Risk factors associated with intimate partner problem related suicides

By

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ABSTRACT

Suicides have been increasing over the past two decades and they are a major public health problem. Intimate partner problems (IPP) are a common precipitating factor associated with suicides. The purpose of this study was to identify risk factors associated with IPP-related suicides and to examine how they differ from non-IPP related suicides.

This cross-sectional study analyzed data from the National Violent Deaths Reporting System (NVDRS) from 18 reporting states, using two samples. The first sample included all suicides of adults (18 years or older) with precipitating circumstances (n=106,994). The second was a subsample that consisted of people who died by suicide and had experienced IPPs matched with individuals who died by suicide but did not experience IPPs (n=59,792). The two groups were matched on the following variables: age (+/- 1 year), race/ethnicity, sex, year of death (+/- 1 year), and state of death. The following risk factors were examined: mental health problems, current depressed mood, history of suicidal thoughts, history of suicide attempts, alcohol abuse problem, other substance abuse problem, physical illness, family problems, friend problems, suicide of family or friend, death of family or friend, arguments over money, property or insult, financial problems, job problems, precipitated by a crime, and recent criminal or legal problems.

Compared to non-IPP suicide decedents, IPP suicide decedents were more likely to be younger and married and to experience (1) current depressed mood, (2) suicide ideation, (3) suicide attempts (only in the unmatched sample), (4) alcohol abuse problems, (5) arguments over money, property, or insult, (6) financial problems, and (7) precipitated by another serious crime. Conversely, non-IPP suicide decedents were more like to be older and never married, single or widowed, and to experience (1) mental health problems, (2) other substance abuse problems, (3) physical illness (4) family problems, (5) friend problems (only in the matched comparison), (6) recent family or friend suicide (only in the unmatched sample), (7) other death of family or friend, (8) job problems, and (9) recent criminal or legal problem. In addition, the cumulative risk (having multiple risk factors) was significantly higher for the IPP-related suicide decedents (mean number of risks = 2.73) than non-IPP related suicide decedents (mean = 2.48).

This study justifies the need for interventions in non-traditional venues. Court representatives could be trained to identify potential individuals with IPPs and refer them to the necessary resources to help mitigate IPP. Alcohol Anonymous programs and other substance abuse treatment facilities could use this analysis to develop tools to identify and address IPPs and prevent suicides. Mental health care providers and personnel in hospitals and emergency rooms could use results from this study to develop screening tools to identify IPP and reduce IPP and suicidal ideation and suicide attempts.

INDEX WORDS: Intimate partner problems, Suicide, Risk factors

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ABBREVIATIONS

CDC	Center for Disease Control and Prevention
IPP	Intimate Partner Problems
IPV	Intimate Partner Violence
NVDRS	National Violent Death Registry System

CHAPTER 1:

INTRODUCTION

Background

Suicide is the 10th leading cause of death in the United States (US) and a major public health problem (Centers for Disease Control and Prevention, 2015b). Within the last two decades, the adult suicide rate has increased by 27%, from 13.6 deaths per 100,000 population in 1999 to 17.3 per 100,000 in 2015 (Centers for Disease Control and Prevention, 2015a; David-Ferdon et al., 2016). The total number of suicides has also increased from 1999 to 2015 (Figure 1.1). Appendix A details the number of suicides among adults 18 years and older and suicide rates per 100,000 from 1999-2015 in the US.

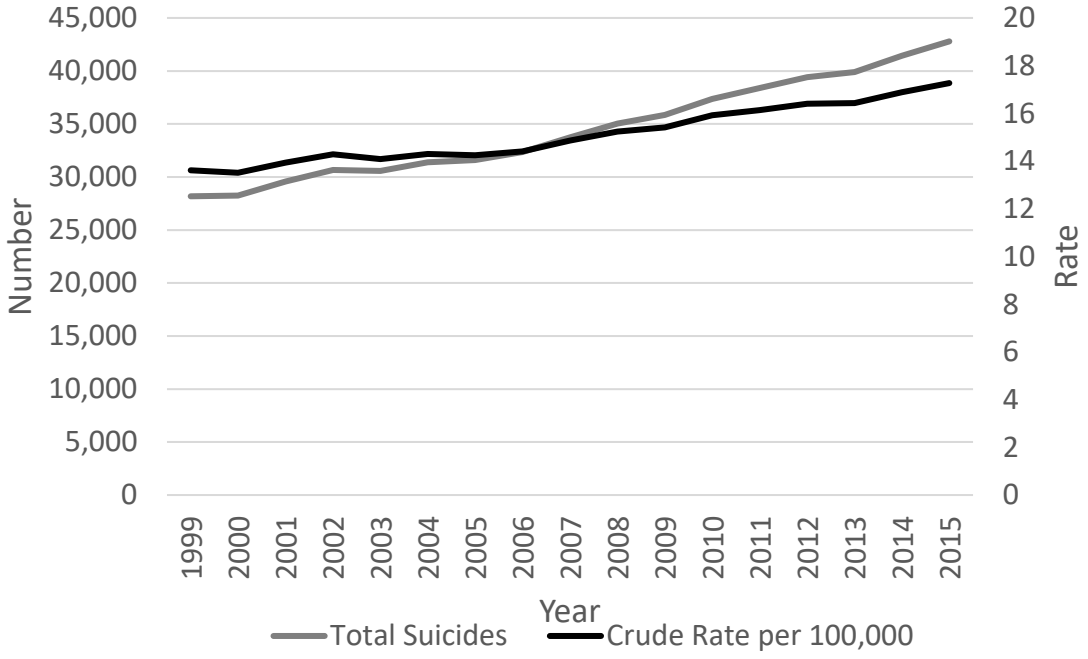

Figure 1.1 Suicide trends for adults 18 years and older—United States, 1999 – 2015

Multiple contributors may precipitate suicides. Mental health problems, physical illnesses, financial challenges, serious injury or assault, bereavement, substance abuse, legal problems, and intimate partner problems (which includes relationship problems and domestic violence) are among the most frequent precipitating factors (Caetano et al., 2015; Comiford, Sanderson, Chesnut, & Brown, 2016; Parks, Johnson, McDaniel, & Gladden, 2014). Mental health problems are the most commonly reported precipitating factor associated with suicides followed by intimate partner problems (IPP) (Comiford et al., 2016).

For this study, IPPs refer to divorce, separation, romantic break-ups, arguments with a partner, jealousy, conflicts, and intimate partner violence (IPV). IPPs are different from IPV. IPV is defined as physical, sexual, psychological harm or threats of physical or sexual harm, and stalking by a current or former partner or spouse (Comiford et al., 2016). IPP includes IPV, but it is not limited to abuse; it involves a wide range of problems with a romantic partner (Comiford et al., 2016).

The association between IPPs and suicide has been established through various studies (McLaughlin, O'Carroll, & O'Connor, 2012; Schiff et al., 2015; Stone, Holland, Schiff, & McIntosh, 2016). Suicide is defined as death caused by self-directed injurious behavior with any intent to die as a result of the behavior (Crosby, Ortega, & Melanson, 2011). Table 1.1 defines the terms used throughout this paper. IPPs such as low quality relationships, interpersonal conflict, and relationship problems (such as separation or divorce) are common precipitating factors to suicide (Kazan, Calear, & Batterham, 2016; Overholser, Braden, & Dieter, 2012). Additionally, researchers have found an association between relationship discord and suicides (Kaslow, Thompson, Meadows, et al., 2000; Logan, Hall, & Karch, 2011). Although the association between IPP in general and suicide has been clearly established (McLaughlin et al.,

2012; Schiff et al., 2015; Stone et al., 2016), there is a need for further exploration of specific risk factors associated with IPP-related suicides.

Table 1.1 Definitions for common terms used throughout this paper

Terms	Definitions
Suicide	Death caused by self-directed injurious behavior with any intent to die as a result of the behavior
Suicidal ideation	Thoughts of engaging in suicide-related behavior.
Suicidal attempt	A non-fatal, self-directed, potentially injurious behavior with an intent to die because of the behavior. A suicide attempt may or may not result in injury
Intimate Partner Problems (IPP)	To divorce, separation, romantic break-ups, arguments with significant other, jealousy, conflicts, and intimate partner violence.
Intimate Partner Violence (IPV)	Physical, sexual, psychological harm or threats of physical or sexual harm, and stalking by a current or former partner or spouse

(Centers for Disease Control and Prevention, 2015c, 2016a; Stone et al., 2017)

A majority of the research that focuses on risk factors associated with IPP-related suicides concentrates primarily on one component of IPP, which is IPV (Alhusen, Frohman, & Purcell, 2015; Cavanaugh, Messing, Eyzerovich, & Campbell, 2015; Gold, Singh, Marcus, & Palladino, 2012; Kaslow, Thompson, Meadows, et al., 2000; Kaslow et al., 1998; Thompson, Kaslow, & Kingree, 2002). Additionally, most IPP-related studies focus on demographic characteristics (e.g., age, employment, race, marital status) and health related risk factors (e.g., mental health problems, substance use) (Alhusen et al., 2015; Cerulli, Stephens, & Bossarte, 2014; Comiford et al., 2016; Gold et al., 2012; Heru, Stuart, Rainey, Eyre, & Recupero, 2006; Houry, Kaslow, & Thompson, 2005). There is a need to explore other facets of IPP-related suicides, beyond IPV, and their association with additional risk factors (e.g. criminal and other

life stressors) to enhance understanding about this major public health concern and develop prevention initiatives.

