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In the Name of Love or Hatred: a Systematic Comparison Between Filicide-Suicide and Mariticide/Uxoricide-Suicide in Hong Kong

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Abstract
While much of work on homicide-suicide (HS) arises out of the USA and the UK, there is a paucity of research on HS outside of the Anglo-American sphere. This paper investigates HS in Hong Kong (HK), comparing the subtypes of filicide-suicide (FS) and mariticide/uxoricide-suicide (MUS) in that context as a means of testing the generalizability of past studies. Data from the HK Special Administrative Region (HKSAR) government and the HK Police Force reports retrieved 156 cases from 2000 to 2019. In that timeframe, HS resulted in 261 deaths, with MUS being the most prevalent type of HS. Male offenders and female victims are more commonly seen. Offenders are generally older than their victims, and over half of offenders are married. FS and MUS display distinct characteristics in terms of offender and victim demographics, relationship dynamics, motives, and mode of killing. Depressed mothers tend to victimize their sons in FS as a means of saving their sons from a perceived miserable future, whereas male offenders aggress upon their female partners in MUS to alleviate their own frustrations, subsequently dying by suicide out of sorrow or a fear of consequence. MUS offenders are more hostile towards their victims and tend to kill with aggressive means, whereas FS offenders are more likely to kill with altruistic motives and with minimal force. These results match patterns of MUS and FS in the Anglo-American sphere, but with some important differences in terms of the use of guns and the presence of altruistic killing.

Keywords Homicide-suicide · Filicide · Mariticide · Uxoricide · Hostility · Altruism

Homicide-suicide (HS) is a phenomenon in which an offender dies by suicide after murdering another person(s) (Banks et al., 2008; Barber, et al., 2008; Chan, 2007; Fridel & Zimmerman, 2019; Haines, Williams, & Lester, 2010; Harper & Voigt, 2007; Liem, 2010; Malphurs et al., 2001). HS is a complex phenomenon, and the attempt to categorize HS and its various subtypes for theoretical interpretation has become a mainstay for research over the past thirty years. Researchers have analyzed HS according to relationships between

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the offenders and victims (Banks et al., 2008; Cohen et al., 1998), offender characteristics (Barber, et al., 2008; Haines et al., 2010; Holmes & Holmes, 2001; Malphurs et al., 2001), case characteristics (Yip et al., 2008), and motives (Chan, 2007; Cooper & Eaves, 1996; Marzuk, et al., 1992).

As the name implies, HS contains both homicidal and suicidal components. That said, it is a phenomenon with its own characteristics and etiology—it cannot be reduced to a simple co-occurrence of homicide and suicide. For example, Liem and Nieuwbeerta (2010) compared HS with homicide-only and suicide-only cases, finding that HS offenses were more likely to result in multiple victims as compared with simple homicide cases. HS also occurred in urban domestic settings more often than regular suicide events. However, like regular homicides and suicides, most suicides in HS involved the use of firearms (Liem and Nieuwbeerta, 2010). Meanwhile, HS offenders were on average older than homicide offenders, and HS victims were found to be predominantly female or children under 12.

The psychodynamics of HS cases have also long been understood to be distinct from other cases of simple suicide or homicide. In a classic study, Dollard et al. (1939) showed that HS often occurs according to a predictable sequence: offenders first externalize their aggression by killing their victim to alleviate frustration, after which they become suicidal upon realizing that they had not only lost the source of their suffering, but also their source of nurturance. This conflicting perception—where the victim is simultaneously the person to whom they are positively attached and also the cause of their misfortune—creates such frustration within offenders that they decided to die (or attempt to die) by suicide (Fridel & Zimmerman, 2019; Harper & Voigt, 2007; Henry & Short, 1954).

Although such work led Liem and Nieuwbeerta (2010) to compellingly argue that HS is a distinct phenomenon deserving attention in its own right because it differs in important ways from both homicide and suicide, many researchers nevertheless continue to analyze HS through either a homicidal (Stack, 1997; Wallace, 1986) or suicidal (Palmer & Humphrey, 1980; West, 1965; Wolfgang, 1958) interpretive frame. Treating HS as an issue that deserves attention in its own right, this study engages in a systematic comparison between its two most common subtypes: mariticide/uxoricide-suicide (MUS), in which someone kills their intimate partner before dying by suicide, and filicide-suicide (FS), in which parents kill a child before dying by suicide.

The etiology of HS is complex, with different processes of origination corresponding to its different subtypes. In cases of MUS, offenders tend to be motivated by jealousy and/or ambivalence in long-term relationships which leads to long-term agitations (Berman, 1996; Stack, 1997). Berman (1996) also suggested a major trigger for MUS comes from separation anxiety and the fear of abandonment. These feelings of unease cause an accumulation conflict between partners, and eventually, homicide results from a rupture within an already fragmented relationship (Saleva et al., 2006). Harper and Voigt (2007) pointed to gendered status differentials as being important for the emergence of homicide in these cases, noting that it tended to occur more often when female victims hold a comparatively favorable profession while male perpetrators are either unemployed or have lower- or middle-class jobs. Such gender discrepancies, occurring against the backdrop of patriarchal expectations, posed a threat to the offenders' self-esteem, leading to homicide as a means of exerting control over a partner (Wolfgang, 1958; see also Stack, 1997). Chan (2005) supported this finding with an examination of cases in Hong Kong and additionally proposed that cultural differences and social isolation related to cross-border marriage was an important contributing factor. Meanwhile, female offenders with mental illness—typically a major depressive disorder—tended to display over-controlling and dependent dispositions (Chan, 2005; Liem & Roberts, 2009). When the victim threatened to leave the offender, both male

and female offenders often experienced jealousy, loss of control, and separation anxiety, which aggressed in the form of homicide, followed by suicide stemming from the guilt of killing their partner (Harper & Voigt, 2007). These offenders showed patterns of fixation over specific frustrations and they tended to ruminate on their partners as the culprit of their misfortune, hence committing HS to express a retributive hostility. The presence of hostility thus differentiates MUS in terms of the offenders and the victims' relationship, the motives for action, and the modes of killing. Hostility is present when offenders hold their victims accountable for their misfortunes and go on to aggress upon their victims after a dispute (Chan, 2007). After such aggressive actions, however, offenders then tend to take their lives as a means of escaping from loss, guilt, and legal consequences.

The dynamics that lead to filicide-suicide (FS) are much different. FS involves instances where someone murders a family member to spare them from illness or to prevent burdens that would befall their care-receiver as a result of deteriorating health. Literature shows that offenders in these cases are predominantly unemployed males or elderly individuals who were afflicted with chronic illness, with deteriorating capability to live alone, and with an increasing sense of hopelessness. These individuals believe that their suicide could lessen the burden of their loved ones (Malphurs et al., 2001). These males are impelled by dependent-protective motives, believing that their families would not be able to live without their protection (Berman, 1979). Their recognition of personal failure and overwhelming stress prompts them to kill their children due to a sense of parental responsibility or deluded altruism in which they "protect" their children from what they perceive as a hopeless future (Harper & Voigt, 2007; Stack, 1997; West, 1965). Such motivations were also seen in familicide-suicide where male perpetrators who were the breadwinners kill themselves and their family members after experiencing a sudden financial crisis or unemployment. Yip et al. (2008) have theorized that the existence of such "delusional altruism"[1] is perhaps more common in Asian societies, where traditions of filial piety lead parents to believe that they have a responsibility to shield their children or care-receivers from future harms. Because individuals within Asian cultures typically have strong identifications with family (Heine, 2016), we hypothesize that delusional altruism in FS will account for a relatively high proportion of offenses as compared with MUS in Hong Kong. Given the limited amount of research on HS in Asian contexts, the relationship between hostility and altruistic motives as they relate to the subtypes of HS deserves greater scrutiny.

