides has generally been limited to short time frames (3,5,8–10). At least within the United States, this has likely been due to the fact that it is not possible to identify homicide–suicide cases in the national publicly available datasets such as the Uniform Crime Report's Supplementary Homicide Reports or the National Incident-Based Reporting System. Therefore, studies of homicide–suicides in the United States have largely been conducted on smaller geographic units, including counties and states, across a limited number of years (11). A few recent exceptions exist, including research by Logan et al. (3) examining data on homicide–suicides for 17 U.S. states using National Violent Death Reporting System data, Killias et al. (12) who examined 185 homicide–suicides over a 25-year period in Switzerland, and Dawson (13) who examined intimate partner femicide–suicides for a 21-year period in

Ontario, Canada. Although several homicide–suicide studies now exist using NVDRS data, identifying such events within this dataset can be challenging and possibly lead to the inclusion of false positives (14). This study seeks to expand our knowledge of trends and patterns in homicide–suicides by examining data for a 26-year period for Ohio's largest county. Homicide–suicide cases are specifically flagged within the Cuyahoga County Medical Examiner's database and therefore are easily identifiable for extraction. Detailed case narratives for each incident were also constructed and used as the basis for applying the typology developed by Marzuk, Tardiff, and Hirsch (4). This typology, described in detail elsewhere, categorizes homicide–suicides on the basis of the victim/offender relationship and precipitating circumstances (4,9). It has been used in previous studies (5,9) of homicide–suicides, and we display its application to our data in a table later in the paper.

Prior Research on Homicide–Suicides*Victim Characteristics*

The overwhelming majority of homicide–suicide incidents involve one homicide victim (1,5,6,15–21). Females comprise two-thirds or more of these victims (1,3,5,15,16,19,21–26). The average age of homicide–suicide victims tends to be between 30 and 40 years old (5,18,23,27).

Perpetrator Characteristics

Homicides followed by suicide are very much the domain of males, who often comprise 90 percent or more of the perpetrators (3,5,23,28–34). Two exceptions to this pattern can be found in Cooper and Eaves (29) and Flynn et al. (16), the former of which focuses on homicide–suicides within the family while the

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latter was conducted in England and Wales. Women are approximately half of the perpetrators of homicide–suicides involving child victims (3). Homicide–suicides are frequently committed by white people, but the range in prior research varies from less than one-third to over 80 percent (3,4,23). Several studies report higher rates of black-perpetrated homicide–suicides than white-perpetrated (8,27). The average age of homicide–suicide perpetrators is generally between 35 and 45 years (4,5,18,23,27, 31,33). Although a couple of studies report averages slightly about 45 years of age (12,35), these studies have either focused on specific subtypes of homicide–suicides such as intimate partner cases or have been conducted outside of the United States (12,35).

Prior research indicates approximately one-quarter to one-third of homicide–suicide perpetrators are under the influence of alcohol at the time of the incident (3,8,12,13,20,27,33,34). Lower percentages have been reported in studies in Canada and Australia (28,36). Researchers have found depression is the most common mental illness among homicide–suicide perpetrators (4,5,11,22,33,37,38).

Previous studies consistently found homicide–suicides most often occur among individuals in current or prior intimate relationships, with the proportion typically ranging from half to three-quarters (1,3,5–8,10,15–20,23,25,27,39,40). A history of violence leading up to the homicide–suicide is common in these relationships, but the reported percentages range anywhere from the mid-40s to above 80 percent (3,5,13,25,30,33). Homicide–suicides of children by parents are typically the next most common form (1,7,10,16,18,31).

Incident Characteristics

The most common location of homicide–suicides is the residence of the victim and/or offender (5,17,21,25,26,37). More than 80 percent of U.S. homicide–suicides are committed with firearms (3,4,6,7,30,35). The proportion of homicide–suicides involving firearms outside of the United States is considerably smaller, falling to as low as one in six (20,41). In the one study that examined the presence of witnesses, 56% were witnessed directly or indirectly (through sound) (5).

