

Mixed Methods Analysis of Sex Differences in Life Stressors of Middle-Aged Suicides

Deborah M. Stone, ScD, MSW, MPH,¹ Kristin M. Holland, PhD, MPH,¹ Lara B. Schiff, MPH,² Wendy LiKamWa McIntosh, MPH¹

Introduction: Between 1999 and 2013, rates of suicide in mid-life increased more than 30%. The purpose of this study is to examine life stressors impacting middle-aged suicide, to determine whether these stressors vary by sex, and to explore their co-occurrence.

Methods: A random sample of 315 men and 315 women aged 35–64 years was selected from 17 states implementing the National Violent Death Reporting System from its inception in 2003 to 2011. Data collection took place between 2003 and 2011 and analysis occurred in 2015. Analysis included coding circumstances of death noted in the law enforcement and coroner/medical examiner reports using an investigator-designed coding instrument. Using the most commonly cited life stressors as a basis, thematic analyses were conducted for cases. Quantitative comparisons of the most common circumstances by sex were calculated via multivariable logistic regression.

Results: The five most common life stressors of suicide included intimate partner, job/financial, health, family, and criminal/legal problems. In adjusted analyses, job/financial problems and criminal/legal problems were more common among men, whereas health and family problems were more common among women. Men and women had similar rates of intimate partner problems. Life stressors also co-occurred, as found per qualitative and quantitative analyses.

Conclusions: Men and women in mid-life have both common and unique circumstances preceding suicide. Prevention strategies that consider these circumstances and co-occurring circumstances are warranted.

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Introduction

Maris¹ observed in 1987 that little is known about suicide in mid-life. In 1995, he warned that increases in suicide among baby boomers in their adolescence and early adulthood signaled subsequent suicide increases in mid-life.^{2,3} Indeed, between 1999 and 2014, suicide among Americans aged 35–64 years increased 33.6%, from 13.7/100,000 to

18.3/100,000 (30.8% among men and 50.3% among women⁴). Theory suggests that mid-life typically involves intense investment in work and family and that perceived failed investments during this time may place socially isolated adults at risk for suicide.⁵ Others identify theories of suicide related to gender roles and socialization (e.g., male masculinity).⁶ These theories can provide a lens for differential distribution of specific premorbid circumstances impacting male and female suicide in mid-life, such as mental health/substance abuse problems (MH/SA-P), sociodemographic factors,⁷ and life stressors, including relationship and physical health problems.^{8–11} Understanding life stressors in particular is important because they are often modifiable, whereas many people with MH/SA-P do not seek out treatment¹² and sociodemographic factors are often immutable.

An understanding of life stressors can be guided by quantitative and qualitative information and analyses.

From the ¹Division of Violence Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, Georgia; and ²Division of Hematology, University of Washington, Seattle, Washington

Address correspondence to: Deborah M. Stone, ScD, MSW, MPH, Division of Violence Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 4770 Buford Highway NE, MS F-64, Atlanta GA 30341. E-mail: dstone3@cdc.gov.

This article is part of the supplement issue titled National Violent Death Reporting System: Analyses and Commentary.