Significance of the Study

With suicide rates increasing, more research is needed to understand the risk factors associated with suicides. The paucity of research that explores risk factors associated with IPP-related suicides highlights the need for studies to understand this problem and develop effective interventions. Research shows that 30% of suicides involve IPP (Lyons, Fowler, Jack, Betz, & Blair, 2016). Improving the understanding of comorbid risk among those who die by suicide and experience IPP may help to improve prevention efforts, and could thus result in approximately 13,000 lives saved per year (Centers for Disease Control and Prevention, 2015a).

Purpose of Study

The purpose of this study was to identify risk factors associated with IPP-related suicides. To achieve this purpose, I used data from the National Violent Deaths Reporting System (NVDRS), a surveillance system that provides information on violent deaths from 18 states from 2003-2014. In 2016, NVDRS expanded to 40 states plus Puerto Rico and Washington DC, but data from only 18 states were available from 2003-2014; thus, these analyses are restricted to those states with a complete data during that time. The NVDRS is the largest database to collect circumstance data associated with violent deaths. This study addressed the following questions:

1. What are the socio-demographic, health-related, life stressors and criminal/legal risk factors associated with IPP-related suicides?
2. How do risk factors associated with IPP-related suicides differ from risk factors associated with non-IPP-related suicides?

3. Does the cumulative number of risk factors associated with IPP-related suicides differ from that of non IPP-related suicides?

Innovation

This study contributes to existing literature in several ways. First, in addition to observing the association between risk factors identified from previous studies (demographic and health risk factors), this study examined other risk factors such as life stressors (e.g. interpersonal conflicts with family members) and criminal or legal problems (Centers for Disease Control and Prevention, 2016b). Understanding these additional risk factors can be beneficial in developing and implementing preventative initiatives for IPP-related suicides. Second, this study examined the whole spectrum of IPP-related suicides and did not focus on IPV alone. Third, this study explored the differences in risk factors between IPP-related suicide and non-IPP related suicide incidents, which has not fully been studied (Comiford et al., 2016). Fourth, this study compared the impact of cumulative risk factors between IPP-related suicides and non-IPP related suicide incidents.

CHAPTER 2:

LITERATURE REVIEW

This literature review has six sections. Section one examines the association between IPPs and suicidal behaviors and cognitions. Sections two through five discuss risk factors associated with IPP and suicidal ideations, attempts, and death by suicide: sociodemographic risk factors, health-related risk factors, life stressors, and criminal and legal risk factors. The final section explains the theoretical background of this study.

IPP and suicidal ideation, attempts, and suicide

The association between IPP and suicidal ideation, attempts and suicides is grounded in empirical research (Cavanaugh et al., 2015; Devries et al., 2011). Depending on the study, IPP is the most common or second most commonly reported precipitating circumstance in suicides and suicidal behaviors (Comiford et al., 2016; Huguet, McFarland, & Kaplan, 2015; Logan, Skopp, Karch, Reger, & Gahm, 2012). Numerous suicides involve recent IPP (in some cases as short as hours or minutes) before death by suicide (Logan et al., 2011). A majority of literature that focuses on IPP and suicidal ideation, attempts, and suicide concentrates on IPV. Therefore, this section of the review was organized into three sub-sections, two concentrated on IPV and suicidal ideation, attempts and suicide and the other focused on the other components of IPP. The first sub-section focused on women and IPV-related suicidal ideation, attempts and suicide because numerous studies focus on the victimization of women through violence from the partner (Alhusen et al., 2015; Cavanaugh et al., 2015; Frye, Manganello, Campbell, Walton-Moss, & Wilt, 2006; Kalesan, Mobily, Vasan, Siegel, & Galea, 2016; Kernic, Wolf, & Holt,

2000; McFarlane et al., 2005; Salari, 2007). The second sub-section focused on men and IPV-related suicidal ideation, attempts, and suicide (including studies where men are victims and perpetrators). Because very few studies have focused on the other components of IPP, the final sub-section combined the other components of IPP (divorces, separation, relationship discord, arguments and jealousy).

Women and IPV-related suicidal ideation, attempts and suicide

IPV involving women victims is a major public health problem in the US, with 36% (42.4 million) of adult women experiencing some form of IPV (Black et al., 2011). Female victims of IPV are more likely to experience suicidal ideation and attempt suicide compared to those who did not have a history of IPV (Black et al., 2011; Edwards et al., 2006; Houry, Kemball, Rhodes, & Kaslow, 2006; McLaughlin et al., 2012; Rees et al., 2011; Schneider, Burnette, Ilgen, & Timko, 2009; Seedat, Stein, & Forde, 2005). IPV has a negative effect on women's mental health, which increases the incidence of depression, post-traumatic stress disorder, anxiety, and suicidal ideation and attempts (Pico-Alfonso et al., 2006). Abused women are also more likely to be hospitalized for suicide attempts compared to women who have not been abused (Kernic et al., 2000). Additionally, women victims of intimate terrorism (the attempt to dominate one's partner and to exert general control over the relationship) are at increased risk of previous suicide attempts or threats (Frye et al., 2006). One study that compared low-income African American females who attempted suicide to those who did not, found that those who attempted suicide were three times more likely to report non-physical abuse and two times more likely to report physical abuse (Kaslow, Thompson, Meadows, et al., 2000; Kaslow, Thompson, Brooks, & Twomey, 2000). Women reporting sexual assault were 5.3 times more

likely to report a suicide attempt within a 90-day period compared to women reporting physical abuse (McFarlane et al., 2005).

Men and IPV-related suicidal ideation, attempts and suicide

Even though 29% of men (more than 1 in 4 men) have experienced some form of IPV at some point in their lifetime (Black et al., 2011), there is a paucity of information regarding the association between IPV and suicidal ideation, attempts and suicide involving men. The few IPP-related suicide studies that include males as victims have conflicting outcomes. Some studies have found that men who have been victims of IPV have increased odds of suicidal ideation and attempts (Cerulli et al., 2014; Langhinrichsen-Rohling, Snarr, Slep, Heyman, & Foran, 2011; Renner & Whitney, 2012; Rhodes et al., 2009; Schneider et al., 2009; Simon, Anderso, Thompson, Crosby, & Sacks, 2002). One study found that men who reported IPV victimization were more likely to attempt suicide in the past year compared to men who did report being a victim of IPV (Schneider et al., 2009). However, Devries et al. (2013) found no clear evidence of an association between IPV and suicide attempts among males. The differences in outcomes among studies could be because of the samples. The studies that found an association between suicidal ideation and attempts and IPV for males focused on adults (Cerulli et al., 2014; Langhinrichsen-Rohling et al., 2011; Renner & Whitney, 2012; Rhodes et al., 2009), while Devries's study focused on adolescent males. In addition, two of the studies that found an association included military personnel in their sample (Cerulli et al., 2014; Langhinrichsen-Rohling et al., 2011). Military personnel can be exposed to other factors that could influence suicidal ideation and suicide attempts, such as deployments and war trauma (Hyman, Ireland, Frost, & Cottrell, 2012).

The association among male perpetrators of IPV and suicidal ideation and suicide attempts is also complex. Some studies have found an association between suicidal ideation and attempts and male perpetration of IPV and bidirectional IPV (defined as both victimization and perpetration in their relationship). Males involved in perpetration or bidirectional IPV are at risk for suicide ideation and suicide attempts (Lamis, Leenaars, Jahn, & Lester, 2013; Renner & Whitney, 2012; Rhodes et al., 2009; Simon et al., 2002; Ulloa & Hammett, 2016). One study that focused on male perpetrators who have had court orders of protection petitioned against them found an association between suicide ideation and IPV (Conner, Cerulli, & Caine, 2002). Men with a history of suicide ideations were more violent and had a greater severity of IPV. Additionally, violent men were more likely to experience the break-up of a romantic relationship in the 12 months preceding suicide (45%) than men who were in a relationship but were not violent (15%) (Conner et al., 2002). Wolford-Clevenger et al. (2015) studied male perpetrators of IPV who were court ordered to attend batterer intervention programs and did not find any significant association between IPV and suicidal ideation even though 22% of the males did report suicide ideation.

Suicidal ideation, attempts and suicide and other forms of IPP

Interpersonal conflicts, disruptions, and stressors (which include divorce, separation arguments, jealousy, and relationship discord) are common precipitating events for suicidal behavior (Caetano et al., 2015; Donald, Dower, Correa-Velez, & Jones, 2006; Kazan et al., 2016; Overholser et al., 2012). The risk of suicidal behavior increases in the months following an important loss, like a recent divorce or separation (Bagge, Glenn, & Lee, 2013; Overholser et al., 2012; Weyrauch, Roy-Byrne, Katon, & Wilson, 2001). Among adults participating in the PATH Through Life project (a population-based study examining the health and well-being of people

aged 20-24, 40-44, and 60-64 years old) the effects of separation on suicidal ideation and attempts were the strongest soon after a separation, with a nearly three-fold increase in ideation and an eight-fold increase in plans or attempts. Additionally, among those who had separated in the prior 2 years, the odds of suicide attempt was 7.7 times higher than among those who were married. The odds for suicidal ideation among those recently separated was 2.7 times higher than among those who were married (Batterham et al., 2014). Another study that used a national sample of adults, found the risk of suicide was 11 times greater for separated or divorced individuals compared to other marital groups (i.e. not separated nor divorced) (Petronis, Samuels, Moscicki, & Anthony, 1990). In a 10-year longitudinal study, Kposowa (2003) showed that divorced and separated persons were twice as likely to die by suicide as married persons.