Current Study

The aim of this study was to examine patterns of homicide–suicide cases in Cuyahoga County, Ohio over a period of more than two decades from 1991 to 2016. This is a significant advantage over previous studies comparing homicide–suicide using 5 years of data or less (1,6). The total sample size is 81 homicide–suicide incidents. Detailed information is available on each case, including demographic characteristics of victims and perpetrators, victim–perpetrator relationship, weapons used, the number of victims, the presence of witnesses, the location of the incident, day of the week, victim and perpetrator toxicology, prior domestic violence, and whether the perpetrator exhibited evidence of mental disorder.

Method

This study involves an examination of all homicide–suicides occurring in Cuyahoga County, Ohio, between 1991 and 2016. Cuyahoga County is 457 square miles and over the time period examined, the average population was approximately 1,398,800. Following the definition used by Marzuk et al. (4), events were

defined as a homicide–suicide if the suicide occurred within 1 week of the homicide. There were 81 such events involving 100 victims recorded in the county during that time.

The main data source for the study was reports provided by the Cuyahoga County Medical Examiner's Office. These reports include death certificates, autopsy results, and police reports related to the incident. Each file was reviewed and coded for information about the homicide victim(s), perpetrator, and incident. A coding sheet was used to code the number of victims, victim and perpetrator gender (male or female), race (white people or black people), ethnicity (Hispanic or non-Hispanic), age (in years), toxicology (types of substances present and amount), relationship of the perpetrator to the victim (intimate partner, exintimate partner, parent, child, other family members, friend, acquaintance, or stranger), whether the perpetrator showed evidence of depression symptoms within 6 months of the incident, the day of the week the incident occurred, the location of the homicide (victim's residence, perpetrator's residence, joint residence, workplace, vehicle, provide outdoor location, public outdoor location), type of weapon used (firearm, knife, hanging, blunt instrument, fire/arson, pills, other), whether witnesses were present at the suicide, and whether there was a known history of domestic violence for cases involving intimate partners.

Narratives were constructed of each event, which was then independently classified using Marzuk et al.'s typology. Interrater reliability was very high at 0.96. Both authors reviewed the classifications together to resolve the few discrepancies that arose.

Findings

We identified 81 homicide–suicide cases occurring in Cuyahoga County over the 26-year period. Figure 1 displays the number of cases by year during this time frame. The average rate was 0.23 per 100,000 between 1991 and 2016, but ranged from 0.07 to 0.55 per 100,000. Just over half of the homicide–suicides in the county occurred in the City of Cleveland (53%). Three suburban cities bordering on Cleveland (East Cleveland, Euclid, and Garfield Heights) each had four homicide–suicide incidents. In total, 19 of the 56 suburbs in the county had at least one case. Over 90% of the suicides occurred the same day as the homicide. In four cases (4.9%), the suicide occurred the following day. The longest length of time between the homicide and the suicide was 4 days, which occurred in one case.

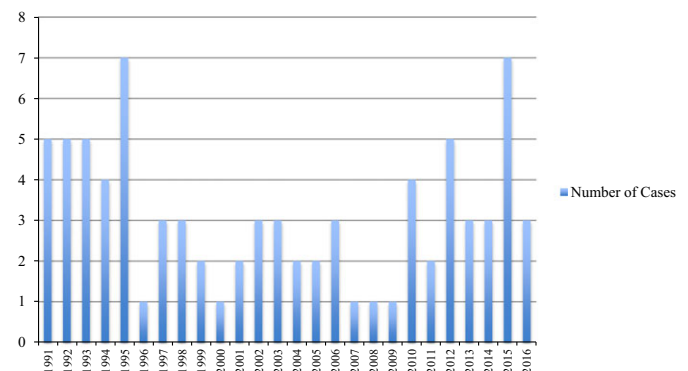


FIG. 1—Homicide–suicide incidents in Cuyahoga County, Ohio, 1991–2016.