0749-3797/\$36.00

<http://dx.doi.org/10.1016/j.amepre.2016.07.021>

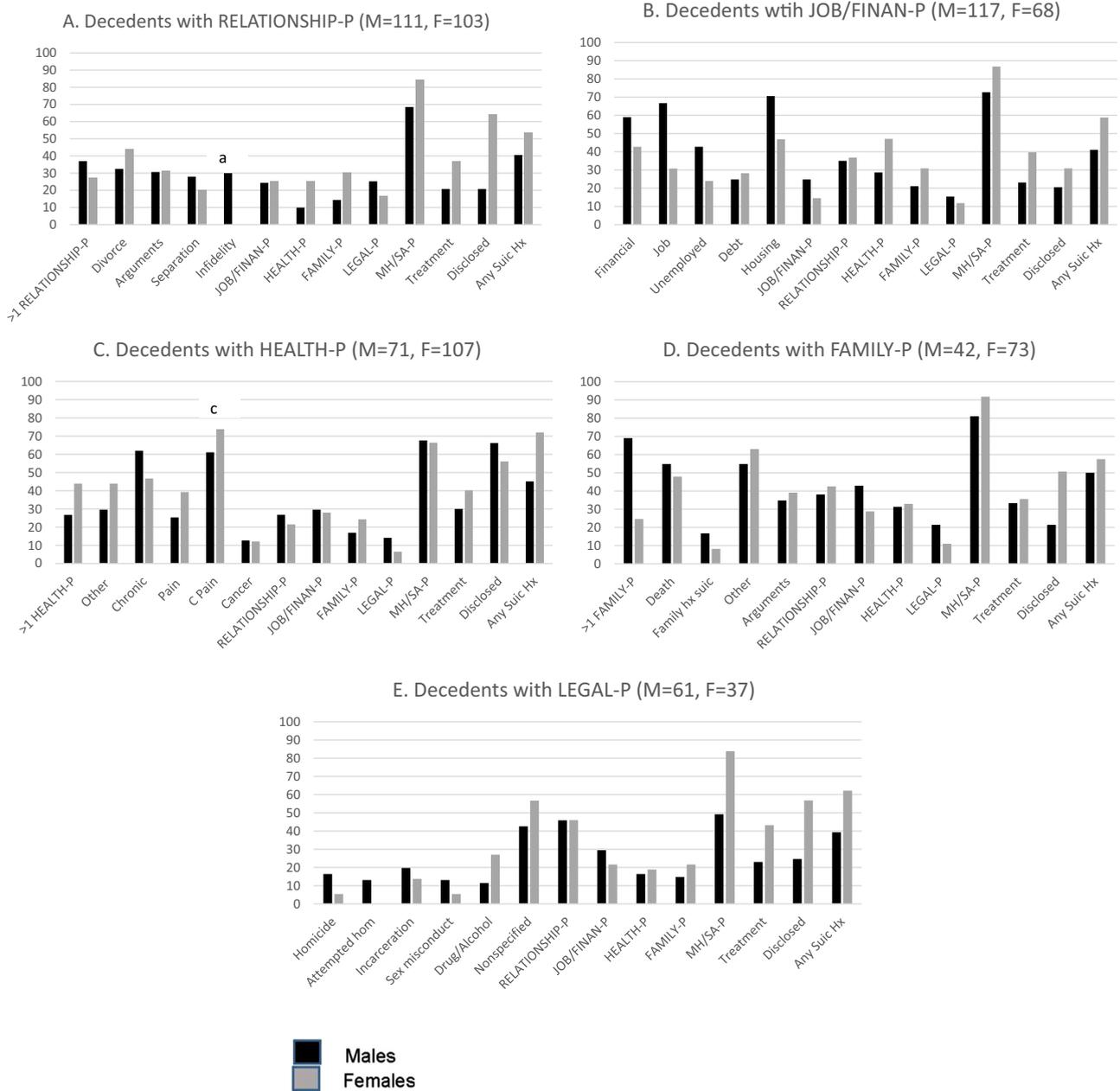


Figure 1. Co-occurring problems in a sample of male ($n=315$) and female ($n=315$) suicide decedents, aged 35–64 years, with RELATIONSHIP-P, JOB/FINAN-P, LEGAL-P, FAMILY-P, and HEALTH-P in 17 NVDRS states.

^aReflects percentage of males who perceived an infidelity among those who committed homicide-suicide.

^bAmong people with financial problems.

^cAmong people with pain conditions.

^dReflects percentage of "other" category.

Any Suic Hx, any history of suicidal ideation or attempts; Attempted hom, Attempted homicide; C pain, chronic pain; Chronic, chronic disease; Disclosed, disclosed suicide intent; Family hx suic, family history of suicide; HEALTH-P, physical health problems; JOB/FINAN-P, job/Financial problems; LEGAL-P, criminal/legal problems; MH/SA-P, mental health/substance abuse problems; NVDRS, National Violent Death Reporting System; RELATIONSHIP-P, intimate partner problem.

Historically, psychological autopsy studies gathered information including suicide decedents' psychological diagnoses and other life circumstances prior to suicide.¹³ These studies tended to focus on youth,^{14–16} older adults,^{17–19} or specific subgroups (e.g., inpatients) without regard for, or

while controlling for, age.^{20–22} Qualitative analyses of mid-life suicide and the associated life stressors among men and women have been limited. Such analyses, beyond expensive psychological autopsy studies, may help to fill this gap.

As for quantitative analysis of mid-life suicide, it has only been since the recent recession and rising rates of suicide in this life stage that research on these suicides,²³ specifically, has increased.^{7,24–28} Some of these studies have used the National Violent Death Reporting System (NVDRS) quantitative data elements, which are useful for examining broad trends. However, none except for one⁸ has used NVDRS qualitative narratives, which provide more specific information about premorbid life stressors, in men and women. To this end, the current study qualitatively examines contextual and specific life stressors and quantitatively examines the association between these stressors in men and women in the presence of other circumstances.

Methods

Data for this study come from NVDRS, a surveillance system operating in 32 U.S. states. NVDRS includes decedent characteristics, manner, cause, and circumstances of death. Information is abstracted from law enforcement and coroner/medical examiner investigative reports (called “narratives” hereafter), toxicology reports, and death certificates. NVDRS and its methodology are described elsewhere.^{29,30}

Data Sample

A sample of 630 suicide decedents (315 women, 315 men), aged 35–64 years, was randomly selected and represented 1.5% of all mid-aged suicides with any circumstances in the 17 NVDRS states contributing data between 2003 and 2011 ($N=41,917$ [10,493 women, 31,424 men]). The analytic sample represents the NVDRS population, except for location; the sample included more people from the West and fewer from the Midwest, though there is no anticipated bias apart from means of suicide, which is not a focus here. The sample size was deemed sufficient to conduct adjusted quantitative analyses and small enough to conduct thorough qualitative analyses. Suicides without any known circumstances were excluded from the sampling frame ($n=4,558$ or 9.8%).

Statistical Analysis

Data analysis occurred in three phases described elsewhere in depth.⁸ In brief, they included:

1. coding broad and more specific categories of life stressors (e.g., broad, job problems; specific, unemployment), other circumstances (e.g., MH/SA-P), and temporality of suicide circumstances (e.g., recent, chronic) using a research team–developed coding guide;
2. exploring patterns of co-occurring circumstances within commonly occurring life stressors; and
3. conducting quantitative analyses.

Chi-square statistics and ANOVA were used to examine male–female differences in individual (e.g., age) and incident characteristics (e.g., means of suicide), year (2003–2006 [pre-recession], 2007–2009 [recession], and 2010–2011 [post-recession]),

and geographic location of suicides (Northwest, Northeast, West, Midwest, and South). Next, bivariate analyses tested male–female differences in common life stressors and MH/SA-P. Finally, multivariable logistic regression analyses assessed the AORs and 95% CIs of the commonly occurring life stressors for men versus women, controlling for a priori individual characteristics, year, place, and all other common life stressors. Quantitative analyses were conducted in 2015 using SAS, version 9.3, with $\alpha=0.05$.

Results

On average, decedents were aged 48.6 years, and most (88.1%) were non-Hispanic white (Tables 1, 2). More than one third of decedents left a suicide note and approximately 25% disclosed suicidal intent. Two thirds of suicides took place in the South or West, and the proportion of suicides was roughly equal across time periods. More men died by firearms (chi-square [1]=32.4, $p<0.001$) and hanging (chi-square [1]=4.8, $p<0.05$), whereas more women died by poisoning (chi-square [1]=64.2, $p<0.001$).