While there has been little done in this area in East Asia, past research does show that geographic and cultural differences do shape HS in important ways. For example, Liem et al. (2010) compared HS with homicide and suicide cases between the Netherlands, Switzerland, and the USA, finding that HS cases in Switzerland and the USA showed a disproportionate use of firearms, reflecting the relatively high prevalence of gun ownership in those regions (Liem and Nieuwbeerta, 2010). Meanwhile, in the Netherlands, HS among the elderly was less common than HS involving children given the fact that euthanasia is legal there (Liem and Nieuwbeerta, 2010). Gathering data from "non-Western" locales is thus important for broadening the comparative frame for this type of research. A study on HS in Hong Kong was conducted during the early 2000s, comparing HK with international samples. Chan et al. (2003) found a wide range of similarities in offenders' and victims' backgrounds and relationship disputes as the major cause of HS between data from the USA, the UK, Australia, and HK. They also revealed, however, a disproportionately high occurrence in HK of FS, and

[1] The term "delusional altruism" refers to situations where someone commits a homicide out of a desire to protect their victim.

a bigger proportion of HS offenders displaying signs of economic distress, with a lack of the use of firearms and a relative absence of mercy killing involving elderly perpetrators (*ibid*., 2003). This study was the first and only systematic analysis that identified some key differences and similarities between Western literature and data grounded in an Asian context. The present study attempts to update and validate the above arguments with data on contemporary HS cases in Hong Kong from 2000 to 2019.

Methods

Data was collected from archival sources, including official reports from the Government of Hong Kong and reports from the Hong Kong Police Force. News reports were used for cross-checking and augmenting this data. The study was pre-registered on Open Science Framework on 15 January 2020, and ethics approval was granted by the Institutional Review Board of the University of Hong Kong on 17 January 2020.

For the purposes of this analysis, HS is defined as the occurrence of any homicide followed by suicide, including attempted homicide and attempted suicide. All HS cases in HK occurring between 2000 and 2019 were included. These data were collected through public sources after the termination of the Hong Kong Homicide Monitoring Database. The data were first collected from the Hong Kong Police Force's press release reports which are released on their website. Cases were categorized as homicide, suicide, attempted homicide, and attempted suicide. Homicide-only and suicide-only cases were excluded. The time and location of the incident, the relationship between the offenders and the victims, the number of the offenders and the victims, the age and gender of the offenders and the victims, the physical condition of the offenders and the victims, the mental health condition of the victims, the offenders' reasons for killing and suicide, the marital status of the offenders, the financial situation of the offenders, the offenders' use of alcohol and/or use of hypnotics on victims, the presence of suicidal ideation of the offenders, the offenders' history of violence, and the involvement of the Social Welfare Department or non-governmental organizations were all collected. This information was then collected again after accessing HKSAR government press release reports, which are available online for public access. These two sources comprise the core of the dataset. Next, news articles were collected and used for cross-checking and to add contextual information. In cases where there was a discrepancy between information contained in the news articles and official reports, the information from the news article was excluded.

Other information such as the nature of the incident, the modes of killing, the causes of death of the offenders and the victims and the offenders' reasons of killing and suicide, the presence of infidelity in a relationship, the presence of economic difficulty, separation anxiety, hostility towards the victim(s), signs of planning before the offense, and signs of suicidal ideation in the offenders were deduced, where possible, from the investigative reports and news reports. Other information, such as whether the homicide and the suicide happened within 24 h of one another and whether the homicide and the suicide happened at the same time, death rates of the offenders and the victims, and the age difference between the offenders and the victims, were also calculated. Some of these parameters were adopted from Yip et al. (2008), who classified HS into clusters of six important factors including motives, killing method, offender–victim relationships, planning, and disputes within 24 h prior to the homicide, and Chan et al. (2003), who researched HS in HK specifically. The notion of hostility was adopted from Chan (2007), and the idea of delusional altruism was

adopted from Yip et al. (2008). Unlike these past studies, however, our study is unique in that it singles out FS and MUS for direct comparison.

The data was tabulated into an Excel file and coded as 0 s and 1 s to represent the absence or presence of the binary parameters for further analysis. All results were analyzed using R-studio, and linear and logistic regression models were applied. All personal information collected was publicly available, but names were not included during data processing, since only the offenders' and victims' age and gender were deemed relevant for the analysis.

Results

Overview of HS

Our sample included 156 cases between 2000 and 2019 in HK, causing 261 deaths. These 156 cases included 96 fatal HS cases and 60 attempted HS cases. Fatal HS cases were cases where the offenders and the victims both died in the incident, whereas attempted HS refers to instances where either the offender and/or the victim had not died in the incident. Attempted HS cases were included because we feel the intention to carry out HS is itself an important indicator of HS trends. FS ($N=55$) and MUS ($N=60$) each accounted for more than one-third of all HS cases, followed by extra-familial HS ($N=19$; 12.18%), familicide-suicide ($N=13$; 8.33%), and parricide-suicide ($N=9$; 5.77%) (a rare form of HS, parricide-suicide refers to cases where the offspring kills their parent(s) before attempting suicide. Also comparatively rare and excluded from the main comparison pursued in this paper, familicide-suicide involves HS between blood relations such as offspring *and* spouse other than FS-only and MUS-only cases).

Offenders' Characteristics and Their Relationships with Their Victims

Of the five types of HS, there were 161 offenders in total with 65.84% being male ($N=106$) and 59.59% of 193 victims being female ($N=115$) (see Table 1). Ninety-seven of all HS cases involved male offenders victimizing female individuals as compared with 39 cases involving male victims. Forty-one cases involved female offenders aggressing upon male victims, compared with 22 cases with female offenders targeting female victims. Data showed that male offenders were more likely to target female victims and vice versa ($\beta=-0.47$, $p<0.001$). Furthermore, female FS offenders were more likely to commit FS as compared with other types of HS ($\beta=0.50$, $p<0.001$), while male HS offenders tended to commit MUS ($\beta=-0.25$, $p<0.01$), familicide-suicide ($\beta=-0.16$, $p<0.05$), and extra-familial-suicide ($\beta=-0.21$, $p<0.01$).

Meanwhile, almost all HS cases involved one offender only ($N=151$; 93.79%), and about 85% of HS cases involved only one victim ($N=132$). A large majority of the offenders ($N=138$; 88.46%) performed a fatal suicide attempt within 24 h of the murder. Female offenders in particular were more likely to die right after aggressing upon their victim ($\beta=0.17$, $p<0.05$), while extra-familial HS offenders were less likely to die immediately after their offenses ($\beta=-0.37$, $p<0.001$). 67.08% of the perpetrators and 79.27% of the victims died in HS.

On average, the offenders were 44.40 years old ($SD=14.11$; $\sigma_{\bar{x}}=1.02$), whereas the victims were 29.86 years old ($SD=24.44$; $\sigma_{\mu}=1.76$), and male offenders tended to

Table 1 Features of HS cases, offenders, and victims in Hong Kong

Features			
Number of cases	$N=156$		
Types of HS			
Parricide-suicide	$N=9$	5.77%	
FS	$N=55$	35.26%	
MUS	$N=60$	38.46%	
Familicide-suicide	$N=13$	8.33%	
Extra-familial HS	$N=19$	12.18%	
Number of casualties (offender:victim)	161:193		
Gender of HS offenders (male:female)	106:55		
Gender of HS victims (male:female)	78:115		
Male offender vs female victim	$N=97$		
Male offender vs male victim	$N=39$		
Female offender vs male victim	$N=41$		
Female offender vs female victim	$N=22$		
Suicide after homicide within 24 h	$N=138$	88.46%	
Age of HS offenders	$\mu=44.40$	$SD=14.11$	$\sigma_{\bar{x}}=1.02$
Age of HS victims	$\mu=29.86$	$SD=24.44$	$\sigma_{\mu}=1.76$
Death rate of HS offenders	$N=108$	67.08%	
Death rate of HS victims	$N=153$	79.27%	

Table 1 illustrates the features of HS cases in Hong Kong, including the types of HS, demographic information of HS offenders and victims. The data showing the number of cases with different gender in the offenders and victims displayed all relationships between each offender and victim. The total number does not equal to the number of cases since there might be more than one offender or victim in a case

be older than female offenders ($\beta=-0.28$, $p<0.001$). There was an age difference of 21.58 years on average between the offenders and their victims, while male victims were younger than female victims ($\beta=0.20$, $p<0.01$). Furthermore, male offenders would be more likely to aggress on younger victims ($\beta=-0.30$, $p<0.001$). When the age difference between the offenders and the victims grew bigger, the offender tended to be a female ($\beta=0.34$, $p<0.001$). Results showed that older victims tended to coincide with older offenders and younger offenders result in younger victims ($\beta=0.51$, $p<0.001$). Most female offenders ($\mu=39.04$ years old; $SD=10.52$ years old) were younger than male offenders ($\mu=47.21$ years old; $SD=14.95$ years old), and both male ($\mu=24.09$ years old; $SD=24.62$ years old) and female ($\mu=33.78$ years old; $SD=23.63$ years old) victims tended to be younger than their offenders. 43.01% of all victims were under the age of 18 ($N=83$), and males below 10 years old were disproportionately victimized ($N=66$; 34.20%).