There are some differences between demographic groups and the effect of interpersonal stressors on suicidal ideation and attempts and suicide. In general, women are more likely than men to *attempt* suicide in a response of interpersonal stressor (e.g. relationship break-up, divorce, separation) (Fazaa & Page, 2003). However, men who experience interpersonal stressors such as arguments with spouse or significant other, divorce or separation are at increased risk from *dying* from a suicide attempt (Hyman et al., 2012; Martin et al., 2013). Among male military personnel, over half of the suicide deaths (54%) were preceded by relationship problems (Stander, Hilton, Kennedy, & Robbins, 2004). Also, suicide decedents were two times more likely than civilians to have an interpersonal conflict (argument or fight with spouse or infidelity from either the spouse or decedent) 24 hours prior to dying by suicide (Martin et al., 2013). Among college students, relationship problems among non-Hispanic students were the most commonly reported precipitating factor associated with suicide ideation (De Luca, Yan, Lytle, & Brownson, 2014). In addition, dating violence (which includes victimization and aggression) among young adults

was associated with suicidal ideation and attempts. Singh et al. (2015) reported that 21% of the young adults who reported dating violence also reported suicidal ideation and attempts; in contrast, 10% of those who did not experience dating violence reported suicidal ideation and attempts.

Socio-demographic risk factors

Individuals with certain socio-demographic characteristics are at greater risk of IPP-related suicidal ideation, attempts, and suicide (Alhusen et al., 2015; Cavanaugh et al., 2015; Comiford et al., 2016). Researchers have studied the association between IPP-related suicidal ideation, attempts, and suicide and five socio-demographic characteristics: age, marital status, socioeconomic status, race/ethnicity, and gender (Batterham et al., 2014; Cavanaugh, Messing, Del-Colle, O'Sullivan, & Campbell, 2011; Cavanaugh et al., 2015; Runyan, Moracco, Dulli, & Butts, 2003). There is some overlap in socio-demographic characteristics and some studies might include more than one in their analysis.

There are gender differences in risk factors associated with IPV and suicidal ideation. Women were more likely to have suicidal ideations than men (Devries et al., 2011; Wu, Su, & Chen, 2009) and were 3 times as likely to attempt suicide compared to men (Henning, Jones, & Holdford, 2003). In an inpatient acute care psychiatric hospital, women were more likely to report poor family function, particularly inability to carry out daily practices and meet emotional needs of nurturance and support of family members, and men were more likely to report poor affective involvement with other members of the family (Heru et al., 2006). However, another study that focused on interpersonal violence (which includes IPV) and suicide attempts, found that gender did not moderate the association between interpersonal violence and suicide attempts. The strength of association for various forms of interpersonal violence exposure and

suicide attempts were similar for men and women (Iverson et al., 2013). Regarding dying by suicide, men were more likely to die by suicide. Among IPP-related suicides, 82% were males (Comiford et al., 2016). Additionally, divorced men were 2 times more likely to die by suicide than married men were. However, there was no significant difference in risk between divorced and married women regarding dying by suicide (Kposowa, 2003).

Women at higher risk of IPP-related suicidal ideation and attempts and dying by suicide tend to be younger and unmarried, make less than $10,000 per year and have less than 12 years of formal education (Alhusen et al., 2015; Cavanaugh et al., 2015). Older women (60 years and over) are less likely to experience suicide ideation, attempts, and die by suicide than younger women (women in their 20s) (Batterham et al., 2014; Cavanaugh et al., 2011; Cavanaugh et al., 2015; Goldman-Mellor et al., 2014; Lacey et al., 2015). IPP-related suicides are also prevalent among women of reproductive age (15-44 years). Among women of reproductive age who died by suicide in the US from 2003-2007 (N=4,203), IPP prior to suicide was reported in 36% of the cases (Ortega & Karch, 2010). Among veterans (male and females) who have died by suicide, younger decedents (18-34 years) were more likely to have IPP than older decedents (greater than or equal to 65 years) (Kaplan, McFarland, Huguet, & Valenstein, 2012).

Men are more likely to die by IPP-related suicides than women are. In Kentucky, 86% of the IPP-related suicides were among males (Comiford et al., 2016).

Studies that discuss the association between socio-economic status and IPP-related suicidal ideation, attempts, and suicide have focused on educational attainment and employment status. Regarding education attainment, college graduates were less likely to experience IPP-related suicidal ideation than high school graduates (Lacey et al., 2015). Employment status is also associated with IPP-related suicidal attempts. Among adult female victims of IPV, part-time

or seasonal employment was a correlate of suicidal behavior (Cavanaugh et al., 2011). Perhaps, the association between IPP-related suicidal ideation, attempts and suicide and lower education exist because those with lower education might lack access to resources to remove themselves from an abusive environment. Having less than high school diploma education can limit employment opportunities. Limited employment opportunities can result in lower income. Low income can hinder a person from moving away from an abusive significant other. In addition, lower education and income could limit access to other resources like internet access (which can be used to find domestic violence assistance).

IPP-related suicidal ideation, attempts, and suicide varies by race and ethnicity (Cavanaugh et al., 2015; Comiford et al., 2016). Among women who exhibited nonfatal suicidal behavior (ideation and attempts), Latina women are more likely to report having a chronic disease, being younger and being unemployed than European and African American women (Cavanaugh et al., 2015). Cavanaugh et al. (2011) also found that African American IPV victims were 40% less likely than Latina victims to have attempted suicide were. Among suicide decedents, research shows that most are non-Hispanic white (Stone et al., 2016). However, among those who had a blood alcohol content greater than .08 g/dl, American Indian/Alaskan Native men had the highest proportion of IPPs (49%), followed by Hispanic (35%), White (34%), Asian/Pacific Islander (20%), and Black (14%) men. American Indian/Alaskan Native women also had a higher proportion of IPPs (41%) compared to the White (26%), Black (11%), Asian/Pacific Islander (13%) and Hispanic (27%) women (Caetano et al., 2015).

Health-related risk factors

This section examines the literature regarding three health-related risk factors associated with suicidal behavior and suicides: mental health problems, physical illness, and substance abuse.

Mental health problems. Depressive symptomology, anxiety, and hopelessness have been a significant predictor of suicidal ideation, attempts, and suicide (Alhusen et al., 2015; Batterham et al., 2014; Comiford et al., 2016; Houry, Kemball, Click, & Kaslow, 2007; Hurwitz, Gupta, Liu, Silverman, & Raj, 2006; Lamis et al., 2013; Wolford-Clevenger et al., 2015). There is a strong association between suicidal ideation, depressive symptomology and IPV among pregnant women. The odds of depressive symptomology among pregnant women who experience IPV was 9 times that among those who did not experience IPV (Alhusen et al., 2015). Among people with chronic mental illness the odds of attempting suicide as a result of IPV is 5.4 times that among people without it. Chronic mental illness is defined as any long-standing mental health condition, such as depression, which has lasted for 12 months or more and which limits day-to-day activities (Khalifeh, Oram, Trevillion, Johnson, & Howard, 2015). Approximately 35% reports of IPP- related suicides stated mental health as a precipitating circumstance (Comiford et al., 2016).

Individuals who were separated from their significant other and attempted suicide had higher depression scores, high risk for previous suicidal ideation, and previous suicidal plans or attempts (Batterham et al., 2014). Among abused women who sought care in emergency departments, suicidal ideation was associated with moderate to severe mental health symptoms (Houry et al., 2007). Also women who came to the hospital with a recent history of IPV and suicidal behavior reported high levels of post-traumatic stress disorder symptoms (Bradley,

Schwartz, & Kaslow, 2005). Abused women were more likely to report depression, anxiety, higher levels of psychological distress, hopelessness, sadness, self- dislike, feelings of worthlessness, and suicidal ideation and attempts than women with no history of IPV (Houry et al., 2005; Hurwitz et al., 2006; Kaslow et al., 1998; Kaslow et al., 2002; Thompson et al., 2002). Depressive symptoms among male and female college students who were both victims and perpetrators of violence significantly predicted suicidal ideation (Lamis et al., 2013). Among males, participating in a court ordered batterer intervention program, depression and the display of symptoms of borderline personality disorder was associated with suicidal ideation (Wolford-Clevenger et al., 2015). Some studies have indicated a bidirectional association between IPV and mental health problems. Women who are exposed to IPV are at an increased risk of depression symptoms and women who report depressive symptoms are more likely to experience IPV (Devries et al., 2013).

Physical illness. Chronic illness among Latina and European women was significantly associated with IPV and nonfatal suicidal behavior such as suicidal ideation (Cavanaugh et al., 2015). Female IPV victims who reported having a chronic disease were more likely to attempt suicide during their lifetime. Women victims of IPV who reported having a chronic or disabling disease had 2.4 times greater odds of having ever threaten or attempted suicide than women who did not have chronic or disabling disease after controlling for other variables (Cavanaugh et al., 2011). Among US Asian Women, IPV victims were more likely to report poor physical health for 7 or more days within the 30 days prior to the study compared to US Asian women who had not experienced IPV (Hurwitz et al., 2006). However, regarding deaths by suicide, physical health was found to be protective against IPP-related suicides after controlling for age, sex, and other precipitating circumstances (Comiford et al., 2016).