The most prevalent life stressors included intimate partner problems (RELATIONSHIP-P, 34%), job/financial problems (JOB/FINAN-P, 29.4%), physical health problems (HEALTH-P, 28.3%), family problems (FAMILY-P, 18.3%), and criminal/legal problems (LEGAL-P, 15.6%) (Table 1). In bivariate analyses, men experienced more JOB/FINAN-P and LEGAL-P than women ($p<0.01$). Women experienced more HEALTH-P and FAMILY-P than men ($p<0.01$). No sex difference was observed for RELATIONSHIP-P. Three quarters of decedents reported MH/SA-P. Prevalence among women was greater than men ($p<0.001$). About 35% of suicides had any MH/SA treatment noted (44.4% among women vs 25.4% among men, $p<0.001$). Finally, 48.4% of decedents had known prior suicide ideation/attempts (60% women vs 36.8% men, $p<0.001$).

About one third of decedents experienced RELATIONSHIP-P (Figure 1). Twenty-seven percent ($n=28$) of women and 36.9% of men ($n=41$) experienced multiple RELATIONSHIP-P. For example, “V’s (victim’s) boyfriend was incarcerated for assaulting her [code: intimate partner victimization]. When released, he discovered that she had cheated on him [infidelity]. They argued frequently [chronic arguing] about this.” RELATIONSHIP-P commonly referenced relationship break-ups and recent arguments. JOB/FINAN-P were referenced frequently as the topic of arguments between partners; for example, “V’s wife said they argued about V’s lack of keeping a job.” Infidelity accusations were also notable for men who perpetrated homicide—suicide. LEGAL-P were noted more among men with RELATIONSHIP-P while co-occurrence of FAMILY-P and HEALTH-P were noted more among women. Men

Table 1. Demographic Characteristics and Circumstances of Suicide, Aged 35–64 Years, by Sex, 17 NVDRS States, 2003–2011

Individual characteristics	Males (n=315)	Females (n=315)	Total	F/ χ^2
Mean age, years	48.9	48.3	48.6	F=1.09
Race, %				
Non-Hispanic white	87.6	88.6	88.1	0.14
Other race/ethnicity	12.4	11.4	11.9	
Left suicide note, %	32.4	39.1	35.7	3.05
Disclosed intent, %	20.3	27.9	24.1	3.50*
Means of suicide				66.2***^a
Firearms	55.9	33.3	44.6	32.4***^b
Hanging	21.3	14.6	17.9	4.8*^b
Poisoning	16.2	45.7	31.0	64.2***^b
Other	6.70	6.40	6.50	0.03
Place characteristics, %				5.7
Northwest (AK, OR)	9.5	7.6	8.6	
Northeast (MA, NJ, RI)	17.8	16.5	17.1	
West (CO, NM, OK, UT)	25.4	27.6	26.5	
South (GA, MD, NC, SC, VA)	41.9	38.4	40.2	
Midwest (KY, OH, WI)	5.4	9.8	7.6	
Time characteristics, %				2.0
Pre-recession (2003–2006)	34.6	29.5	32.1	
Great recession (2007–2009)	36.2	40.0	38.1	
Post-recession (2010–2011)	29.2	30.5	29.8	
Circumstances/life stressors, %				
Intimate partner problems	35.2	32.7	34.0	0.45
Job/financial problems	37.1	21.6	29.4	18.4***
Any job problems	24.8	11.4	18.1	18.9***
Any financial problems	21.9	15.9	18.9	3.7**
Physical health problems	22.5	33.9	28.3	10.1**
Family problems	13.3	23.2	18.3	10.22**
Criminal/legal problems	19.4	11.8	15.6	7.0**
MH/SA problems	67.9	82.2	75.1	17.2***
Treatment for MH/SA	25.4	44.4	34.9	25.1***
Prior suicidal ideation/behavior	36.8	60.0	48.4	33.9***

Note: Boldface indicates statistical significance (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$).

^aSignificant difference overall in means of suicide used between males and females.

^bSignificant difference in specific means used between males and females.

MH/SA, mental health and/or substance abuse problem; NVDRS, National Violent Death Reporting System.

and women commonly experienced MH-P, but women appeared to have more SA-P than men. Women also appeared to receive MH/SA treatment, have a history

of suicide ideation/attempts, and disclosed suicide intent more than men. Treatment was more frequently described among decedents with known MH/SA-P, prior

suicidal ideation/attempts, and who disclosed suicidal intent. However, most people were not known to have received treatment.

Sixty-eight women and 117 men experienced JOB/FINAN-P (overall, 29.4%) (Figure 1). Most experienced a job or financial problem, not both. Among women, financial problems appeared more common than job problems and mentions of chronic debt arose frequently; for example, “V had a negative bank account balance, was going into collections, and unable to pay her bills.” Conversely, men appeared to experience more job than financial problems. For both sexes, unemployment was noted frequently. Both recent (“The victim recently lost his job due to an injury”) and chronic unemployment (“Sister stated that V was unemployed for approximately 5 years ...”) were common among men, whereas unemployment appeared more chronic in nature for women, often co-occurring with HEALTH-P or MH/SA-P (“V suffered from depression since her son’s suicide 10 years earlier ... V lost her job a year prior”). Among men and women, housing issues were fairly common (“V was being evicted from his apartment”). About one quarter of people with JOB/FINAN-P had co-occurring FAMILY-P cited. LEGAL-P and RELATIONSHIP-P were reported similarly among men and women. Women more frequently than men disclosed their suicidal intent, received any MH/SA treatment, and had prior suicidal behavior.