Table 2 illustrates a list of characteristics of HS offenders in HK. Although data revealed that about half of the offenders were married, the five marital statuses (i.e., single, married, divorced, separated, and widowed) were not mutually exclusive. 17.95% of the cases involved cross-border marriages between mainland China and HK (see Table 2). About 30% of the offenders had shown signs of separation anxiety whereas 18.59% of the offenders displayed relationship infidelity. 28.57% of the offenders were unemployed at the time of their offense. Nevertheless, most offenders showed evidence of planning before the murder and the suicide as stated in their suicide note and preparation of means of homicide

Table 2 Characteristics of HS offenders

Characteristics	*N*	%
Marital status		
Single	34	21.12%
Married	79	49.07%
Divorced	25	15.53%
Separated	11	6.83%
Widowed	3	1.86%
Relationship infidelity	29	18.59%
Mainland China-HK marriage	28	17.95%
Employment status		
Employed	46	28.57%
Unemployed	59	36.65%
Retired	8	4.97%
History of mental disorder	43	26.71%
Economic difficulty	62	39.74%
Separation anxiety	47	30.13%
Hostility to victim	88	54.66%
Planning before offense	97	62.18%
Previous history of violence	12	7.45%
Suicidal ideation	15	9.32%
Use of hypnotics to victims	27	13.99%
Use of drugs or alcohol	11	6.83%
Involvement of SWD or NGO	15	9.62%

Table 2 illustrates the characteristics of HS offenders, including their demographics, risk factors of offense, and features prior to the offense by the number and portion of cases out of all HS cases

and/or suicide (e.g., sealing windows, burning charcoal). The offender(s) in 39.74% of HS cases had displayed signs of economic difficulty prior to the offense. The presence of economic difficulty was defined as offenders who were described by their close relatives as having suffered from a significant drop in income or savings or being recipient(s) of comprehensive social security assistance. Financial struggle and unemployment were therefore classified as a predisposing factor for offense. Unfortunately, the Social Welfare Department (SWD) or non-governmental organizations (NGOs) only had prior contact with 9.62% of the cases in this study, suggesting a relatively low detection rate for potentially violent situations.

In addition, roughly half of the offenders displayed hostility to the victims. Hostility is the attitude of the offenders who blame their victims for their own suffering and who intend to inflict harm upon their victims, typically after a conflict (Chan, 2007). The presence of hostility is operationalized as any signs or acts of aggression of which the offenders impose towards their victim, whom they wish to blame for their misfortune. Choice of weapon (i.e., the use of sharp utensils and fire), number of injuries found on the victim, reports from neighbors and relatives about conflicts existed between the offender(s) and the victim(s) or presence of separation anxiety seen in the offenders, and the recovery of suicide note (i.e., direct expressions of motive from offenders) can serve as an indication of hostility in the offenders towards their victims. Data showed that hostility was

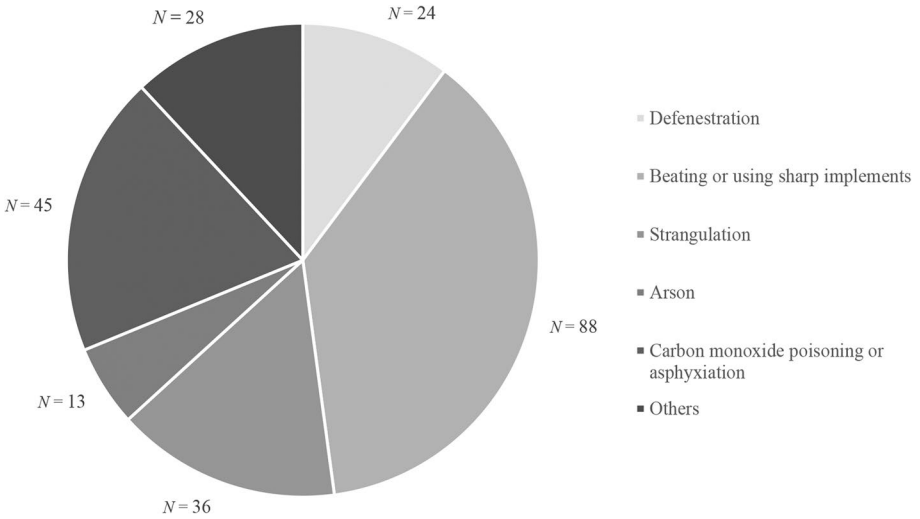

Fig. 1 HS offenders' modes of killing. Note: Fig. 1 displays the modes of killing HS offenders practiced during their offenses

more apparent in male offenders ($\beta = -0.45$, $p < 0.001$). Those HS offenders with hostility tended to victimize females ($\beta = 0.26$, $p < 0.001$) and older individuals ($\beta = 0.43$, $p < 0.001$). HS offenders who have planned their offense had fewer hostile intentions towards their victims; likewise, those offenders who kill out of impulsiveness were more hostile towards their victims ($\beta = -0.20$, $p < 0.05$). HS offenses that were planned ahead of time tended to result in male victims ($\beta = -0.22$, $p < 0.05$).

Furthermore, 26.71% of offenders suffered from mental illness ($N = 43$), and female offenders tended to be afflicted with mental health illnesses ($\beta = 0.21$, $p < 0.05$). Of those offenders with known mental illness, more than a quarter of the mentally ill offenders were diagnosed with major depressive disorder ($N = 12$), followed by 13.95% had postpartum depression ($N = 6$) and 6.97% were schizophrenia patients ($N = 3$).

Prior to committing HS, 9.32% of the offenders had attempted suicide or had presented with suicidal ideation as seen in their suicide note and/or from relatives or neighbors and 8.70% of the offenders had a previous history of violent offense(s). However, there was no evidence regarding the relationship between having a history of violence and greater hostile intention towards their victims ($\beta = 0.15$, $p > 0.1$), but these offenders tended to victimize more individuals ($\beta = 0.27$, $p < 0.01$). 13.99% of HS cases showed that the offenders had drugged their victims with hypnotics before the offense, and female offenders were more likely to use hypnotics ($\beta = 0.20$, $p < 0.05$). 6.83% of HS offenders were under the influence of medications or alcohol at the time of the offense.