Substance abuse. Drugs and alcohol are risk factors associated with IPP-related suicidal ideation and attempts (Schneider et al., 2009). Among college students who were victims and perpetrators of IPV, alcohol related problems were a significant predictor of suicidal ideation. Alcohol related problems among college students include missing class, getting into fights and arguments, and driving while intoxicated (Lamis et al., 2013). Also while controlling for social desirability, hopelessness, depressive symptoms, and perceived burdensomeness, alcohol-related problems predicted suicide ideation (Lamis et al., 2013). Among women and men entering a treatment for alcohol, IPV victimization was associated with suicidal ideation (Schneider et al., 2009). A study focused on patients seeking treatment for drug and alcohol abuse found that physical aggression towards a partner was consistently related to higher rates of suicidal ideation even after controlling for other known risk factors. The odds of suicidal ideation among patients seeking treatment for drug and alcohol abuse and experienced physical aggression was 1.8 times that among those who did not experience physical aggression (Ilgen et al., 2009). Compared to non-attempters, low-income African American women victims of IPV and suicide attempts were more likely to report alcohol and drug use (Kaslow et al., 1998; Kaslow et al., 2002; Thompson et al., 2002). In another study that focused on battered wives who sought emergency surgical care, of the battered women who attempted suicide, 59% were classified as alcohol or drug abusers in the medical records. In 74% of the cases where women reported drug intoxication, they also reported alcohol use (Bergman & Brismar, 1991).

Among deaths by suicide associated with IPP, substance abuse is frequently reported as a precipitating circumstance (Caetano et al., 2015; Comiford et al., 2016). Among Hispanic men, there is an association between IPP and blood alcohol content being .08 g/dl or higher prior to suicide (Caetano et al., 2015). Among IPP-related suicides documented in the Kentucky National

Violent Death Reporting Systems, the odds of alcohol problems prior to suicide was 2.14 times that among suicides that were not IPP-related (Comiford et al., 2016). Additionally, there have been reports of higher prevalence of alcohol and substance dependence (37%) among suicide decedents who experienced divorced or separation prior to suicide compared to mood or anxiety disorder (11%) (Duberstein, Conwell, & Caine, 1993).

Life stressors

Life stressors—problems with family or friend, suicide of family or friend, other death of family or friend, history of suicide attempts, argument over money, property, or drugs, and other arguments—are associated with IPP and suicidal ideation, attempts, and suicide (Comiford et al., 2016). One potential life stressor is poor family functioning (Heru et al., 2006; Kaslow, Thompson, Brooks, et al., 2000). Characteristics of family functioning are problem solving, communication, behavior control, affective involvement, affective responsiveness, and roles. Men were more likely to score in the unhealthy range for affective involvement (which measures how family members are involved with each other). Women's unhealthiest scores were within the dimension of roles (which measures the ability of the family to carry out daily practical tasks as well as meeting the emotional needs of nurturance and support of all the family members) (Heru et al., 2006; Heru, Stuart, & Recupero, 2007). Another life stressor associated with suicidal ideation during divorce or separation is recent financial problems. The odds of suicide ideation among those with recent financial issues is 1.4 times that of those without financial problems. The odds of suicide attempts among those with recent financial issues is 1.8 times that of those without financial issues (Batterham et al., 2014). The odds of individuals with a history of suicide attempts among IPP-related suicides was 1.5 times that among non IPP-related suicides (Comiford et al., 2016).

Criminal and legal risk factors

Research exploring the association between criminal and legal problems and IPP-related suicides is scarce. Only two studies documented an association between the criminal/legal issues and IPP-related suicides. Comiford et al. (2016) found that IPP-related suicides were precipitated by a serious crime and other precipitating legal problems. IPP-related suicides were 4 times as likely to be precipitated by a crime compared to non-IPP related suicides (Comiford et al., 2016). Logan et al. (2011) found that those with recent criminal problems had a moderate probability of having intimate partner problems.

Theoretical background

The current study was guided by two theoretical frameworks: interpersonal theory of suicide (Joiner, 2005; Joiner, Van Orden, Witte, & Rudd, 2009) and strain theory of suicide (Zhang, 2016). According to the interpersonal theory of suicide, individuals will not die by suicide unless they have been through enough past pain and provocation (including but not limited to self-injury) that they have habituated to future fear and pain of self-injury (Joiner et al., 2009). Self-injury can include non-fatal and fatal suicidal behavior and attempts or non-suicidal behavior (e.g., cutting) (Crosby et al., 2011). Some factors that contribute to the habituation experience are injury, accidents, violence, previous suicide attempts, and exposure to violence and injury through an outside source (i.e., domestic violence). Experiences through habituation result in increased pain tolerance and a reduction of fear of death, which produces the acquired capability to enact lethal self-injury (Joiner et al., 2009; Van Orden et al., 2010). The habituation experience influences capability or ability to die by suicide. History of suicidal thoughts and attempts can result in habituation experience. Previous suicidal thoughts and attempts reduce the fear of death and influences the capability to future suicide attempts and potentially death from

suicide. The health-related risk factor, physical illness, could also contribute to the habituation experience. Having a chronic physical illness can influence a reduction of fear of pain because the victim is accustomed to pain. This fear of pain could influence capability to attempt suicide. Capability does not necessarily result in desire to die by suicide. Two additional factors explain suicidal desire: thwarted belongingness and perceived burdensomeness (Joiner et al., 2009; Van Orden et al., 2010). According to Joiner et al. (2009) both thwarted belongingness and perceived burdensomeness are necessary for one to have the desire to die by suicide .

Thwarted belongingness is defined as loneliness and social isolation (Joiner et al., 2009). Social isolation is when a person is not an integral part of the family, circle of friends, or other valued group or the absence of reciprocally caring relationships (Joiner et al., 2009; Van Orden et al., 2010). Social isolation is a strong, reliable predictor of suicidal ideation, attempts and lethal suicidal behavior among different samples that vary by age, nationality, and clinical severity (Van Orden et al., 2010). According to Van Orden et al. (2010), the absence of reciprocally caring relationships can result in the following observable risk factors for lethal suicidal behavior: social withdrawal, domestic violence, childhood abuse, and family discord. The following life stressors could derive from thwarted belongingness: family problems, friend problems, family or friend suicide, and other death of family of friends. Problems with family or friends could result in social isolation. Individuals who have a discord with their family or friends might feel that suicide is the only way to leave a conflicting relationship with IPP.

Perceived burdensomeness comprises two dimensions: the belief in being so defective or flawed that one is a burden to the family and society (a liability on others) and cognitions of self-hatred (Joiner, 2005; Van Orden et al., 2010). Feeling like a liability can potentially be the consequence of six observable risk factors for lethal suicidal behavior, mainly, distress caused by

(1) unemployment, (2) homelessness, (3) distress from incarceration, (4) serious physical illness, (5) burdensome communication (i.e., verbal statements or notes stating by the individual stating that they are expendable, unwanted or burden to others), and (6) the belief that one is a burden on family (Van Orden et al., 2010). Perceptions of burden can differ between individuals with histories of suicide attempts and individuals with no histories of attempts (Van Orden et al., 2010). The following health-related risk factors could have derived from perceived burdensomeness: mental health problems and physical illness. Both physical illness and mental health problems could involve cognitions of self-hatred and the belief that one is a burden on the family. In the current study, being unemployed, having financial problems, and having been involved in a serious crime or legal problem could lead to the belief that one is a burden on their family.

Strain theory posits that suicide is usually preceded by some psychological strains (Zhang, 2016). Strain is not simply pressure or stress, but a strain is made up of at least two pressures or two variables (Zhang, 2016). The strain is so intense that it pulls or pushes individuals in different directions and it can make them frustrated, upset, and angry (Zhang, 2016). Zhang proposed four sources of strain:

1. Differential values: when two conflicting social values or beliefs are competing in an individual's daily life.
2. Reality versus aspiration: when there is a discrepancy between an individual's aspiration or goals and the reality the person has to live with.
3. Relative deprivation: when an extremely poor individual realizes other people of the same or similar background are leading a much better life.

4. Deficient coping: when facing a life crisis, some individuals are unable to deal with it and they experience coping strain.

Relative deprivation can influence the following demographic risk factors: education and employment status. IPP-related suicides are associated with lower education and part-time and unemployment status. Coping strain can be induced by health-related risk factors, life stressors, and criminal or legal risk factors. Strain theory also provides support for the cumulative effect of having multiple risk factors for IPP-related suicides. IPP is already a life crisis and those who die by suicide are more likely to have more than one risk factor or life crisis.

CHAPTER 3:

METHODS

This chapter, organized in four section, describes the methodology of the study. The first section describes the objectives, design and research questions. The second section explains how the sample was obtained. The third section details the measures used in this study. The last section describes the statistical analysis plan.

Objectives, design and research questions

This study has three objectives. The first objective is to identify risk factors associated with IPP-related suicides. The second objective is to examine the differences in risk factors between IPP-related suicides and those that were not IPP-related. The differences between suicide decedents with precipitating IPPs and those without have not been fully studied (Comiford et al., 2016). The third objective was to determine if the cumulative risk factors of IPP-related suicides differed from the cumulative risk of non-IPP related suicides. This cross-sectional study used data from the National Violent Death Reporting System (NVDRS).

The **research questions** and **hypotheses** of the study were:

1. What are the socio-demographic, health-related, life stressors and criminal/legal risk factors among IPP related suicides?