Thirty-four percent ($n=107$) of women and 22.5% ($n=71$) of men experienced known HEALTH-P (Figure 1). Of these, 43.9% of women and 26.8% of men had more than one HEALTH-P: “V was non-compliant with monitoring his blood pressure. He also has a long history of pancreatitis and severe abdominal pain [chronic HEALTH-P].” Chronic disease appeared more frequent among men and restricted decedents’ activities, for example, “chronic health problems ... had taken away his independence.” Conversely, more women than men seemed to experience pain, and when pain was mentioned it tended to more chronic in nature: “Victim mentioned suicide on many occasions as an ‘out’ to her chronic unbearable pain.” Although cancer was not frequently noted, it appeared to impact many aspects of decedents’ lives: “The V had to quit his job and undergo intensive radiation treatment.” Other HEALTH-P were common and included recent or acute-on-chronic (i.e., recent exacerbation of a chronic problem), hospitalizations, injuries, surgery, and unspecified issues. Most people with HEALTH-P had MH/SA-P, with more women than men receiving treatment. RELATIONSHIP-P and JOB/FINAN-P were noted in about 25% and 28% of cases, respectively. Women more commonly than men experienced FAMILY-P, whereas LEGAL-P appeared to

arise more among men. Unlike other areas, men with HEALTH-P disclosed suicide intent more frequently than women. More women than men had a history of ideation and attempts.

Eighteen percent of decedents (23.2% women, 13.3% men) had FAMILY-P (Figure 1), with 24.6% of women and 69% of men experiencing multiple FAMILY-P. Problems often involved death of a loved one, with many deaths having occurred within the previous month or year. Men more than women experienced a family history of suicide: “... V’s son committed suicide 5 years ago. Since then V had become more depressed.” Most decedents had other FAMILY-P noted. Many involved arguments that occurred the day of, or the day prior to, suicide. Most arguments involved the decedent and their child, parents, siblings, or other relatives. Arguments related to the decedent’s drinking, medication abuse, or MH/SA-P, financial and property disagreements, and health problems of a family member (e.g., “Victim was the caregiver for her father and had taken little vacation in the past 10 years”). Mentioned less frequently were death of pets and recent moves of family members. Most people with FAMILY-P appeared to have MH/SA-P and many cases noted co-occurring RELATIONSHIP-P and HEALTH-P; this was approximately equal among men and women. However, more men than women seemed to experience co-occurring JOB/FINAN-P and LEGAL-P. About one third of women had known MH/SA treatment, yet 57.5% had a history of suicide ideation or attempts. More than 50% of women disclosed intent prior to suicide.

Sixty-one men (19.4%) and 37 women (11.7%) experienced LEGAL-P (Figure 1). Most LEGAL-P among men involved homicide or attempted homicide, often within hours of death. Two women perpetrated homicide (none attempted). Most homicides involved the decedent’s partner or ex-partner. Of the 37 women who had LEGAL-P, most were unspecified and appeared chronic or acute-on-chronic in nature. Other commonly occurring LEGAL-P included a recent release from, or fear of pending, incarceration and sexual misconduct among men. Men and women who perpetrated homicide often had other co-occurring problems, such as RELATIONSHIP-P. For instance, one man who killed his partner had “a history of domestic problems... . A protective order was filed a few months ago against him.” Women with LEGAL-P appeared to experience SA-P: “Mother reported that V was recently arrested for driving under the influence and attempted suicide while in the holding cell.” It appeared that many more women than men with LEGAL-P had an MH/SA-P, received MH/SA treatment, disclosed suicide intent, and had a history of suicide ideation/attempts.

Table 2. Narrative Examples of Suicides, Aged 35–64 Years, in 17 NVDRS States, by Sex and Circumstances, 2003–2011