Victim Characteristics

Homicide–suicide incidents overwhelmingly involved one homicide victim (Table 1). Multiple victims made up fewer than 20% of cases during this time period. Over three-quarters of homicide victims in homicide–suicide events were female (76.0%). Slightly less than half of the victims were Black people (48.0%). Only three of the victims identified as Hispanic. With respect to age, over half of victims were between 19 and 39 years. Fifteen percent were 18 years of age or younger. Victims who were 60 years of age and older made up the smallest percentage (14.0%). The average victim age was 34.8 years. Roughly two-thirds of victims had no alcohol or drugs in their systems at the time of death. Toxicology reports showed alcohol in 15.0% of victims, drugs in 16% of victims, and both alcohol and drugs in one victim (1.0%).

Perpetrator Characteristics

Perpetrators of homicide–suicide events were overwhelmingly male (93.8%) (Table 2). Just over half of the perpetrators were Black people (54.3%). All of the homicide–suicides were intraracial in nature. Four perpetrators were Hispanic (4.9%). The majority of perpetrators are between the ages of 19 and 39 (58.0%), followed by 40–59 years (25.9%). The smallest age group consisted of those 60 years and older (16.1%). The average age of perpetrators was 42.3 years.

A higher percentage of perpetrators than victims tested positive for substances at the time of the incident. Toxicology reports for the perpetrators indicated just over half showed no alcohol or illegal substances (50.6%), 22.8% had alcohol in their system, 17.7% had drugs in their system, and 8.9% had both. In 32 cases (39.5%), there was evidence the perpetrator had experienced symptoms of depression in the period leading up to the incident. In at least 13 of these, there was an official diagnosis of depression and eight perpetrators had a known history of suicide attempts. Only two perpetrators clearly lacked a history of

TABLE 2—Perpetrator characteristics in homicide–suicide incidents, 1991–2016, Cuyahoga County, Ohio (N = 81).

Perpetrator gender	
Female	5 (6.2%)
Male	76 (93.8%)
Perpetrator race	
Black people	44 (54.3%)
White people	37 (45.7%)
Perpetrator ethnicity	
Hispanic	4 (4.9%)
Non-hispanic	77 (95.1%)
Perpetrator age	
19–39 years	47 (58.0%)
40–59 years	21 (25.9%)
60 years and over	13 (16.1%)
Perpetrator toxicology	
No substances present	40 (50.6%)
Alcohol only	18 (22.8%)
Drugs only	14 (17.7%)
Both alcohol and drugs	7 (8.9%)
Missing	2
Perpetrator evidence of depression symptoms	
Yes	32 (39.5%)
No	2 (2.5%)
Unknown	47 (58.0%)
Perpetrator relationship with victim	
Intimate partner	47 (47.0%)
Exintimate partner	14 (14.0%)
Parent	11 (11.0%)
Child	2 (2.0%)
Other family	9 (9.0%)
Friend/Acquaintance	10 (10.0%)
Other	7 (7.0%)

depression symptoms and, most commonly (58%), this history could not be elicited in retrospective review. Given the large percentage of cases missing data on mental health history, these findings should be interpreted as a conservative estimate of the degree to which perpetrators exhibit a history of depression prior to the homicide–suicide. With respect to the relationship of the perpetrator to the victim, over half of the victims were killed by an intimate or exintimate partner (61%). The next most common relationship categories were parents (11.0%) and friends and acquaintances (10.0%).

Incident Characteristics

About one-quarter of homicide–suicide incidents occur on the weekends (Table 3). Over one-third occurred in a joint residence, and another one-quarter took place in the victim's residence. Both the homicides and suicides were overwhelming committed with firearms (93.8% and 96.3%, respectively). The vast majority of suicides following homicides occurred without witnesses (70.4%).

We collected information on whether a history of domestic violence existed in cases involving intimate partners. This information was available in two-thirds of such cases. Among those cases, 61.5% had a clear history of domestic violence. We were also able to identify 20 cases where the perpetrator engaged in a pattern of jealousy toward the victim and 13 cases where the perpetrator actively stalked the victim.