Modes of Killing, Offenders' Causes of Death, and Motives

This study drew partially from Chan et al.'s (2003) categorization of offenses in terms of how the offender killed the victims and treated the corpse (see Fig. 1). Data revealed that the most common mode of killing was beating or use of sharp implements to stab or slit vital locations ($N = 88$; 37.61%), followed by carbon monoxide poisoning or asphyxiation ($N = 45$; 19.23%) and strangulation ($N = 36$; 15.38%). Approximately 80% of the victims

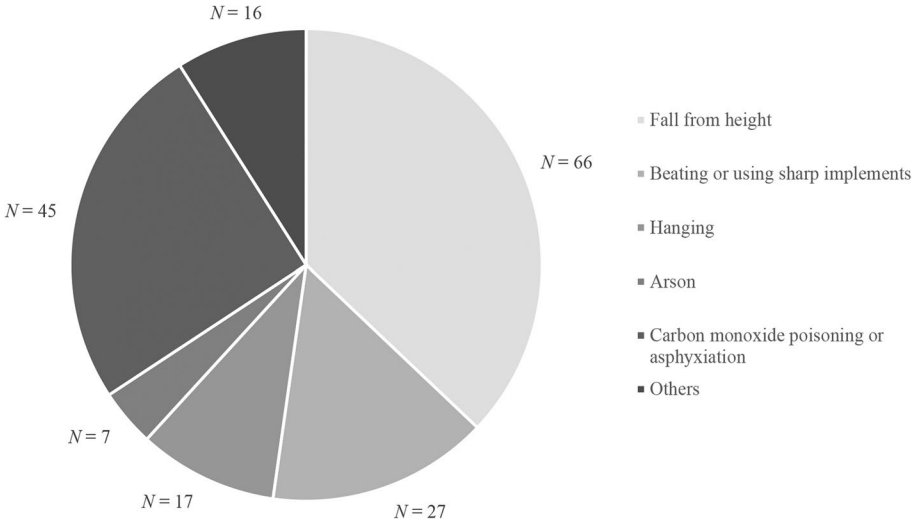

Fig. 2 HS offenders' causes of death. Note: Fig. 2 displays HS offenders' causes of death during or after their offenses

died in HS ($N=153$). Victims who are defenestrated ($\beta=-0.26$, $p<0.001$) in HS tended to be younger than their offenders and younger offenders tended to defenestrate their victims ($\beta=-0.16$, $p<0.05$). HS offenders preferred to kill females ($\beta=0.18$, $p<0.05$) and older victims ($\beta=0.40$, $p<0.001$) with sharp instrument to stab or slit vital locations. Offenders who preferred killing younger ($\beta=-0.33$, $p<0.001$) and male ($\beta=-0.16$, $p<0.05$) victims aggressed through carbon monoxide poisoning or asphyxiation; these offenders tended to be male ($\beta=-0.32$, $p<0.01$). Data also showed that offenders who stabbed or slit vital areas of their victims using sharp implements were more hostile ($\beta=0.53$, $p<0.001$) as compared to those who used carbon monoxide poisoning or asphyxiation ($\beta=-0.47$, $p<0.001$) and with other means ($\beta=-0.21$, $p<0.01$). Older victims tended to be burned by HS offenders ($\beta=0.17$, $p<0.05$). Male offenders were more likely to use other means to kill ($\beta=-0.17$, $p<0.05$).

Cause of death refers to how the offenders died during or after the offense. Many offenders sought to die by falling from height ($N=66$; 37.08%), usually from their residence, followed by carbon monoxide poisoning or asphyxiation ($N=45$; 25.28%) and beating or by the use of sharp implements to stab or slit vital locations ($N=27$; 15.16%) (see Fig. 2). Only about two-thirds of offenders died as compared with their victims ($N=108$). Offenders who died by falling from height tended to kill younger ($\beta=0.16$, $p<0.05$) and female victims ($\beta=0.18$, $p<0.05$). Those offenders who committed a fatal suicide attempt by burning were also more likely to kill female victims ($\beta=0.18$, $p<0.05$). HS offenders who chose to die from carbon monoxide poisoning or asphyxiation tended to kill younger ($\beta=-0.32$, $p<0.001$) and male ($\beta=-0.16$, $p<0.05$) victims, and these offenders tended to be younger ($\beta=-0.22$, $p<0.01$) and female ($\beta=0.21$, $p<0.01$). Moreover, offenders who died from falling from height tended to be more hostile to their victims ($\beta=0.21$, $p<0.01$) while those who died from and killed by carbon monoxide poisoning or asphyxiation were less likely to be hostile ($\beta=-0.46$, $p<0.001$). Interestingly, those offenders who stabbed themselves to death were not as hostile to their victim ($\beta=0.16$, $p<0.1$) as compared with those who fell from height.

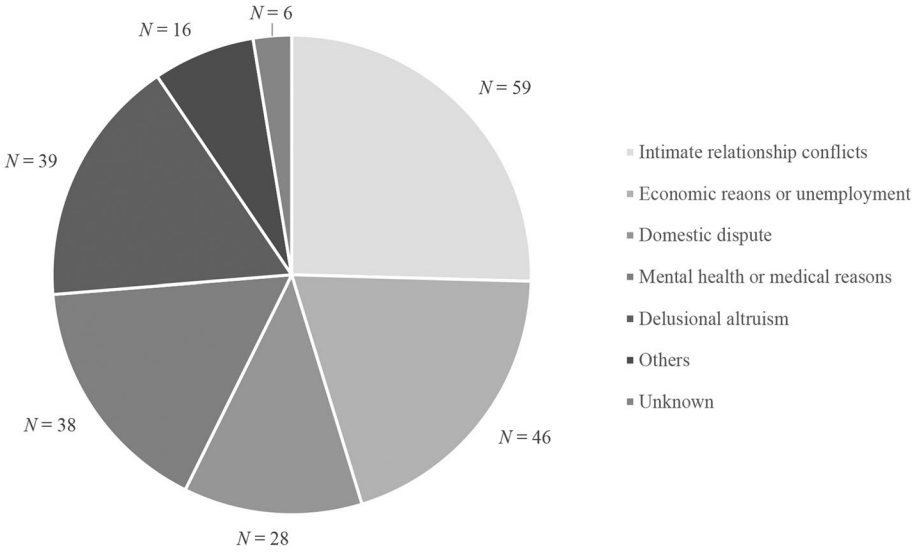

Fig. 3 HS offenders' reasons of killing. Note: Fig. 3 displays HS offenders' reasons of killing their victims

In most cases, the method of killing was the same as the method of suicide with over half of the offenders ($N=105$) choosing the same means of homicide as their suicide. Offenders who defenestrated their victim were also more likely to fall from height to die ($\beta=0.35$, $p<0.001$). This pairing was also evident in beating or use of sharp implements ($\beta=0.28$, $p<0.01$), strangulation ($\beta=0.22$, $p<0.01$), arson ($\beta=0.58$, $p<0.001$), carbon monoxide poisoning or asphyxiation ($\beta=0.88$, $p<0.001$), and other means ($\beta=0.37$, $p<0.001$). Other means of killing or suicide include drowning, shooting, and poisoning.

Roughly a quarter of the offenders killed their victims due to intimate relationship conflicts ($N=59$), followed by around one-fifth who were motivated by economic reasons or issues that resulted from unemployment ($N=46$) (see Fig. 3). Those offenders who were triggered by relationship conflicts were younger ($\beta=-0.21$, $p<0.01$). Finally, about 17% of cases contained indications of delusional altruistic killing ($N=39$). These offenders that killed their victims for altruistic reasons tended to be female ($\beta=0.19$, $p<0.05$) and older ($\beta=0.18$, $p<0.05$). Data revealed that hostility was more apparent in HS cases where the offenders were motivated by intimate relationship conflicts ($\beta=0.28$, $p<0.001$) and less likely to exist in cases where the offenders killed their victims for medical or mental health issues ($\beta=-0.19$, $p<0.05$).