Life stressors preceding suicide	Subcategories of life stressors	Narrative examples with life stressor codes	
		Males	Females
Intimate partner problem (RELATIONSHIP-P)	Argument/fighting Left home/separation Divorce/break-up Infidelity Violence perpetration Violence victimization Other RELATIONSHIP-P	V was under indictment for sexual assault on a child (LEGAL-P; sex misconduct-ongoing). Per friend, V was having trouble finding an attorney, as he did not qualify for public defender and did not have funds to hire an outside attorney (JOB/FINAN; financial-ongoing). V had history of multiple suicide attempts (Hx suicide attempts) and was diagnosed with depression (MH/SA). V was raised with a large number of siblings with very strict parents who abused them (FAMILY-P; ACE). V's older brother killed himself (FAMILY-P; Hx suicide)	Decedent was the victim of IPV (RELATIONSHIP-P; IPV) resulting in a rib fracture; she was being treated for PTSD and depression (MH/SA) and often abused alcohol and methamphetamines (MH/SA; alcohol, drug use) She also recently learned that her daughter was diagnosed with cancer (FAMILY-P; other-recent). Further, she had attempted suicide at least three times within 2 years of her death (Hx suicide attempts).
Job/financial problem (JOB/FINAN)	Co-worker problems Unemployed Lost job Other job problems Lost home In debt/can't pay bills Other JOB/FINAN-P	V was found deceased in his driveway as the result of a single self-inflicted gunshot wound. V was estranged from his wife (RELATIONSHIP-P; break-up-chronic), had been fired from his job (job problem-ongoing) and was unable to work due to physical health issues, (HEALTH-P; unspecified-chronic) and the V suffered from an alcohol problem (MH/SA; alcohol abuse-chronic). In the V's residence police found a notice for the cut off of his electrical service for non-payment of the bill (the power was already cut off) (JOB/FINAN-P; financial). A (suicide note) was located in the V's pocket.	V was found dead in her house by her adult daughter. Daughter was concerned about V because she had been depressed lately (MH/SA; recent) and drinking every day (MH/SA; alcohol). She was having trouble finding a job (JOB/FINAN-P; unemployed, ongoing), and she was in the process of losing her house (JOB/FINAN-P; Financial-loss of house, recent). V was recently divorced (RELATIONSHIP-P; divorce, recent). Several (suicide notes) were found in the house.
Physical health problem (HEALTH-P)	Cancer Chronic disease Pain Other health problems	V believed he had pancreatic cancer (HEALTH-P; cancer) due to some symptoms he was experiencing. The symptoms had existed for a year or more (chronic) and V believed his insides were rotting out. In the past, V underwent surgery for a ruptured colon (HEALTH-P; other-surgery).	V suffered from fibromyalgia (HEALTH-P; chronic) and was in a great deal of [pain]. V had been unable to work for over (JOB/FINAN-P; job-chronic) a year due to the pain. V had never attempted suicide but often joked about overdosing (Hx ideation) and her fear she would be found then her stomach pumped.
Family problem (FAMILY-P)	Death of friend/family member Family history of incarceration Family history of MH problems Child maltreatment by decedent ACE Other family problems	V found dead at his home. V's medical history included a severe accident that left him mildly mentally and physically disabled (HEALTH-P; other/ accident/ disability-chronic). Since that event V had bouts of depression (MH/SA) with (suicidal ideation) and (attempts) via drug overdose. The prior day, V got upset with one of the children (FAMILY-P; argument-recent) and started yelling and hitting objects. Police were called to the scene but no arrests were made (LEGAL-P). V's mother died within past 2 weeks (FAMILY-P; death-recent).	V's daughter states that she and the V had a fight (FAMILY-P; argument-recent) and she was supposed to move back home the day after the incident (JOB/FINAN-P; housing). When the daughter got up on incident date, she had a text from the V threatening to kill herself (disclosed suicide). The daughter stated that her mother had done this many times (Hx ideation). She told her mother she was "stupid and ridiculous."
Criminal/legal problems (LEGAL-P)	Child and family services referral Sexual misconduct Drug/alcohol-related charge Arrest/warrant for arrest Recent/pending incarceration Other LEGAL-P, e.g., restraining order Homicide Attempted homicide	V shot himself with a revolver after the police pursued him. V had a protective order against him (LEGAL-P; protective order) and, with a sledgehammer, hit the windshield of the vehicle owned by the woman who had the protective order put on him (RELATIONSHIP-P; recent intimate partner violence). V had been released from jail days earlier (recent incarceration). V had been arrested for assault with a dangerous weapon, violation of a protective order and resisting an officer (recent arrest for various LEGAL-Ps).	V died at her residence as a result of an overdose of prescription drugs as well as the illicit drug methamphetamine (drug use immediately prior to death). V had diagnosed anxiety (MH/SA) and was taking psychiatric medications (in treatment for mental health problem). This day, V was arrested for driving under the influence (LEGAL-P—recent arrest, alcohol-related charge). V had threatened suicide (suicidal ideation) to her boyfriend stating that she would take a bunch of prescription medication to kill herself if faced with jail time.

Note: Narrative details have been modified to reduce risk of victim identification. ACE, adverse childhood experience; Hx, history; IPV, intimate partner victimization; MH, mental health; NVDRS, National Violent Death Reporting System; PTSD, post-traumatic stress disorder; SA, substance abuse; V, victim.

Logistic regression analyses found the same pattern of sex differences found in bivariate analyses: Men had significantly greater odds than women of JOB/FINAN-P and LEGAL-P (Table 3, Models B and E), and women had significantly greater odds than men of HEALTH-P and FAMILY-P (Models C and D), controlling for all other factors. There were no significant differences between men and women in odds of RELATIONSHIP-P (Model A). RELATIONSHIP-P and LEGAL-P were significantly negatively associated with HEALTH-P (Model C), and were positively associated with each other (Models A and E). That is, people with LEGAL-P had 69% greater odds of RELATIONSHIP-P than people without LEGAL-P (Model A) and, likewise, people with RELATIONSHIP-P had 65% greater odds of LEGAL-P compared with those without RELATIONSHIP-P (Model E). People with MH/SA-P had more than twice the odds of FAMILY-P as compared with those without MH/SA-P (Model D), and known MH/SA-P were negatively associated with LEGAL-P (AOR=0.49, 95% CI=0.30, 0.82, $p<0.01$, Model E). People with any

mental health treatment had significantly reduced odds of RELATIONSHIP-P (Model A; AOR=0.62, 95% CI=0.41, 0.93) and prior suicidal ideation/attempts was not associated with any of the examined life stressors, controlling for all other variables. The years pre- and post-recession (versus recession years) were not associated with significantly decreased odds of any life stressors (Table 3), except for LEGAL-P, for which a 49% reduction in odds was observed after the recession. Additionally, RELATIONSHIP-P were elevated pre- and post-recession compared with during the recession. Post-hoc interactions between year and sex were tested. No significant effect was found (results not shown).

Discussion

Results suggest that middle-aged men and women have both common and unique life stressors preceding suicide, and these circumstances frequently co-occur. Qualitative analyses indicate that specific types of problems are more commonly experienced by subgroups of decedents. For

Table 3. Odds of Specific Life Stressors Preceding Suicide, Among a Sample of Males and Females Aged 35–64 Years, in 17 NVDRS States ($n=630$)