We used the typology developed by Marzuk, Tardiff, and Hirsch (4) to classify each homicide–suicide case in our data. By far, the most common was type I2iiA, or consensual/jealousy, which accounted for more than one-quarter of the cases (Table 4). The second most common was IIiA (spousal/jealousy), followed by IIIA (extrafamilial/jealousy). In

TABLE 1—Victim characteristics in homicide–suicide incidents, 1991–2016, Cuyahoga County, Ohio (N = 100).

Characteristic	Frequency (%)
Number of victims	
1	66 (81.5)
2	13 (16.1)
3 or more	2 (2.4)
Victim gender	
Female	76 (76.0)
Male	24 (24.0)
Victim race	
Black people	48 (48.0)
White people	52 (52.0)
Victim ethnicity	
Hispanic	3 (3.0)
Non-Hispanic	97 (97.0)
Victim age	
18 years and under	15 (15.0)
19–39 years	55 (55.0)
40–59 years	16 (16.0)
60 years and over	14 (14.0)
Victim toxicology	
No Substances present	68 (68.0)
Alcohol only	15 (15.0)
Drugs only	16 (16.0)
Both alcohol and drugs	1 (1.0)

TABLE 3—Incident characteristics in homicide–suicide incidents, 1991–2016, Cuyahoga County, Ohio (N = 81).

Characteristic	Frequency (%)
Weekday/Weekend	
Monday–Friday	48 (73.8)
Saturday or Sunday	17 (26.2)
Homicide location	
Victim's residence	20 (24.7)
Perpetrator's residence	10 (12.3)
Joint residence	30 (37.0)
Other indoor location	11 (13.6)
Outdoor location	5 (6.2)
Vehicle	5 (6.2)
Homicide weapon	
Firearm	76 (93.8)
Knife	2 (2.5)
Strangulation/Suffocation	3 (3.7)
Suicide weapon	
Firearm	78 (96.3)
Knife	2 (2.5)
Hanging	1 (1.2)
Witnesses present at suicide	
Yes	24 (29.6)
No	57 (70.4)
History of domestic violence	
Yes	24 (38.1)
No	15 (23.8)
Unknown	24 (38.1)
Not Applicable*	18 (22.2)

*Case does not involve intimate partners.

fact, amorous jealousy was the “class” of 52 of the 100 cases. It is clear this is a significant motivating factor in a large number of homicide–suicide cases. It is also interesting to note that this class is not limited to cases involving intimate partners. In Cuyahoga County, jealousy was a central theme of homicide–suicides resulting in the deaths of noninfant children, adult family members, and nonfamily members. Although mercy killings are another well-known type of homicide–suicide, only eight of these cases occurred in the 26-year period under examination here, the majority of which involved ailing elderly spouses.

Discussion and Conclusion

An examination of 26 years of homicide–suicide data for Cuyahoga County, Ohio, reveals a rate of 0.23 per 100,000, which is relatively consistent with other U.S.-based research on the topic. However, this rate does fluctuate considerably over the time period examined. These incidents occur disproportionately in the city of Cleveland; while Cleveland accounts for approximately one-third of the population in the county, they account for about half of the homicide–suicides.

Many of the victim, perpetrator, and incident patterns identified in this study replicate prior research on homicide–suicides, particularly with respect to the overrepresentation of males as offenders, females as victims, firearms as weapons, and residences as locations. The average age of offenders (42.3 years) and victims (34.8 years) is also consistent with previous studies. The percentage of Black people victims (48.0%) and perpetrators (54.3%) in our data is higher than in many previous studies and is likely due to the large number of these events occurring within the city of Cleveland (which has a large minority population). Similar racial distributions have been seen in other studies with mixed suburban/rural and large urban areas (9,42).

TABLE 4—Classification of homicide–suicides using Marzuk, Tardiff, and Hirsch typology, Cuyahoga County, Ohio (N = 100).