Additionally, one-third of the offenders died by suicide due to living stress or illness in themselves or their victims ($N=57$), followed by more than a quarter who feared the consequences of the murder they committed ($N=46$) (see Fig. 4). Overwhelming stress or illnesses was often the motivator in female offenders ($\beta=0.43$, $p<0.001$), and these offenders were more likely to victimize younger ($\beta=-0.22$, $p<0.01$) and male ($\beta=-0.19$, $p<0.01$) victims. Meanwhile, male offenders were more likely to commit a fatal suicide attempt out of fear of the consequences of murder ($\beta=-0.34$, $p<0.001$). These offenders tended to aggress upon female ($\beta=0.22$, $p<0.01$) and older ($\beta=0.22$, $p<0.01$) victims. In addition, offenders who feared the consequences of the murder were more hostile towards victims ($\beta=0.51$, $p<0.001$), while offenders motivated by living stress and illness were not ($\beta=-0.58$, $p<0.001$). About one-fifth of cases occurred because of interpersonal conflict

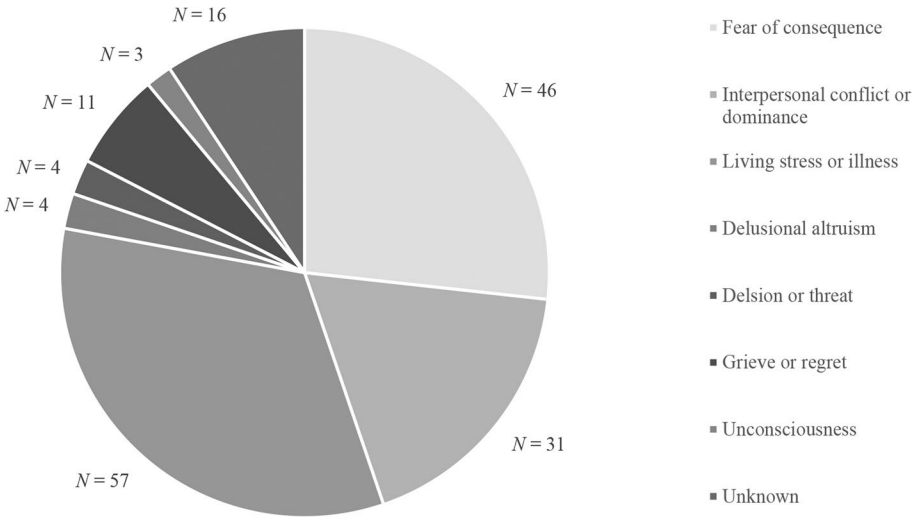

Fig. 4 HS offenders' reasons of suicide. Note: Fig. 4 displays HS offenders' reasons of attempting a fatal suicide

or a wish to express ownership of their victim through killing them ($N=31$). Those offenders who chose to die because of relationship conflict were younger ($\beta=-0.22$, $p<0.01$) and would target younger victims ($\beta=-0.18$, $p<0.05$).

Comparison Between FS and MUS

This study includes FS between parents of a child or children of all ages, including neonaticide, infanticide, and other filicide. The term MUS is the acronym denoting HS between romantic partners (uxoricide) and married couples (mariticide), both estranged or currently in a relationship, homosexual and heterosexual. Data suggested that FS and MUS were the two most common types of HS, with 55 FS cases causing 93 deaths and 60 MUS cases resulting in 95 deaths between 2000 and 2019.

Offenders' Characteristics and Their Relationships with Their Victims

There were 57 FS offenders with 64.91% being female and more than 60% of the 67 victims being male. Among the 60 MUS offenders and 60 victims, the offenders were mostly male ($N=50$; 83.33%) whereas the victims were mainly female ($N=47$; 78.33%). MUS offenders were significantly more likely to kill victims of the opposite sex ($\beta=-0.85$, $p<0.001$). Seventeen perpetrators and 14 victims survived through FS attempts, but 40 perpetrators (70.18%) and 53 victims (79.10%) died in total, whereas 18 MUS offenders and 7 victims survived, resulting in the death of 42 offenders (70.00%) and 53 victims (88.33%). Offenders of FS and MUS presented a similar death rate, but MUS victims were less likely to survive in comparison to FS victims.

On average, FS offenders were 39.93 years old ($SD=9.04$; $\sigma_{\mu}=1.20$), whereas the victims were 8.60 years old ($SD=8.35$; $\sigma_{\mu}=1.02$), making the age difference 31.17 years between the two (see Table 3). Sixty-two of the 67 FS victims were under 18, which

Table 3 Features of cases, offenders, and victims in FS and MUS

Features	FS	MUS
Number of cases	$N=55$	$N=60$
Number of casualties (offender:victim)	57:67	60:60
Gender of offenders (male:female)	20:37	50:10
Gender of victims (male:female)	42:25	13:47
Male offender vs female victim	$N=11$	$N=47$
Male offender vs male victim	$N=15$	$N=3$
Female offender vs male victim	$N=29$	$N=10$
Female offender vs female victim	$N=14$	$N=0$
Death rate of offenders	$N=40$ or 70.18%	$N=42$ or 70.00%
Death rate of victims	$N=53$ or 79.10%	$N=53$ or 88.33%
Age of HS offenders	$\mu=39.93$; $SD=9.04$; $\sigma_x=1.20$	$\mu=48.23$; $SD=16.20$; $\sigma_x=2.09$
Age of HS victims	$\mu=8.60$; $SD=8.35$; $\sigma_x=1.02$	$\mu=45.15$; $SD=17.62$; $\sigma_x=2.27$
Suicide after homicide within 24 h	$N=53$ or 92.98%	$N=55$ or 91.67%

Table 3 illustrates the features of FS and MUS cases in Hong Kong, including demographic information of the offenders and victims. The data showing the number of cases with different gender in the offenders and victims displayed all relationships between each offender and victim. The total number does not equal to the number of cases since there might be more than one offender or victim in a case

accounted for 92.54% of all victims. These female offenders tended to be younger as they committed FS ($\beta=-0.39$, $p<0.01$). Contrastingly, MUS offenders were 48.23 years old on average ($SD=16.20$; $\sigma_\mu=2.09$), with victims 45.15 years old ($SD=17.62$; $\sigma_\mu=2.27$), making the mean age difference 6.12 years. Both MUS ($\beta=0.83$, $p<0.001$) and FS offenders ($\beta=0.74$, $p<0.001$) tended to kill older victims, as they were themselves older. FS offenders were more hostile to older ($\beta=0.46$, $p<0.001$) and female ($\beta=0.25$, $p<0.05$) victims. In addition, hostility was more common in older FS offenders ($\beta=0.32$, $p<0.05$). However, MUS offenders were hostile towards younger victims ($\beta=-0.53$, $p<0.001$), and hostility was more apparent in younger MUS offenders as well ($\beta=-0.45$, $p<0.001$).

Most FS ($N=53$; 92.98%) and MUS ($N=55$; 91.67%) offenders died within 24 h of the murder; in addition, FS offenders tend to die right after their offense than other types of HS ($\beta=0.22$, $p<0.01$). Driven by suicidal ideations ($N=55$; 79.71%), FS offenders were more likely to murder and die at the same time ($N=27$; 60.87%), but their MUS counterparts—who were motivated more by homicidal thoughts ($N=52$; 86.67%)—tended to attempt their suicide after the murder of their victims ($N=55$; 91.67%).

From Table 4, 54.39% of FS and 51.67% of MUS offenders were married. Among them, 20.00% and 15.00% of the FS and MUS cases respectively involved a cross-border marriage between mainland China and HK (see Table 4). In 10.91% of all FS cases, FS offenders were found to be engaging in infidelity, as compared with 35% of the MUS cases. Nearly 50% of the MUS offenders had experienced separation anxiety, as compared to only 23.64% of FS offenders. FS offenders were three times more likely to be unemployed in comparison to MUS offenders. A substantial proportion of FS offenders were afflicted with mental illness (36.84%), compared with a smaller proportion among MUS cases (18.33%) and other types of HS ($\beta=0.21$, $p<0.05$). Furthermore, as over half of FS offenders displayed signs of economic difficulty, only 28.33% of MUS offenders were undergoing such difficulties. Those offenders with economic difficulty planned their offense in FS ($\beta=0.41$, $p<0.05$), and MUS offenders who had encountered the same difficulty tended to victimize