Variable	Intimate partner problem (Model A)	Job/financial problem (Model B)	Physical health problem (Model C)	Family problem (Model D)	Criminal/legal problem (Model E)
Male (ref=female)	1.01 (0.69, 1.49)	2.41 (1.64, 3.54)***	0.56 (0.38, 0.84)**	0.54 (0.34, 0.86)**	1.71 (1.04, 2.80)*
Age	0.95 (0.93, 0.97)***	1.01 (0.98, 1.03)	1.04 (1.02, 1.07)**	0.97 (0.95, 1.00)	0.99 (0.96, 1.02)
Racial/ethnic minority (ref=white/NH)	0.87 (0.51, 1.49)	1.01 (0.57, 1.76)	1.26 (0.67, 2.39)	0.86 (0.45, 1.64)	1.21 (0.61, 2.43)
RELATIONSHIP-P	—	1.14 (0.77, 1.68)	0.54 (0.35, 0.83)**	1.26 (0.80, 1.99)	1.65 (1.03, 2.66)*
JOB/FINAN-P	1.13 (0.76, 1.67)	—	0.99 (0.66, 1.50)	1.48 (0.93, 2.36)	0.78 (0.47, 1.30)
HEALTH-P	0.54 (0.35, 0.82)**	0.96 (0.63, 1.45)	—	1.04 (0.65, 1.68)	0.54 (0.30, 0.97)*
FAMILY-P	1.28 (0.81, 2.02)	1.48 (0.94, 2.35)	1.06 (0.66, 1.71)	—	0.97 (0.53, 1.78)
LEGAL-P	1.69 (1.06, 2.71)*	0.78 (0.47, 1.31)	0.54 (0.30, 0.97)*	0.95 (0.52, 1.74)	—
MH/SA-P	1.33 (0.86, 2.05)	1.41 (0.91, 2.19)	1.15 (0.72, 1.84)	2.30 (1.24, 4.29)**	0.49 (0.30, 0.82)*
MH/SA treatment	0.62 (0.41, 0.93)*	0.74 (0.49, 1.12)	0.96 (0.64, 1.44)	1.39 (0.88, 2.20)	1.08 (0.64, 1.82)
Prior ideation/attempt	1.08 (0.74, 1.58)	1.13 (0.77, 1.65)	0.94 (0.63, 1.39)	0.93 (0.59, 1.46)	1.22 (0.75, 1.99)
2003–2007 (ref=2008–2009)	1.73 (1.09, 2.73)	0.71 (0.46, 1.10)	0.98 (0.62, 1.54)	0.94 (0.56, 1.57)	0.90 (0.53, 1.55)
2010–2011	1.75 (1.07, 2.87)	0.98 (0.61, 1.56)	0.77 (0.46, 1.28)	0.70 (0.39, 1.26)	0.51 (0.27, 0.97)*

Note: Boldface indicates statistical significance (* $p<0.05$; ** $p<0.01$; *** $p<0.001$). Data are OR (95% CI). All models adjusted for geographic location. All variables categorical except age, which is continuous.

FAMILY-P, family problem; HEALTH-P, physical health problem; JOB/FINAN-P, job/financial problem; LEGAL-P, legal problem; MH/SA-P, mental health and/or substance abuse problem; NH, non-Hispanic; NVDRS, National Violent Death Reporting System; RELATIONSHIP-P, intimate partner problem.

example, infidelity is a specific type of RELATIONSHIP-P, more common among homicide–suicides than single-victim suicides. Additionally, qualitative analyses indicate that precipitating problems tend to “pile up,” or accumulate. For example, women with JOB/FINAN-P tended to experience chronic unemployment, frequently because of HEALTH-P, such as chronic pain, and FAMILY-P tended to occur more among people with MH/SA-P and co-occurring RELATIONSHIP-P and HEALTH-P.

Quantitative analyses reinforced qualitative results and indicated that women were more likely to have known HEALTH-P and FAMILY-P, whereas men were more likely to have JOB/FINAN-P and LEGAL-P. Both had similar odds of RELATIONSHIP-P, the most commonly noted life stressor. Certain circumstances were also more or less associated with each other (e.g., RELATIONSHIP-P and LEGAL-P were positively associated to each other and negatively associated with HEALTH-P). In the context of multivariable models, MH/SA-P were positively associated with FAMILY-P and negatively associated with LEGAL-P, likely reflecting the larger and smaller proportion of women in these categories, respectively, and the greater likelihood of MH/SA diagnosis in women. People with MH/SA treatment were less likely to experience RELATIONSHIP-P, which provides useful prevention information.

The broad life stressors identified using mixed methods in this study concur with prior psychological autopsy studies^{26,31–34} and indicate similar sex differences.^{5,26,31,34} For example, middle-aged male suicides in the United Kingdom more often had JOB/FINAN-P compared with women, whereas women more often had FAMILY-P. Relationship breakdown (RELATIONSHIP-P) was similarly common in middle-aged male and female suicides.⁵ Conversely, other researchers using NVDRS reported lower estimates for all life stressors in men and women among decedents aged 40–64 years.²⁶ This may be attributed to examination of different years of data (2005–2010 vs 2003–2011), a census of suicides in 17 states versus a random sample, or the additional information provided by qualitative case narratives versus quantitative data alone. In an earlier study, researchers examined circumstances 1 week and 3 months preceding all Finnish suicides.³¹ Estimates of JOB/FINAN-P, HEALTH-P, and FAMILY-P were similar in magnitude to those in the current study; however, estimates of RELATIONSHIP-P were about half as much. This pattern of results was also true of 100 suicides in the United Kingdom,⁵ and is likely due to the broad RELATIONSHIP-P issues able to be extracted from the NVDRS narratives in the current study.

The current study has several strengths. Its mixed methods approach using abstracted death scene narratives provides a novel way of considering co-occurring circumstances and their complex interplay among men

and women. Qualitative analyses allowed for examination of specific types of broad problems (e.g., chronic pain as a health problem among women) and the temporality of specific problems. Although NVDRS quantitative data contain a variable indicating whether decedents experienced a recent crisis, this variable does not indicate which of the multiple problems the decedent experienced was considered the recent crisis. Additionally, the study focuses on middle-aged adults, specifically, a population with growing suicide mortality and the study examined important sex differences. The sample size was both considerably large for a qualitative analysis and sufficient to detect significant differences by sex in adjusted quantitative analyses.

Limitations

Limitations include the collection of circumstance data from proxies. However, this weakness is common to all postmortem methodologies.¹³ Other NVDRS limitations pertain to this study as well. Results may not generalize to the entire U.S. population, given they come from just 17 states,³⁵ and the sample was not representative of all regions. Also, year of death was tested in unequal time categories. However, this was purposeful to reflect the recession and pre- and post-recession years. Finally, the current study did not employ a control group. However, the primary purpose was to compare men and women who died by suicide. Further in-depth study assessing clustering of co-occurring circumstances and sex differences in suicide is warranted.