   The study examined the following risk factors:

   - Socio-demographic risk factors of IPP-related suicides were sex, age, race, education, and marital status.

- Health-related risk factors of IPP-related suicides were current depressed mood, mental health problems, history of suicidal thoughts, history of suicide attempts, alcohol abuse problems, substance abuse problems, and physical illness.
- Life stressor risk factors were family or friend problems, suicide of family or friend, death of family of friend, arguments, and financial issues.
- Criminal/legal risk factors involved a crime and/or recent criminal legal problems.

2. How do risk factors associated with IPP-related suicides differ from risk factors associated with non-IPP related suicides? Compared to non-IPP suicide decedents,
    - Socio-demographic: IPP-related suicide decedents will be younger, less educated, and more likely to be White and males.
    - Health problems: IPP-related suicide decedents will have a significantly higher prevalence of current depressed mood, mental health problems, history of suicidal thoughts, history of suicide attempts, alcohol abuse problem, substance abuse problem, and physical illness prior to suicide.
    - Life stressors: IPP-related suicide decedents will have a significantly higher prevalence of family or friend problems, death of family or friends, arguments, and financial problems.
    - Criminal/legal problems: IPP-related suicide decedents will have significantly higher reports of suicide precipitated by a crime and recent criminal/legal problems prior to suicide.
3. Does the cumulative number of risk factors associated with IPP-related suicides differ from that of non IPP-related suicides?
    - IPP-related suicides will have more risk factors than non-IPP related suicides.

Sample

Data for this study was derived from the National Violent Deaths Reporting System (NVDRS). The Centers for Disease Control and Prevention (2016b) initiated NVDRS in 2003. This state-base surveillance system provides information on violent deaths, including suicides. For this current study, over the years, the number of reporting states has varied ranging from 7 (in 2003) to 18 (in 2014). Table 3.1 lists the number of death by year for each reporting state. The reporting state abstracts the death and it could be different from where the death occurred. The death state is the state where the death certificate was filed. However, the reporting state is the state of residence. States are expected to collect violent death information about their residents regardless of where the death occurred.

To abstract deaths, data are pooled together from the following required primary sources: local medical examiner/coroner (which includes toxicology reports), law enforcement reports, data abstractor input and death certificates (Centers for Disease Control and Prevention, 2015c). Optional sources are Child Fatality Review team data, Intimate Partner Violence expanded data, Crime Lab data, and Hospital data. To determine factors that led to death, law enforcement and coroner/medical examiner investigators gather information on precipitating circumstances of violent deaths (including suicides) by conducting open-ended interviews with family members, friends, and other associates of the decedents, as well as witnesses to the death (Logan et al., 2015). Investigators corroborate statements, identify commonalities, and compare testimonies to physical evidence (e.g., a suicide note) to enhance their understandings of the motive of death before they determine cause of death and contributing factors (Logan et al., 2011; Logan et al., 2015).

Table 3.1. Number of suicidal deaths by reporting NVDRS states and year, 2003-2014, adults 18 years or older

Reporting state	Number of suicide deaths by years participated*												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
	n	n	n	n	n	n	n	n	n	n	n	n	
Alaska	114	137	127	120	129	150	132	152	140	159	156	153	1,669
Colorado	**1**	755	743	670	774	774	857	838	821	850	886	947	8,916
Georgia	-	796	648	620	580	854	889	849	969	971	951	1,009	9,136
Kentucky	-	-	443	433	472	368	350	351	498	463	345	554	4,277
Maryland	452	443	407	437	463	458	511	480	511	501	523	548	5,734
Massachusetts	334	374	417	397	445	468	499	552	526	554	535	564	5,665
Michigan	-	-	-	-	-	-	-	-	-	-	-	1,138	1,138
New Jersey	495	543	480	532	534	548	539	604	598	539	601	636	6,649
New Mexico	-	-	319	334	366	359	352	384	387	401	364	398	3,664
North Carolina	-	942	925	1042	996	1,057	1,065	1,108	1,126	1,220	1,176	1,228	11,885
Ohio	-	-	-	-	-	-	-	-	1,141	1,378	1,416	1,349	5,284
Oklahoma	-	487	495	497	500	556	550	607	651	624	606	683	6,256
Oregon	589	537	555	541	578	546	607	648	596	653	654	719	7,223
Rhode Island	-	82	71	94	101	108	107	125	95	99	130	109	1,121
South Carolina	441	422	454	412	435	427	444	475	531	493	552	552	5,638
Utah	-	-	333	339	361	372	436	447	498	530	542	530	4,403
Virginia	750	797	826	854	858	884	921	953	1,002	1,007	1,004	1,075	10,931
Wisconsin	**1**	597	590	624	678	709	681	630	699	689	799	708	7,405
Total	3,187	6,917	7,833	7,946	8,270	8,638	8,940	9,203	10,789	11,131	11,240	12,900	106,994

* Numbers in bold indicate that the state did not officially participate in NVDRS during that year

Data may be manually entered into the software or electronically imported and is stored in a secure national database maintained by the Centers for Disease Control and Prevention (CDC). Data sources are used to fill in information within the 21 data topics (Appendix B). The initial stage of data collection includes basic demographic information for early analyses and the detail information about causal factors are entered at a later date. In most states, death certificates provide the earliest data. Law enforcement and coroner/medical examiner data are expected to be available within 18 months of the death (Centers for Disease Control and Prevention, 2015c).

Suicides are identified by death certificates that list the International Classification of Diseases (ICD), 10th Revision codes X60-X84 and Y87.0, https://www.cdc.gov/nchs/icd/icd10cm.htm, as the primary cause of death (Centers for Disease Control and Prevention, 2016b). A suicide is a death resulting from the intentional use of force against oneself. Evidence should indicate that the use of force was intentional (Centers for Disease Control and Prevention, 2015c). This study used data from 2003 to 2014 of adults 18 years and older from 18 states. The CONSORT flowchart (Figure 3.1) shows original sample of all suicides that were assessed for eligibility (n=123,325). This study excluded records of those for whom the situation of death was unknown or were minors. This study used two datasets. One dataset included all eligible suicides (n=106,994), which were divided into 32,782 IPP-related suicides and 74,212 non-IPP related suicides. The second data set was a matched case-control that had a sample size of n=59,792. The matching process is explained in the statistical analysis section.

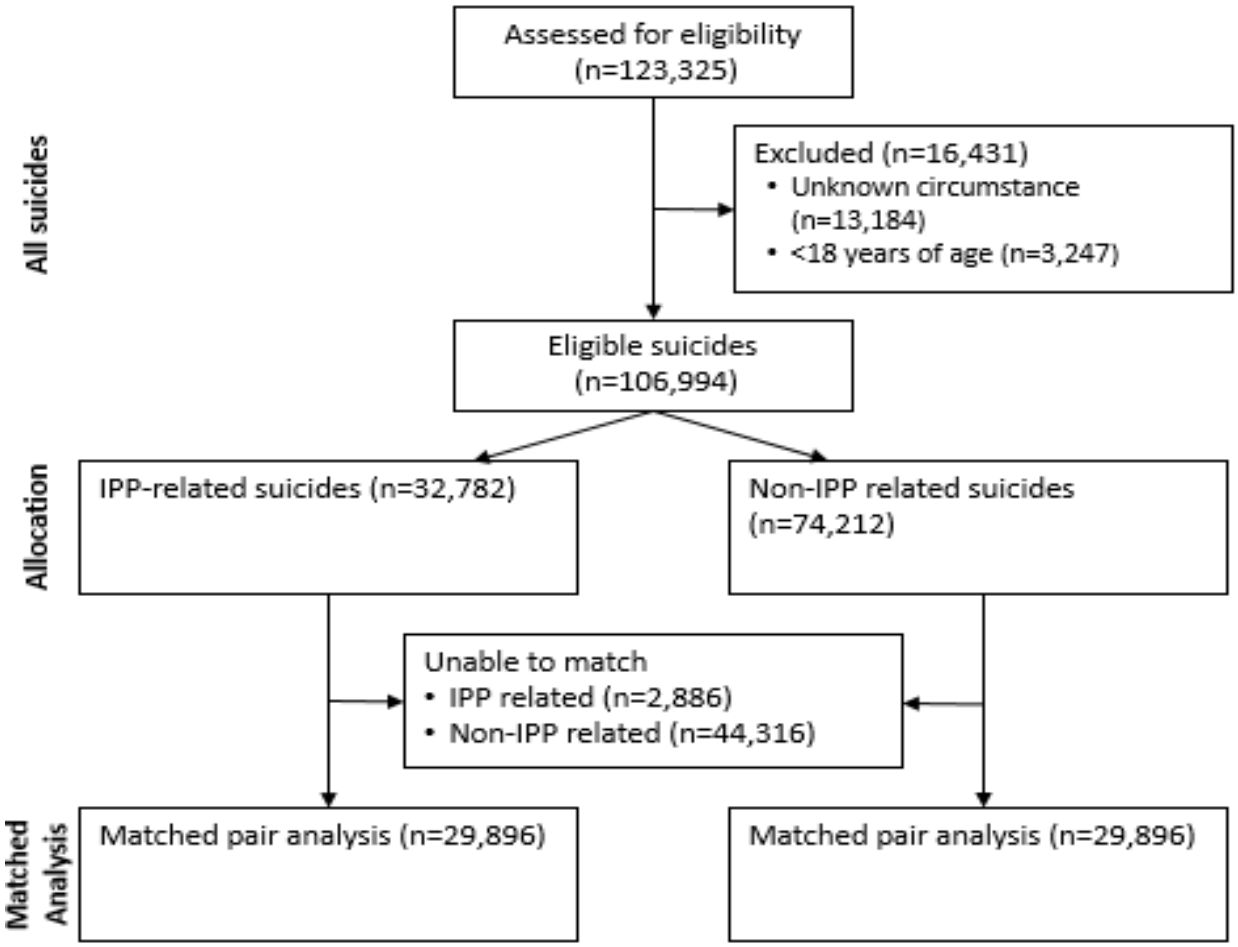

Figure 3.1. CONSORT flow diagram

Measures

This section characterizes the outcome measure, demographic variables and independent variables (also known as precipitating factors) that were included in this study. All dichotomous variables (*yes/no*) were coded 1 for *yes* and 0 for *no.* Table 3.2 lists the variables included in this

study, a description of the measures, the source of the data and definition of the precipitating factor. All variables were derived from the NVDRS data.