Table 4 Characteristics of FS and MUS offenders

Characteristics	FS offenders		MUS offenders	Chi-square test at 0.05 significance level			
	N	%	*N*	%	X^2	*df*	*p*-value
Marital status							
Single	7	12.28%	14	23.33%	Not significant		
Married	31	54.39%	31	51.67%	Not significant		
Divorced	12	21.05%	8	13.33%	Not significant		
Separated	3	5.26%	7	11.67%	Not significant		
Widowed	3	5.26%	0	0.00%	Not significant		
Relationship infidelity	6	10.91%	21	35.00%	5.85	1	$p < 0.01$
China-HK marriage	11	20.00%	9	15.00%	Not significant		
Employment status							
Employed	14	24.56%	23	38.33%	Not significant		
Unemployed	30	62.63%	13	21.67%	12.06	1	$p < 0.001$
Retired	1	1.75%	7	11.67%	Not significant		
History of mental disorder	21	36.84%	11	18.33%	5.04	1	$p < 0.05$
Economic difficulty	29	50.88%	17	28.33%	6.23	1	$p < 0.05$
Separation anxiety	13	23.64%	28	46.67%	7.31	1	$p < 0.01$
Hostility to victim(s)	5	8.77%	51	85.00%	68.07	1	$p < 0.001$
Planning before offense	35	63.64%	29	48.33%	Not significant		

Table 4 (continued)

Characteristics	FS offenders		MUS offenders		Chi-square test at 0.05 significance level			
	N	%	*N*	%	X^2	*df*	*p*-value	
Previous history of violence	4	7.02%	5	8.33%	Not significant			
Suicidal ideation	9	15.79%	3	5.00%	Not significant			
Use of hypnotics to victims	16	23.88%	9	15.00%	Not significant			
Use of drugs or alcohol	2	3.51%	6	10.00%	Not significant			
Involvement of SWD or NGO	4	7.27%	6	10.00%	Not significant			

Table 4 compares characteristics between FS and MUS offenders, including their demographics, risk factors of offense, and features prior to the offense by the number and portion of cases with the chi-square test of FS and MUS cases respectively. "Not significant" is defined as $p > 0.05$

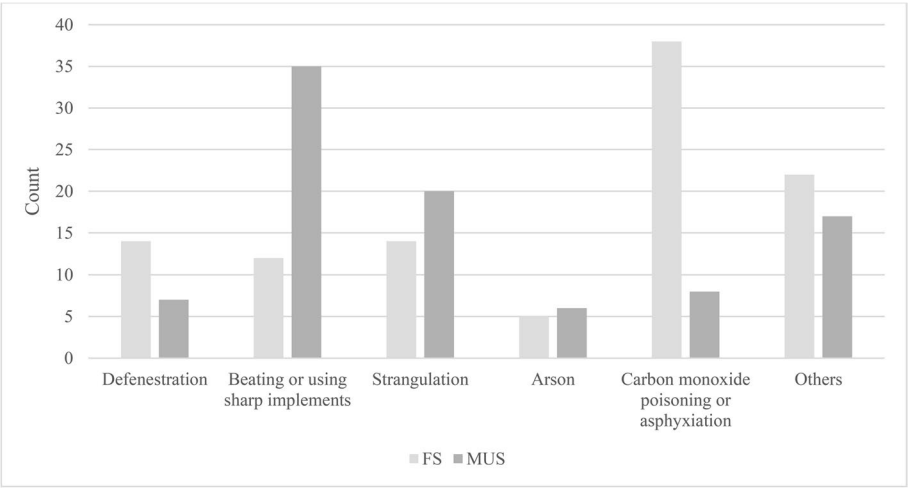

Fig. 5 FS and MUS offenders' modes of killing. Note: Fig. 5 displays the modes of killing FS and MUS offenders practiced during their offenses

female individuals ($\beta = 0.66$, $p < 0.01$). The SWD or NGOs intervened in 7.27% of FS and 10.00% of MUS cases. Over 60% of the FS offenses were planned as compared with 48.33% in MUS incidents. FS offenders were three times more likely to have displayed obvious signs of suicidal ideation (15.79%) than their MUS counterparts (5.00%) and were more likely to use hypnotics on their victims (23.88%) than MUS offenders (15.00%) and other types of HS ($\beta = 0.16$, $p < 0.05$). However, MUS offenders were found to have consumed alcohol or drugs more often before their offenses (10.00%) as compared with their FS counterparts (3.51%). FS (7.02%), and MUS (8.33%) offenders were found to have similar rates of previous histories of violence. Male FS offenders were disproportionately more likely to have a previous history of violence ($\beta = -0.54$, $p < 0.001$), and female FS offenders were more likely than their male counterparts to be suffering from mental health issues ($\beta = 0.34$, $p < 0.05$). Those FS offenders with a violent offense history tended to have more victims ($\beta = 0.47$, $p < 0.01$). These data regarding signs of planning before the offense, previous history of violence, evidence of suicidal ideation, use of hypnotics on the victims, consumption of drugs or alcohol by the offenders, and the involvement of SWD or NGO have to be interpreted with care since the number of occurrences was small.

Nevertheless, 8.77% of FS offenders were hostile to their victims as compared with 85.00% of MUS offenders being hostile. Older FS offenders were more hostile against their victims ($\beta = 0.32$, $p < 0.05$) whereas male ($\beta = 0.23$, $p < 0.05$) and older ($\beta = 0.46$, $p < 0.001$) victims received more hostility. Young MUS offenders on the contrary displayed more hostility ($\beta = -0.45$, $p < 0.001$), and younger victims were more susceptible to hostile intentions ($\beta = 0.52$, $p < 0.05$) in MUS.

Modes of Killing, Offenders' Causes of Death, and Motives

The most common method of killing was carbon monoxide poisoning or asphyxiation ($N = 38$; 36.19%), followed by defenestration ($N = 14$; 13.33%) and strangulation ($N = 14$; 13.33%) among FS offenders (see Fig. 5). However, beating or use of sharp implements

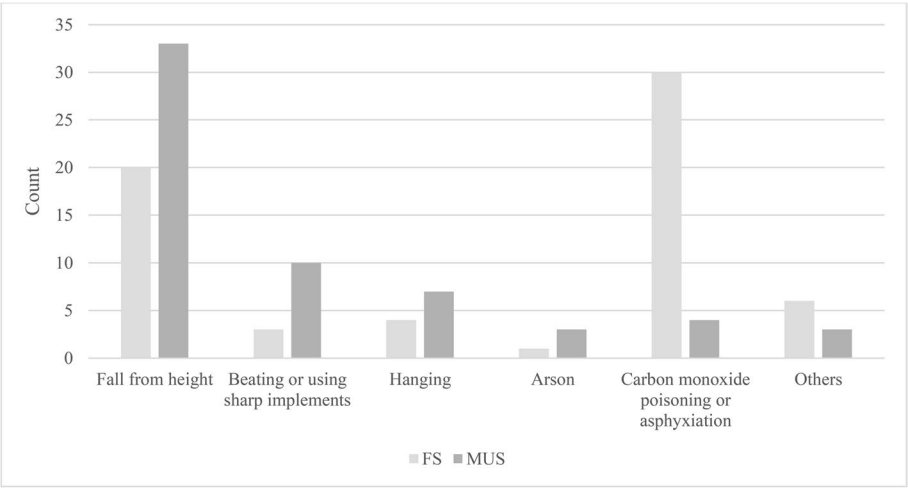

Fig. 6 FS and MUS offenders' causes of death. Note: Fig. 6 displays FS and MUS offenders' causes of death during or after their offenses

($N=35$; 37.63%), strangulation ($N=20$; 21.51%), and other means ($N=17$; 18.28%) were the most common methods in MUS. MUS ($\beta=-0.47$, $p<0.001$) and FS ($\beta=-0.28$, $p<0.05$) offenders were hostile to their victims when they killed their victims through carbon monoxide poisoning or asphyxiation. Younger FS offenders tended to defenestrate their victims ($\beta=-0.34$, $p<0.05$), and defenestration in FS would more likely result in a younger victim ($\beta=-0.25$, $p<0.05$). The use of beating or use of sharp implements was more apparent in older FS offenders ($\beta=0.47$, $p<0.001$), and FS offenders tended to stab or beat older ($\beta=0.45$, $p<0.001$) and female ($\beta=0.28$, $p<0.05$) victims. FS ($\beta=0.55$, $p<0.001$) and MUS ($\beta=0.28$, $p<0.05$) offenders were significantly more hostile when they beat or kill their victims using sharp implements. Nonetheless, the older the offender, the more likely they were to choose to kill with fire in FS ($\beta=0.31$, $p<0.05$). FS offenders were disproportionately more hostile when they burned their victim ($\beta=0.43$, $p<0.001$).