Conclusions

Study findings have implications for prevention. For example, professionals who work with middle-aged adults (e.g., criminal–legal, medical, human resources) may benefit from assessing co-occurring problems in individuals' lives and training on recognizing and responding to warning signs of suicide. Referral into MH/SA treatment may help decrease the likelihood of future crisis situations and life stressors, such as RELATIONSHIP-P. Decreasing stigma related to seeking help, particularly among men, is critical, given their low treatment rates.³⁶ Other important prevention strategies include increased mental health literacy, especially given the large proportion of decedents with prior suicidal behavior or who disclosed suicidal intent. Additionally, upstream strategies—those seeking to prevent suicide risk from arising in the first place³⁷—can focus on improved problem solving and enhanced coping skills among younger generations to manage negative life events. Efforts to enhance social connectedness may buffer stressors related to interpersonal difficulties.⁵

Connectedness can also decrease one's sense of burden-someness,³⁸ sometimes observed among those with HEALTH-P and other chronic issues.³⁹ Comprehensive strategies for suicide prevention have been found to be effective in reducing suicide in work places such as the U.S. Air Force and among first responders.^{40,41} Suicide is preventable and a greater understanding of the circumstances behind middle-aged suicide, for men and women, can help reverse troubling recent trends.

Publication of this article was supported by the Centers for Disease Control and Prevention. The findings and conclusions in this article are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

No financial disclosures were reported by the authors of this paper.

References

- Maris RW. Mid-life male suicides. Paper presented at: the Annual Conference of the American Association of Suicidology, San Francisco, CA, 1987.
- Maris RW. Suicide prevention in adults (age 30–65). *Suicide Life Threat Behav.* 1995;25(1):171–179.
- McIntosh JL. Generational analyses of suicide baby boomers and 13ers. *Suicide Life Threat Behav.* 1994;24(4):334–342.
- CDC. Injury prevention and control: data and statistics (WISQARS™). www.cdc.gov/injury/wisqars/index.html. Accessed July 2, 2016.
- Shiner M, Scourfield J, Fincham B, Langer S. When things fall apart: gender and suicide across the life-course. *Soc Sci Med.* 2009;69(5):738–746. <http://dx.doi.org/10.1016/j.socscimed.2009.06.014>.
- Canetto SS, Cleary A. Men masculinities and suicidal behaviour. *Soc Sci Med.* 2012;74(4):461–465. <http://dx.doi.org/10.1016/j.socscimed.2011.11.001>.
- Bálint L, Osváth P, Rihmer Z, Döme P. Associations between marital and educational status and risk of completed suicide in Hungary. *J Affect Disord.* 2016;190:777–783. <http://dx.doi.org/10.1016/j.jad.2015.11.011>.
- Schiff LB, Holland KM, Stone DM, et al. Acute and chronic risk preceding suicidal crises among middle-aged men without known mental health and/or substance abuse problems. *Crisis.* 2015;36(5):304–315. <http://dx.doi.org/10.1027/0227-5910/a000329>.
- Murphy GE. Psychiatric aspects of suicidal behaviour: substance abuse. In: Hawton K, VanHeeringen K, eds. *The International Handbook of Suicide and Attempted Suicide*. Chichester: John Wiley & Sons; 2000:135–146. <http://dx.doi.org/10.1002/9780470698976.ch9>.
- Harris EC, Barraclough B. Suicide as an outcome for mental disorders. A meta-analysis. *Br J Psychiatry.* 1997;170(3):205–228. <http://dx.doi.org/10.1192/bjp.170.3.205>.
- Henriksson MM, Aro HM, Marttunen MJ, et al. Mental disorders and comorbidity in suicide. *Am J Psychiatry.* 1993;150(6):935–940. <http://dx.doi.org/10.1176/ajp.150.6.935>.
- Niederkrotenthaler T, Logan JE, Karch DL, Crosby A. Characteristics of U.S. suicide decedents in 2005–2010 who had received mental health treatment. *Psychiatr Serv.* 2014;65(3):387–390. <http://dx.doi.org/10.1176/appi.ps.201300124>.
- Hawton K, Appleby L, Platt S, et al. The psychological autopsy approach to studying suicide: a review of methodological issues. *J Affect Disord.* 1998;50(2–3):269–276.
- Brent DA, Baugher M, Bridge J, Chen T, Chiappetta L. Age- and sex-related risk factors for adolescent suicide. *J Am Acad Child Adolesc Psychiatry.* 1999;38(12):1497–1505. <http://dx.doi.org/10.1097/00004583-199912000-00010>.
- Brent DA, Perper JA, Moritz G, et al. Psychiatric risk factors for adolescent suicide: a case-control study. *J Am Acad Child Adolesc Psychiatry.* 1993;32(3):521–529. <http://dx.doi.org/10.1097/00004583-199305000-00006>.
- Marttunen MJ, Henriksson MM, Isometsa ET, Heikkinen ME, Aro HM, Lonnqvist JK. Completed suicide among adolescents with no diagnosable psychiatric disorder. *Adolescence.* 1998;33(131):669–681.
- Harwood D, Hawton K, Hope T, Jacoby R. Suicide in older people without psychiatric disorder. *Int J Geriatr Psychiatry.* 2006;21(4):363–367. <http://dx.doi.org/10.1002/gps.1473>.
- Chiu HF, Yip PS, Chi I, et al. Elderly suicide in Hong Kong—a case-controlled psychological autopsy study. *Acta Psychiatr Scand.* 2004;109(4):299–305. <http://dx.doi.org/10.1046/j.1600-0447.2003.00263.x>.
- Van Orden K, Conwell Y. Suicides in late life. *Curr Psychiatry Rep.* 2011;13(3):234–241. <http://dx.doi.org/10.1007/s11920-011-0193-3>.
- Foster T, Gillespie K, McClelland R, Patterson C. Risk factors for suicide independent of DSM-III-R Axis I disorder. Case-control psychological autopsy study in Northern Ireland. *Br J Psychiatry.* 1999;175(2):175–179. <http://dx.doi.org/10.1192/bjp.175.2.175>.
- Chachamovich E, Ding Y, Turecki G. Levels of aggressiveness are higher among alcohol-related suicides: results from a psychological autopsy study. *Alcohol.* 2012;46(6):529–536. <http://dx.doi.org/10.1016/j.alcohol.2012.03.007>.
- Law YW, Wong PW, Yip PS. Suicide with psychiatric diagnosis and without utilization of psychiatric service. *BMC Public Health.* 2010;10:431. <http://dx.doi.org/10.1186/1471-2458-10-431>.
- CDC. Suicide among adults aged 35–64 years—United States, 1999–2010. *MMWR Morb Mortal Wkly Rep.* 2013;62(17):321–325.
- Draper B, Kolves K, De Leo D, Snowdon J. A controlled study of suicide in middle-aged and older people: personality traits, age, and psychiatric disorders. *Suicide Life Threat Behav.* 2014;44(2):130–138. <http://dx.doi.org/10.1111/sltb.12053>.
- Wong PWC, Chan WSC, Chen EY, Chan SSM, Law Y-w, Yip PSF. Suicide among adults aged 30–49: a psychological autopsy study in Hong Kong. *BMC Public Health.* 2008;8(1):147. <http://dx.doi.org/10.1186/1471-2458-8-147>.
- Hempstead KA, Phillips JA. Rising suicide among adults aged 40–64 years: the role of job and financial circumstances. *Am J Prev Med.* 2015;48(5):491–500. <http://dx.doi.org/10.1016/j.amepre.2014.11.006>.
- Phillips JA, Robin AV, Nugent CN, Idler EL. Understanding recent changes in suicide rates among the middle-aged: period or cohort effects? *Public Health Rep.* 2010;125(5):680–688.
- Snowdon J, Draper B, Wyder M. Age variation in the prevalence of DSM-IV disorders in cases of suicide of middle-aged and older persons in Sydney. *Suicide Life Threat Behav.* 2011;41(4):465–470. <http://dx.doi.org/10.1111/j.1943-278X.2011.00049.x>.
- Paulozzi LJ, Mercy J, Frazier Jr, Annett JL, Centers for Disease Control and Prevention. CDC's National Violent Death Reporting System: background and methodology. *Inj Prev.* 2004;10(1):47–52. <http://dx.doi.org/10.1136/ip.2003.003434>.
- Blair JM, Fowler KA, Jack SP, Crosby AE. The National Violent Death Reporting System: overview and future directions. *Inj Prev.* 2016;22(suppl 1):i6–i11. <http://dx.doi.org/10.1136/injuryprev-2015-041819>.
- Heikkinen M, Aro H, Lonnqvist J. Recent life events, social support and suicide. *Acta Psychiatr Scand Suppl.* 1994;89(suppl 377):65–72. <http://dx.doi.org/10.1111/j.1600-0447.1994.tb05805.x>.
- Foster T. Adverse life events proximal to adult suicide: a synthesis of findings from psychological autopsy studies. *Arch Suicide Res.* 2011;15(1):1–15. <http://dx.doi.org/10.1080/13811118.2011.540213>.
- Duberstein PR, Conwell Y, Conner KR, Eberly S, Caine ED. Suicide at 50 years of age and older: perceived physical illness, family discord and