IPP-related Suicide

The outcome measure for this study is IPP-related suicides. IPP-related suicides refers to suicides where the decedent experienced problems with current or former intimate partners that appear to be related to the suicide. IPPs can include divorce, break-ups, arguments, jealousy, conflicts, or discord, which appeared to have contributed to the death (Centers for Disease Control and Prevention, 2015c; Comiford et al., 2016). The IPP variable is derived from coroner /medical examiner and law enforcement reports. IPP-related suicide was categorized as a dichotomous variable (*yes/no*).

Demographic variables

This study controls for the following demographic variables: age, race, sex, education, occupation status, marital status. Age was coded into the following categories *18 to 34*, *35 to 65*, *>65* years. Race/ethnicity was categorized *White*, *Black*, *Hispanic, and Other*. Sex was categorized as *male* and *female*. Education was categorized into *<high school*, *high school*, and *>high school*. Marital status was categorized into *married*, *married but separated or divorced, and never married, single nos, or widowed*. Single nos (not otherwise specified) was used when it was not clear whether the person never married, widowed, divorced, or separated. Age, sex, race education, marital status variables came from death certificates, coroner /medical examiner and law enforcement reports (Centers for Disease Control and Prevention, 2015c).

Health-related

The following health-related variables were included in the analysis: mental health, substance abuse, and physical illness.

The **mental health problem** variable derives from two variables: current diagnosis of mental health problem and history of mental illness. If the answer was affirmative to any of the two variables, then mental health problems was recoded as *yes*. The variable current depressed mood was also be analyzed to assess mental health problems, however, it was its own variable.

Suicide of family or friend was defined as, "suicide of family member or friend appears to have contributed to suicide." There is no time limit of the suicide other than it occurred at some point during the victim's lifetime and it contributed to the victim's suicide. Other death of friend or family was defined as, "death of a family or friend due to something other than suicide appears to have contributed to the suicide."

History of suicide thoughts was defined as "victim has a history of suicidal thoughts, plans to die by suicide within the last month prior to death. Disclosure of suicidal thoughts or plan can be verbal, written or electronic." History of suicide attempts was defined as "victim has a history of attempting suicide before the fatal incident."

Substance abuse was measured by three variables. One variable was alcohol problems, the second was alcohol use suspected, and the final was other substance use problems. Alcohol abuse problem was defined as "a person has alcohol dependence or alcohol problem." Other substance abuse problem was defined as "a person has a non-alcohol related substance abuse problem."

Physical illness was defined as "victim physical health problem(s) appeared to have contributed to the suicide (e.g. they were experiencing a terminal disease, debilitating condition, or chronic pain)." Mental health, alcohol problems, other substance use problems, and physical illness derived from coroner /medical examiner and law enforcement reports (Centers for Disease Control and Prevention, 2015c).

Life stressors

The following life stressors were included in the analysis: family problems, friend problems, suicide of family or friend, other death of family or friend, history of suicide thoughts, history of suicide attempts, argument, and financial problems.

Family problems was defined as "victim had relationship problems with a family member (other than an intimate partner) that appeared to have contributed to the suicide (e.g. a victim could be despondent over an argument with their parents and dies by suicide)." **Friend problems** derived from the variable other relationship problem. Other relationship problem was defined, as "problems with a friend or associate (other than an intimate partner or family member) appear to have contributed to suicide.

An **argument** was defined as a "conflict or arguments that led to the victim's suicide." The argument or disagreement must be specific and related to the suicide (e.g. argument over money, property, or an insult).

Financial problems was defined as "any financial problems that might have contributed to death (e.g. overwhelming debt)." Financial crisis is "a recent financial problem e.g. car being repossessed a day before suicides."

Job problem could include problems at work such as tensions with a co-worker, poor performance reviews, increased pressure, and fear of layoff. Unemployment is frequently one of the job related problems associated with suicidal deaths (Schiff et al., 2015). All of the life stressor variables derived from coroner /medical examiner and law enforcement reports (Centers for Disease Control and Prevention, 2015c).

Criminal or legal problems

The following criminal or legal problems were included in this study: precipitated by a crime and recent criminal or legal problem. Precipitated by a crime was defined as "the suicide was precipitated by another serious crime (e.g. drug dealing or robbery)." A recent criminal or legal problem was defined as "criminal or legal problems that appear to have contributed to the suicide." It can include impending court date, recent arrests, or law enforcement appearing at the house to arrest the victim. Both of the criminal and legal variables derived from coroner/medical examiner and law enforcement reports (Centers for Disease Control and Prevention, 2015c).

Statistical analysis

For this study I used two samples: the total sample of all adult suicides with precipitating circumstances and a matched sample. To make manageable comparisons between IPP-related suicides and non-IPP related suicides, using SPSS, I made one-to-one matches for IPP suicide decedents to non-IPP suicide decedents on the following criteria: sex, age (plus or minus 1 year), race/ethnicity, state of death, and year of death (plus or minus 1 year). This method allowed for comparison of cases of IPP-related suicide to demographically similar cases of suicide that did not involve IPP. I conducted a matched case-control study using methodology that has been previously used for NVDRS suicide data (Logan et al., 2015).

Descriptive analysis was conducted using frequencies and percentages. I used descriptive statistics to describe demographic characteristics between both groups. Chi-square test of independence was used to conduct bivariate analysis to compare demographic characteristics between both groups. ANOVA was used to assess the differences in age between both groups. To address the first research question (What are the socio-demographic, health-related, life stressors and criminal/legal risk factors associated with IPP-related suicides?), I used conditional

logistic regression. For matched pair datasets, simple conditional logistic regression was used to make comparisons by demographic factors. Multivariable conditional logistic regression models were used to make comparisons in respect to other risk factors association with death (e.g. health, life stressors, and criminal/legal). To address the second research question (How do risk factors associated with IPP-related suicides differ from risk factors associated with non-IPP-related suicides?), I used matched prevalence odd ratios to assess associations. Odds ratios with adjustments for the following categories (potential confounders): race/ethnicity, sex, and age (biological factors); marital status education, race/ethnicity, sex, and age (socio-biological factors); the final model included all demographic variables (socio-biological factors) and risk factors. A p value of $<.05$ and 95% confidence interval was used to determine statistical significance. To address the third research question (Does the cumulative number of risk factors associated with IPP-related suicides differ from that of non IPP-related suicides?), I used two-sample t test. Additionally, I used logistic regression with number of risk factors as a covariate. The reference number was 0 risk factors and odds ratios were reviewed for the comparison between the different number of risk factors compared to 0 risk factors between IPP and non-IPP relate suicides, Data were analyzed using SAS version 9.3.

Table 3.2 Description of variables included in this study

	Construct	Description of Measure (code)	Source	
		Outcome measure		
1	Intimate partner problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement report	
		Demographic variables		
2	Age	18-34 years (1) 35-65 years (2) >65 years (3)	Death certificate, Coroner /medical examiner and Law enforcement reports	
3	Race/Ethnicity	White (1) Black (2) Hispanic (3) Other (4)	Death certificate, Coroner /medical examiner and Law enforcement reports	
4	Sex	Male (1) Female (2) Unknown (9)	Death certificate, Coroner /medical examiner and Law enforcement reports	
5	Education status	<High school (1) High school (2) >High school (3)	Death certificate, Coroner /medical examiner and Law enforcement reports	
6	Marital status	Married (1) Separated or divorce (2) Unmarried (include never married and widow) (3)	Death certificate, Coroner /medical examiner and Law enforcement reports	
	Construct	Description of Measure (code)	Source	Definition
		Health-related risk factors		
7	Mental health problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent had been identified as having a mental health disorder or syndrome listed in the Diagnostic and Statistical Manual of Mental Disorders, with the exception of alcohol and

				other substance dependence. Or decedent was being treated for a mental health problem.
8	Current depressed mood	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent was perceived by self or others to be depressed at time of suicide.
9	History of suicide thoughts	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent had a history of suicidal thoughts, plans or attempts. Disclosure of suicidal thoughts or plan can be verbal, written or electronic.
10	History of suicide attempts	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent had a history of attempting suicide before the fatal incident
11	Alcohol abuse problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent had alcohol dependence or alcohol problem
12	Other substance abuse problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent has a non-alcohol related substance abuse problem
13	Physical illness	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent had an acute or chronic illness at the time of the incident
		Life stressors		
14	Family problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent had relationship problems with a family member (other than an intimate partner) that appear to

				have contributed to the death.
15	Friend problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Decedent was having problems with a friend or associate (other than an intimate partner or family member) appear to have contributed to the death.
16	Suicide of family or friend	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Suicide of a family member or friend appears to have contributed to the death
17	Death of family or friend	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Death of a family member or friend due to something other than suicide appears to have contributed to the death.
18	Argument over money, property or insult	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	An argument or conflict that led to the decedent's death.
19	Financial problems	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Financial problems appear to have contributed to the death
20	Job problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Job problem(s) appear to have contributed to the death
	Criminal or legal problems			
21	Precipitated by a crime	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	The death was precipitated by another serious crime (e.g., drug dealing, robbery)
22	Recent criminal or legal problem	No (0) Yes (1)	Coroner /medical examiner and Law enforcement reports	Criminal legal problems appear to have contributed to the death