About half of the FS offenders chose to die from carbon monoxide poisoning or asphyxiation ($N=30$), and these FS offenders were not hostile towards their victims ($\beta=-0.34$, $p<0.05$), while the cause of death of over half of the MUS offenders was falling from height ($N=33$) (see Fig. 6). This was followed by FS offenders who die through falling from height ($N=20$; 31.25%) and other means ($N=6$; 9.38%), but MUS offenders were more likely to beat or use sharp implements ($N=10$; 10.75%) or hang themselves ($N=7$; 11.83%). FS offenders who chose to fall from height were significantly more hostile towards their victims ($\beta=0.32$, $p<0.05$). In addition, FS offenders who hung themselves tended to be older ($\beta=0.26$, $p<0.05$).

About three-quarters of FS offenders ($N=51$) chose the same means for their homicides as for their suicides, compared with less than half in the case of MUS offenders ($N=25$). This was reflected in defenestration and falling from height in FS ($\beta=0.70$, $p<0.001$), strangulation and hanging in FS ($\beta=0.35$, $p<0.01$) and in MUS ($\beta=0.26$, $p<0.05$), burning in MUS ($\beta=1.00$, $p<0.001$), carbon monoxide poisoning or asphyxiation in FS ($\beta=0.93$, $p<0.001$) and in MUS ($\beta=0.62$, $p<0.001$) and other means in MUS ($\beta=0.63$, $p<0.001$).

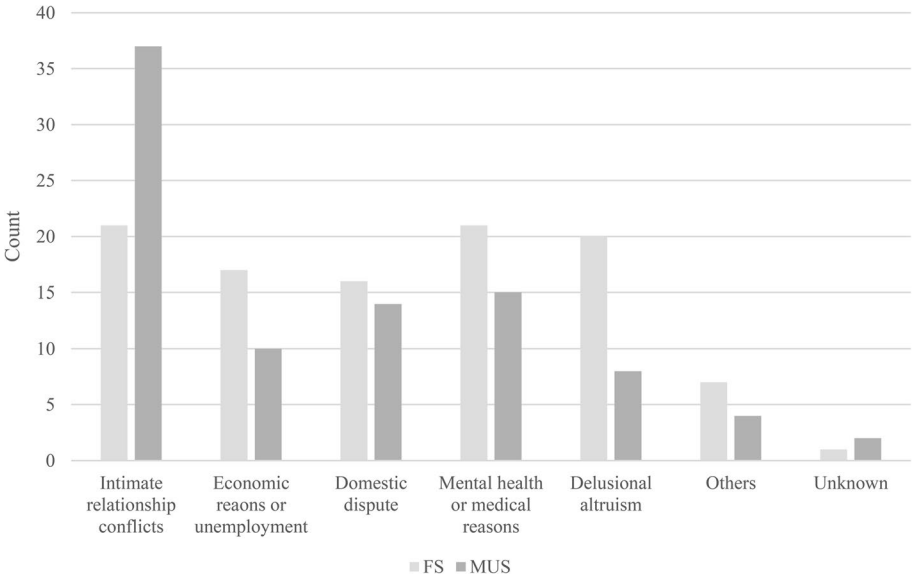

Fig. 7 FS and MUS offenders' reasons of killing. Note: Fig. 7 displays FS and MUS offenders' reasons of killing their victims

Moreover, FS and MUS offenders showed some similarities in their reasons for killing. One-fifth of FS offenders ($N=21$) and two-fifths of the MUS offenders ($N=37$) were killed for conflicts related to their romantic or marital relationships, followed by mental health or medical conditions ($N_{FS}=21$; 20.38%, $N_{MUS}=15$; 16.67%) (see Fig. 7). FS offenders tended to be hostile when they killed their victims because of domestic disputes ($\beta=0.35$, $p<0.01$) and mental health or medical conditions ($\beta=0.27$, $p<0.05$). Younger MUS offenders tended to murder as a result of relationship conflicts ($\beta=-0.47$, $p<0.001$), and offenders who killed for the same reason victimized younger individuals in MUS ($\beta=-0.39$, $p<0.01$) and FS ($\beta=-0.25$, $p<0.05$). In addition, MUS offenders were more hostile when they killed their victims because of relationship conflicts ($\beta=0.46$, $p<0.001$) and a lot less when performing altruistic killing ($\beta=-0.93$, $p<0.001$). The third most common reason to kill in FS stemmed from delusional altruism ($N=20$; 19.42%), contrasting with domestic disputes in MUS cases ($N=14$; 15.56%). Older MUS offenders tended to perform altruistic killing ($\beta=0.38$, $p<0.01$), and the same reason caused the death of older victims in MUS ($\beta=0.45$, $p<0.001$). Nevertheless, male FS offenders were more likely to commit HS as they suffered from unemployment or economic difficulty ($\beta=-0.28$, $p<0.05$). FS offenders who killed their victims after domestic disputes tended to have older victims ($\beta=0.27$, $p<0.05$).

The reasons for the choice to attempt suicide in more than half of the FS offenders was the overwhelming living stress or worrying medical conditions they were experiencing, either of themselves or in their victims ($N=35$), as compared with over half of the MUS offenders that died because of a fear of the consequences of their actions ($N=31$) (see Fig. 8). Both FS ($\beta=0.28$, $p<0.05$) and MUS ($\beta=0.40$, $p<0.01$) offenders were more hostile when they died because of a fear of consequences of their actions. Dying because of a fear of consequence more likely occurred in older FS offenders ($\beta=0.35$, $p<0.01$) and male MUS offenders ($\beta=-0.27$, $p<0.05$). The suicide of MUS offenders caused by living

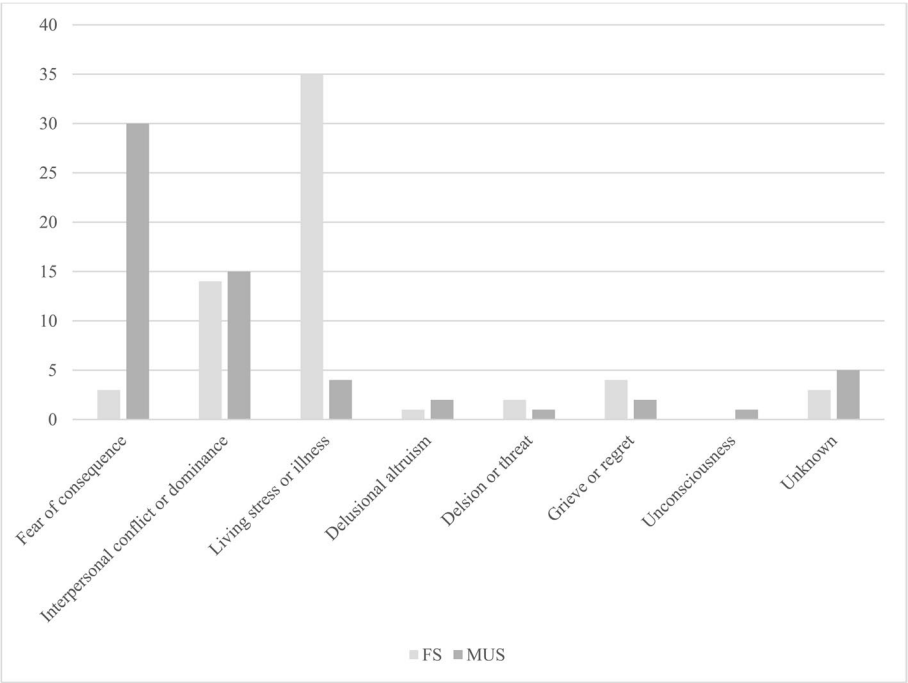

Fig. 8 FS and MUS offenders' reasons of suicide. Note: Fig. 8 displays FS and MUS offenders' reasons of attempting a fatal suicide