	Frequency
<i>I. Spousal or consortial</i>	
Perpetrator	
1. Spouse	
i. Uxoricide	
A. Amorous jealousy	18
B. Mercy killing	5
C. Altruistic/extended suicide	4
D. Familial financial or social stressors	2
E. Retaliation	0
F. Other	1
G. Unspecified	1
2. Consort	
ii. Consortial	
A. Amorous jealousy	26
B. Mercy killing	0
C. Altruistic/extended suicide	0
D. Familial financial or social stressors	1
E. Retaliation	0
F. Other	2
G. Unspecified	3
<i>II. Familial</i>	
Perpetrator	
1. Mother	
i. Neonaticide	0
ii. Infanticide (>1 day, <1 year)	0
iii. Pesticide (1–16 years)	
C. Altruistic/extended suicide	2
iv. Adult family member (>16 years)	
C. Altruistic/extended suicide	1
2. Father	
ii. Infanticide (>1 day, <1 year)	
A. Amorous jealousy	1
iii. Pesticide (1–16 years)	
A. Amorous jealousy	1
B. Mercy killing	1
C. Altruistic/extended suicide	1
D. Familial financial or social stressors	2
iv. Adult family member (>16 years)	
F. Other	1
3. Child (under 16 years)	0
4. Other adult family member (over 16 years)	
iii. Pesticide (1–16 years)	
A. Amorous jealousy	1
iv. Adult family member (>16 years)	
A. Amorous jealousy	2
B. Mercy killing	2
E. Retaliation	4
G. Unspecified	4
<i>III. Extrafamilial</i>	
A. Amorous jealousy	8
B. Mercy killing	0
C. Altruistic/extended suicide	0
D. Familial financial or social stressors	1
E. Retaliation	4
F. Other	1
G. Unspecified	0

We also examined some variables that have been studied less frequently, including alcohol/drug use, mental health history, day of the week, and the presence of witnesses. Our findings show alcohol and/or drugs were present in almost half of perpetrators and about one-third of victims. Exhibition of depression symptoms by the perpetrator prior to the event was also common. A history of depression within the context of domestic violence in particular may indicate a risk of harm to both self and partner.

Based on an examination of the detailed narratives constructed for each event, it is clear that women who have left or are trying to leave abusive relationships constitute the largest group of

victims in murder-suicide cases in Cuyahoga County. In this respect, our findings provide support for theoretic perspectives emphasizing the importance of male sexual proprietariness, power, and control as factors underlying violence (43,44). We need to continue to educate domestic violence victims regarding the risk factors for lethal violence by their intimate partners at this particularly volatile time in the relationship. Greater implementation of lethality assessment tools may be a particularly effective way to help victims gain a true sense of extent of the danger posed by their partner. More attention should also be given to warning signs that elderly caretakers are overwhelmed by the duties of caring for a spouse in poor health. Although a considerable range of homicide-suicide types were identified using the Marzuk et al. classification, those involving intimate partners are still the most prevalent. Consistent with prior research indicating it is rare for mothers who kill infants to commit suicide (37,45,46); none of the homicide-suicides in Cuyahoga County during this 26-year period involved mothers committing neonaticide or infanticide.

Utilization of the Marzuk et al. typology has been criticized for imprecision (9,42). We found the classification to be generally acceptable but not without difficulties. In practice, its relative simplicity is preferable to more detailed (yet cumbersome) methodologies in our experience although its simpler form does sacrifice some epidemiological detail that might be more useful in a more in-depth survey.

The length of the current study period offers the benefit of a larger study population compared to most previous studies where the study intervals were relatively short and the number of homicide-suicide events was smaller. This may also be a limitation in our research in that the length of time studied covers a period where the understanding of domestic violence and the response to it (and other related risk factors) was evolving and this evolution may limit the comparability of earlier and later data and runs this risk of missing temporally overlapping trends. This seems less likely given the similarity to data in previously published smaller studies that cover much of the time examined in our present research. The impact on homicide-suicide of evolving societal responses to its risk factors is an area worthy of future study, especially as incidence rates appear to have remained stagnant for decades. The stagnation may reflect the lack of efficacy of current intervention strategies or the difficulty reaching a refractory population with deeply entrenched social concepts. The latter scenario would imply the need for further, more intensive and directed educational efforts while the former would require a rethinking of intervention approaches and the development of better strategies.

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