Chapter 4:

RESULTS

Results were analyzed in two ways. First, unmatched IPP-related suicides were compared to non-IPP related suicides to identify risk factors associated with IPP-related suicides. Second, a one-to-one matched case-control analysis was used to compare IPP-related suicides to non-IPP related suicides and to identify risk factors associated with IPP-related suicides. This chapter consists of four sections. The first section characterizes IPP and non-IPP related suicides by each of the proposed risk factors, using the unmatched and matched samples and addresses the first research question. The second section uses logistic regression to examine all socio-demographic characteristics and hypothesized risk factors to compare IPP-related and non-IPP related suicides and addresses the second research question. The third section compares the cumulative effect of number of risk factors between IPP and non-IPP related suicides and addresses the third research question. The fourth section is a final summary of the results.

Descriptive and bivariate analyses

This section describes the proportion of IPP and non-IPP related suicides for the total sample and the matched sample by each one of the predictor variables. Chi-square and ANOVA were used to compare both samples. The unmatched dataset contained 32,782 IPP-related suicides and 74,212 non-IPP related suicides. In the matched dataset, the cases (IPP-related suicides) and controls (non-IPP related suicides) each had 29,896 suicides. The sample was matched on age (plus or minus 1 year), race/ethnicity, and sex. Therefore, the cases and controls for the matched variables have the same frequencies with the exception of the age variable.

Demographic characteristics

Table 4.1a shows the unmatched demographic data for IPP and non-IPP related suicides IPP-related suicide decedents were more likely to be younger, white males who had =< high school diploma and were married. Compared to non-IPP suicide decedents, IPP suicide decedents were, on average, 9 years younger and a slightly smaller proportion were White. Table 4.1b shows matched comparisons of the demographic characteristics. Because the age variable was matched based upon plus or minus 1 year of age, the frequencies for cases and controls are slightly different. The mean age for IPP-related suicides in the matched dataset was similar to the mean age in the unmatched dataset [mean (SD): 41.1 (13.6) vs. 40.5(13.6)]. However, for the non-IPP related suicides the mean age was lower in the matched dataset [mean (SD): 40.2 (13.5) vs. 49.7 (17.7)].

The proportion in each category of education status was similar for IPP and non-IPP related suicides. The most frequent report education level was high school for both IPP and non-IPP related suicides.

Similar to the unmatched dataset, IPP-related suicide decedents had a higher proportion of being married compared to non-IPP-related suicide decedents (46.0% vs 27.1%, p<.0001) and a lower proportion of being never married or widowed compared to non-IPP-related suicide decedents (28.2% vs. 48.3%, p<.0001).

Table 4.1a Demographic characteristics of suicide decedents with and without a history of IPP, NVDRS 2003-2014

Characteristics	IPP-related suicides *n*= 32,782 No. (%)	Non-IPP related suicides *n*= 74,212 No. (%)	Chi-square value (df)	P-value[a,b]
Age, years				
Mean (SD)	40.5 (13.6)	49.7 (17.7)	7072.611 (1)	<.0001[b]
Age group in years			5204.294 (3)	<.0001[a]
18-34	11,970 (36.5)	16,600 (22.4)		
35-64	19,252 (58.7)	43,657 (58.5)		
>=65	1,551 (4.7)	14,927 (20.1)		
Race/Ethnicity			470.301 (4)	<.0001[a]
White	26,903 (82.1)	64,227 (86.5)		
Black	2,240 (6.8)	4,235 (5.7)		
Hispanic	2,008 (6.1)	2,666 (3.6)		
Other	940 (2.9)	1,809 (2.4)		
Sex			276.901 (2)	<.0001[a]
Male	26,494 (80.8)	56,581 (76.2)		
Female	6,287 (19.2)	17,631 (23.8)		
Education status			72.761 (3)	<.0001[a]
<High school	3,215 (9.8)	7,299 (9.8)		
High school	8,006 (24.4)	16,426 (22.2)		
>High school	6,903 (21.1)	16,558 (22.3)		
Marital Status			1910.590 (3)	
Married	14,897 (45.4)	24,501 (33.0)		<.0001[a]
Separated or divorced	8,133 (24.8)	18,384 (24.8)		
Never married, single nos, or widowed[d]	9,585 (29.2)	30,408 (41.0)		

[a]Chi-square

[b]ANOVA and F-value

[c]Data were provided by the National Violent Death Reporting System Unknown values are not presented; therefore, variables might not total 100%.

[d]Single nos (not otherwise specified) was used when it was not clear whether the person was never married, widowed, divorced, or separated

Table 4.1b Demographic characteristics of suicide decedents with and without a history of intimate partner problems, a matched comparison, NVDRS 2003-2014

Characteristics	IPP-related suicides *n*= 29,896 No. (%)	Non-IPP related suicides *n*= 29,896 No. (%)	Chi-square value (df)	P-value
Age, years				
Mean (standard deviation)	41.1 (13.6)	40.2 (13.5)		
Age group in years				
18-34	10,377 (34.7)	10,901 (36.5)		
35-64	18,025(60.3)	17,657 (59.1)		
>=65	1,494 (5.0)	1,338 (4.5)		
Race/Ethnicity				
White	25,959 (86.8)	25,959 (86.8)		
Black	1,810 (6.1)	1,810 (6.1)		
Hispanic	1,334 (4.5)	1,334 (4.5)		
Other	454 (1.5)	454 (1.5)		
Sex				
Male	24,433 (81.7)	24,433 (81.7)		
Female	5,463 (18.3)	5,463 (18.3)		
Education status			38.284 (3)	<.0001
<High school	2,811 (9.4)	2,804 (9.4)		
High school	7,311 (24.4)	6,688 (22.4)		
>High school	6,267 (21.0)	6.545 (21.9)		
Marital Status			3173.850 (3)	<.0001
Married	13,756 (46.0)	8,103 (27.1)		
Separated or divorced	7,573 (25.3)	6.971 (23.2)		
Never married, single nos, or widowed[b]	8,420 (28.2)	14,452 (48.3)		

[a] Data were provided by the National Violent Death Reporting System Unknown values are not presented; therefore, variables might not total 100%.

[b]Single nos (not otherwise specified) was used when it was not clear whether the person was never married, widowed, divorced, or separated

Health-related risk factors

There were significant differences among all health-related risk factors between IPP-related suicides and non-IPP related suicides. IPP-related suicides had higher proportions for all the reported health-related risk factors with the exception of mental health problems (41.0% vs 48.8%, p<.0001) and physical illness. The proportion of physical illness of non-IPP related suicides was more than double the proportion of those with IPP-related suicides (10.1% vs 27.5%, p<.0001). (Table 4.2a.). However, some of the significant differences found in the matched dataset differed from the unmatched dataset. In addition to IPP-related suicides having lower proportions of mental health problems and physical illness, there were also lower proportions of suicide attempts (20.9% vs 22.1%, p=.0003) and other substance abuse problems (17.2% vs 18.7%, p<.0001) (Table 4.2b). IPP-related suicide decedents were more likely to have current depressed mood, suicidal ideation, suicide attempts, alcohol abuse problems and other substance abuse problems (Table 4.2a). However, the health-related factors differed for the matched comparison analysis. IPP-related suicide decedents were more likely to have current depressed mood, suicidal ideation, and alcohol abuse problems (Table 4.2b).