stress was more common among older offenders ($\beta = 0.29$, $p < 0.05$) and tended to result in older victims ($\beta = 0.38$, $p < 0.01$). Data also revealed that FS ($\beta = -0.30$, $p < 0.05$) and MUS ($\beta = -0.68$, $p < 0.001$) offenders were not hostile towards their victims when they aggressed as a result of living stress and illnesses. The second most common reason for suicide in FS ($N = 14$; 22.58%) and MUS ($N = 15$; 25.00%) was interpersonal conflicts or an eagerness to possess full ownership of their victims. Young ($\beta = -0.29$, $p < 0.05$) and female ($\beta = 0.26$, $p < 0.05$) MUS offenders tended to die from these conflicts. The third most common reason for suicide in FS was grief or regret about the murder they committed ($N = 4$; 6.45%), while illness or living stress was the third most common reason for suicide among MUS offenders ($N = 4$; 6.67%). MUS offenders were also not hostile when performing altruistic killing ($\beta = -0.36$, $p < 0.01$) or because the offenders were in a state of unconsciousness ($\beta = -0.33$, $p < 0.05$).

Discussion

MUS and FS are widely recognized as the most common subtypes of homicide-suicide (Chan et al., 2003; Cooper & Eaves, 1996; Flynn, et al., 2009; Harper & Voigt, 2007; Liem & Nieuwbeerta, 2010; Malphurs et al.,, 2001; Marzuk et l., 1992; Stack, 1997; West, 1965). These two subtypes are distinguished from one another in a variety of ways, including the means of killing, the hostility level of the offenders, the motives involved, the presence of delusional altruism, and demographic factors.

In the present study, we found that both subtypes showed a high prevalence of conflict between the sexes, with male offenders typically victimizing female partners (conforming to Allen's (1983) finding), and female offenders victimizing male children. In our MUS dataset, most offenders were married (which conforms to previous findings (see Chan et al., 2003; Berman, 1979; Marzuk et al., 1992)), but these were not harmonious marriages. In many cases, the couples were at the brink of divorce, some had been separated from their partners, and some lived under the same roof but in different rooms. Our data confirmed that the dominant cause of HS was an escalation of conflict in intimate relationships. One reason for this was offenders' feelings of separation anxiety and jealousy related to relationship infidelity. While these factors might not have directly caused HS, they nevertheless exacerbated conflicts between MUS offenders and victims, threatening the offenders' self-esteem, and strengthening their will to achieve whole ownership of their victims. Frustrated by an ambivalent relationship or unrequited love, male MUS offenders attempted to exert control over their female intimate partners as a means of preventing them from leaving. In short, their aggression marked an attempt to restore lost self-esteem, and taking their own lives subsequent to the homicide was an attempt to reduce shame (Abrutyn & Mueller, 2016; Liem & Roberts, 2009).

Dollard et al.'s (1939) theory is applicable to MUS as it manifests in the context we study. MUS offenders externalize their aggression by killing their victims to alleviate frustration and become suicidal while grieving the loss of their victims and regretting their aggression. That is, where indicators were available, most of the offenders in the HK dataset displayed an aggression that stemmed from the desire to fully own their victims. The choice to die (or the choice to attempt to die) came upon realizing consequences of their actions. These scenarios display an urge towards dominance and reflect narcissistic tendencies within offenders. Their fear of abandonment was expressed through the use of hands-on methods like strangulation, beating, or the use of sharp implements and/or defenestrating their victims.

The choice of weapon for murder is also indicative of the offenders' level of hostility towards their victims (Chan, 2007). In our data, MUS offenders preferred more violent methods of killing, and less of them chose methods that required more preparation such as charcoal burning or the use of fire. In addition, our findings reveal that the most common type of weapons used in homicide of all HS cases were sharp utensils (i.e., knives) which likely reflects strict gun control in HK, whereas firearms were the dominant weapon in much of the literature studying the Anglo-American population (Allen, 1983; Banks et al., 2008; Barber et al, 2008; Marzuk et al., 1992; Saleva et al., 2006).

FS offenders by contrast had comparatively stable family situations with no obvious signs of abnormality or indications of violent tendencies. When FS offenders experienced conflict, it was typically with people who were not their victims. The reasons for FS offending were more multifaceted than MUS, with overwhelming stress in the family and in the workplace being common factors. These offenders tended to gradually acquire an awareness of their inability to continue to care for their families, which in turn became their motivation to kill (Agnew, 1992, 2004). Since many FS offenders regard their children as extensions of themselves, the inclusion by these perpetrators of their children in their violent acts essentially represents an expansion of the suicidal motive (West, 1965). This type of HS was thus an illustration of suicide-motivated HS, where (in contrast to MUS) the offender exhibited suicidal ideation prior to committing murder.

FS offenders generally had no hostile intentions towards their victims, and they tended to be responsible caregivers in their daily lives, with positive attachments to their victims (Stack, 1997). Moreover, they preferred killing through carbon monoxide

poisoning or asphyxiation (i.e., charcoal burning)—less painful means of murder than the more violent methods favored by MUS offenders. The "delusional altruism" mentality of FS was apparent in our sample and thus supports Chan's (2007) earlier findings. Instead of being driven by hostility (as with MUS cases), their offenses constituted (to them) an expression of love and an eagerness to protect. However, we must note that hostility was detected in a minority of the FS offenders in our data. These were typically mothers with postpartum depression. Their offenses stemmed from an emotional fluctuation from other stimuli, like financial burden or social expectations. Police investigations revealed that some mothers had been ruminating on the hopelessness of their own future and projecting this perceived future onto their children. Therefore, these offenders defenestrated their children before jumping from their residences themselves, or they fell from their residential building together. Their hostility may not fully originate from their victims because their victims typically were not the target or source of conflict, but it was nevertheless a factor that interacted with other environmental stimuli, resulting in these tragic incidents.

The most common mental disorders diagnosed among HS offenders in HK were major depressive disorders, postpartum depression, and schizophrenia. Based on criminal records, police records, and reports from relatives and neighbors of offenders, data suggested that only a small proportion of the offenders had a prior history of violence. Allen (1983) and Chan et al.'s (2003) research also discovered that HS offenders had fewer previous criminal histories in comparison with homicide-only offenders. These offenders believed that using violence was not justified in the past course of their life and that the occurrence of violence in the form of HS was a result of overwhelming stress and conflicts with close relations. In fact, our regression model did not show any relationship between previous history of violent offenses and the occurrence of all five subtypes of HS as well as the gender, age, time and location, and mental health conditions.

To conclude, our data suggested that MUS was primarily triggered by homicidal and hostile motives, while FS tended to be motivated primarily by suicidal ideation and delusional altruism. These respective tendencies can be seen through the modes of killing, motives for killing, and the reasons for suicide.

Limitations and Future Directions

This study presented an overview of HS and a comparison between two of its subtypes—FS and MUS—in HK. This study collected data from the HKSAR government and HK Police Force investigative reports. Although data was gathered on reported alcohol consumption or drug use in the offenders and whether hypnotics were administered to the victims, a lack of access to coroner reports rendered this study unable to determine with certainty the actual presence or absence of these factors. The limitation was caused initially by the social movement in 2018 and the government's service delay because of the COVID-19 situation in Hong Kong.

Our data displayed apparent differences between the two main types of HS. However, because we lacked a control group, we were unable to predict the probability of HS occurring from different variables. Future studies may include homicide and suicide incidents as control groups to delineate the likelihood of HS happening in HK. The study on the presence of hostility and delusional altruism in FS and MUS should continue to be conducted cross-culturally to delineate its generalizability across all HS cases.

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Data Availability The data that supports the findings of this study are openly available in Dataverse at https://dataverse.harvard.edu/dataset.xhtml?persistentId=10.7910/DVN/J4D9HW.

Declarations

Competing Interests The authors declare no competing interests.

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