- financial strain. *Psychol Med*. 2004;34(1):137–146. <http://dx.doi.org/10.1017/S0033291703008584>.
34. Heikkinen ME, Isometsa ET, Aro HM, Sarna SJ, Lonnqvist JK. Age-related variation in recent life events preceding suicide. *J Nerv Ment Dis*. 1995;183(5):325–331. <http://dx.doi.org/10.1097/00005053-199505000-00009>.
 35. Parks SE, Johnson LL, McDaniel DD, Gladden M. Surveillance for violent deaths—National Violent Death Reporting System, 16 states, 2010. *MMWR Surveill Summ*. 2014;63(1):1–33.
 36. Pitts-Tucker T. Pressure to keep up macho image might be behind rise in suicides among men. *BMJ*. 2012;345. <http://dx.doi.org/10.1136/bmj.e6356>.
 37. Wyman PA. Developmental approach to prevent adolescent suicides: research pathways to effective upstream preventive interventions. *Am J Prev Med*. 2014;47(3 suppl 2):S251–S256. <http://dx.doi.org/10.1016/j.amepre.2014.05.039>.
 38. Van Orden KA, Witte TK, Cukrowicz KC, Braithwaite SR, Selby EA, Joiner Jr. The interpersonal theory of suicide. *Psychol Rev*. 2010;117(2):575–600. <http://dx.doi.org/10.1037/a0018697>.
 39. Kanzler KE, Bryan CJ, McGeary DD, Morrow CE. Suicidal ideation and perceived burdensomeness in patients with chronic pain. *Pain Pract*. 2012;12(8):602–609. <http://dx.doi.org/10.1111/j.1533-2500.2012.00542.x>.
 40. Knox KL, Pflanz S, Talcott GW, et al. The U.S. Air Force suicide prevention program: implications for public health policy. *Am J Public Health*. 2010;100(12):2457–2463. <http://dx.doi.org/10.2105/AJPH.2009.159871>.
 41. Mishara BL, Martin N. Effects of a comprehensive police suicide prevention program. *Crisis*. 2012;33(3):162–168. <http://dx.doi.org/10.1027/0227-5910/a000125>.