Table 4.2a Frequencies of health-related factors for suicide decedents with and without a history in intimate partner problems (IPP), NVDRS 2003-2014

Health-related factors	**IPP-related suicides *n*=32,782 No. (%)**	**Non-IPP related suicides *n*=74,212 No. (%)**	**Chi-square value df=1**	**P-value**
Current depressed mood			94.4573	<.0001
No	18,605 (56.8)	44,471 (59.9)		
Yes	14,177 (43.2)	29,741 (40.1)		
Mental health problems			556.8872	<.0001
No	19,337 (59.0)	37,983 (51.2)		
Yes	13,445 (41.0)	36,229 (48.8)		
Suicidal ideation			1064.2590	<.0001
No	21,400 (65.3)	55,653 (75.0)		
Yes	11,382 (34.7)	18,559 (25.0)		
Suicide attempts			40.8310	<.0001
No	25,842 (78.8)	59,759 (80.5)		
Yes	6,940 (21.2)	14,453 (19.5)		
Alcohol abuse problems			900.9732	<.0001
No	25,073 (76.5)	62,459 (84.2)		
Yes	7,709 (23.5)	11,753 (15.8)		
Other substance abuse problems			147.7459	<.0001
No	27,145 (82.8)	63,598 (85.7)		
Yes	5,637 (17.2)	10,614 (14.3)		
Physical illness			3873.5962	<.0001
No	29,466 (89.9)	53,821 (72.5)		
Yes	3,316 (10.1)	20,391 (27.5)		

Table 4.2b Frequencies of health-related factors for suicide decedents with and without a history of intimate partner problems, a matched comparison, NVDRS 2003-2014

Health-related factors	**IPP-related suicides *n*=29,896 No. (%)**	**Non-IPP related suicides *n*=29,896 No. (%)**	**Chi-square value df=1**	**P-value**
Current depressed mood			76.3877	<.0001
No	16,964 (56.7)	18,017 (60.3)		
Yes	12,932 (43.3)	11,879 (39.3)		
Mental health problems			450.5583	<.0001
No	17,497 (58.5)	14,911 (49.9)		
Yes	12,399 (41.5)	14,985 (50.1)		
Suicidal ideation			566.5625	<.0001
No	19,538 (65.4)	22,210 (74.3)		
Yes	10,358 (34.6)	7,686 (25.7)		
Suicide attempts			13.0607	.0003
No	23,652 (79.1)	23,289 (77.9)		
Yes	6,244 (20.9)	6,607 (22.1)		
Alcohol abuse problems			243.3207	<.0001
No	22,790 (76.2)	24,348 (81.4)		
Yes	7,106 (23.8)	5,548 (18.6)		
Other substance abuse problems			22.6529	<.0001
No				
Yes	24,742 (82.8)	24,295 (81.3)		
	5,154 (17.2)	5,601 (18.7)		
Physical illness			724.2176	<.0001
No	26,791 (89.6)	24,492 (81.9)		
Yes	3,105 (10.4)	5,404 (18.1)		

Life stressors

Table 4.3a showed that there were significant differences in the proportions of the reported life stressors between IPP-related suicides and non-IPP related suicides except for recent family or friend suicide (1.9% vs 1.8%, p=.4754). Among the significant differences in proportions of life stressors reported for suicide decedents, IPP-related suicides had higher proportions of a majority of the life stressors variables with the exception of other death of family or friend (4.4% vs 7.4% respectively, p<.0001). In the matched comparison analysis of life stressors, there was not a significant difference between IPP-related suicides and non-IPP related suicides among job problems (14.9% vs 15.4%, p=.0679). There was marginal significance between IPP related suicides and recent family or friend suicide (1.8% vs 2.1%, p=.0547) (Table 4.3b). Additionally, among the matched comparison analysis of life stressors, there were statistically significant lower proportions of reports of friend problems (7.9% vs 8.6% respectively p=.0011) and other death of family or friend (4.3% vs 6.3%, respectively, p<.0001). IPP-related suicide decedents were more likely to have the following life stressors: family problems, friend problems, recent family or friend suicide, argument over money, property or insult, financial problems and job problems (Table 4.3a). For the matched comparison, IPP-related suicide decedents were more likely to have family problems, friend problems, argument over money, property or insult, and financial problems (Table 4.3b).

Table 4.3a Frequencies of life stressors for suicide decedents with and without a history of intimate partner problems, NVDRS 2003-2014

Life stressors	IPP-related suicides *n*=32,782 No. (%)	Non-IPP related suicides *n*=74,212 No. (%)	Chi-square df=1	P-value
Family problems			168.2579	<.0001
No	30,481 (93.0)	70,476 (95.0)		
Yes	2,301 (7.0)	3,736 (5.0)		
Friend problems			67.7127	<.0001
No	30,150 (92.0)	69,291 (93.4)		
Yes	2,632 (8.0)	4,921 (6.6)		
Recent family or friend suicide			0.5095	.4754
No	32,172 (98.1)	72,878 (98.2)		
Yes	610 (1.9)	1,334 (1.8)		
Other death of family or friend			327.4998	<.0001
No	31,340 (95.6)	68,761 (92.7)		
Yes	1,442 (4.4)	5,51 (7.4)		
Argument over money, property, or insult			7200.5259	<.0001
No	27,163 (82.9)	72,224 (97.3)		
Yes	5,619 (17.1)	1,988 (2.7)		
Financial problems			269.6063	<.0001
No	28,039 (85.5)	66,102 (89.1)		
Yes	4,743 (14.5)	8,110 (10.9)		
Job problems			137.3273	<.0001
No	27,919 (85.2)	65,144 (87.8)		
Yes	4,863 (14.8)	9,068 (12.2)		

Table 4.3b Frequencies of life stressors for suicide decedents with and without a history of intimate partner problems, a matched comparison, NVDRS 2003-2014

Life stressors	IPP –related suicides *n*=29,896 No. (%)	Non-IPP related suicides *n*=29,896 No. (%)	Chi-square value df=1	P-value
Family problems			53.450	<.0001
No	27,779 (92.9)	28,215 (94.4)		
Yes	2,112 (7.1)	1,681 (5.6)		
Friend problems			10.612	.0011
No	27,543 (92.1)	27,324 (91.4)		
Yes	2,353 (7.9)	2,572 (8.6)		
Recent family or friend suicide			3.693	.0547
No	29,345 (98.2)	29,280 (97.9)		
Yes	551 (1.8)	616 (2.1)		
Other death of family or friend			112.254	<.0001
No	28,588 (95.6)	28,005 (93.7)		
Yes	1,308 (4.3)	1,891 (6.3)		
Argument over money, property, or insult			3262.275	<.0001
No	24,769 (82.9)	28,979 (96.9)		
Yes	5,127 (17.1)	917 (3.1)		
Financial problems			74.505	<.0001
No	25,544 (85.4)	26,262 (87.8)		
Yes	4,352 (14.6)	3,634 (12.2)		
Job problems			3.332	.0679
No	25,449 (85.1)	25,289 (84.6)		
Yes	4,447 (14.9)	4,607 (15.4)		

Criminal or legal problems

Table 4.4a showed that there were statistically significantly higher reports of IPP-related suicides being precipitated by a crime (3.0% vs 1.3%, p<.0001) and decedents having recent criminal or legal problems prior to death (11.3% vs 9.1%, p<.0001) compared to non-IPP related suicides. The matched comparison dataset showed that proportion of suicides precipitated by a crime among IPP-related suicides was still statistically significantly higher than non-IPP related suicides (2.9% vs 1.7 %, p<.0001). However, the proportion of recent criminal or legal problem prior to death among IPP-related suicides was statistically significantly lower among IPP-related suicides compared to non-IPP related suicides (11.1% vs 12.8%, p<.0001) (Table 4.4b). IPP-related suicides were more likely to be precipitated by a crime and experience recent criminal or legal problems. (Table 4.4a). However, for the matched comparison, IPP-related suicides were more likely to be precipitated by a crime (Table 4.4b).

Table 4.4a Frequencies of criminal or legal problems for suicide decedents with and without a history in intimate partner problems, NVDRS 2003-2014

Criminal or legal problems	**IPP-related suicides *n*=32,782 No. (%)**	**Non-IPP related suicides *n*=74,212 No. (%)**	**Chi-square value df=1**	**P-value**
Precipitated by a crime			355.6867	<.0001
No	31,805 (91.0)	73,214 (98.7)		
Yes	977 (3.0)	998 (1.3)		
Recent criminal or legal problem			126.9516	<.0001
No	29,066 (88.7)	67,448 (90.9)		
Yes	3,716 (11.3)	6,764 (9.1)		

Table 4.4b. Frequencies of criminal or legal problems for suicide decedents with and without a history of intimate partner problems, a matched comparison, NVDRS 2003-2014

Criminal or legal problems	IPP-related suicides n=29,896 No. (%)	Non-IPP related suicides n=29,896 No. (%)	Chi-square value df=1	P-value
Precipitated by a crime			96.6242	<.0001
No	29,034 (97.1)	29,393 (98.3)		
Yes	862 (2.9)	503 (1.7)		
Recent criminal or legal problem			39.7237	<.0001
No	26,572 (88.9)	26,072 (87.2)		
Yes	3,324 (11.1)	3,824 (12.8)		

Regression analyses

Two sets of regression analyses were conducted. The first was with the unmatched dataset and the second with the matched dataset. Based on the bivariate analyses and previous literature that use NVDRS data, the following precipitating factors were included in the final model of both analyses: current depressed mood, mental health problems, suicidal ideation, suicide attempts, alcohol abuse problems, other substance abuse problems, family problems, friend problems, recent family or friend suicide, other death of family or friend, argument over money, property, or insult, financial problems, job problems, precipitated by a crime, and recent criminal or legal problem.

Unmatched analyses

Table 4.5a compared differences between IPP-related suicides to non-IPP related suicides by using crude odds ratios and three adjusted odds ratios (controlling for race/ethnicity, sex, age; all demographic variables (race/ethnicity, sex, age, education, and marital status); and all demographic variables along with all precipitating factors). The r-squared for this model was .1948.

Crude odds ratio. With respect to differences in precipitating factors for suicide in the unadjusted analysis, the two groups differed significantly. Compared to non-IPP related suicides, suicide decedents with a history of IPP had greater odds of experiencing all the precipitating factors except for mental health problems (significantly less likely), physical illness (significantly less likely), recent family or friend suicide (no significant difference), and death of family or friend (significantly less likely). The greatest significant difference between the groups was with arguments of money, property, or insult. The odds of a history of arguments over money, property, or insults was 7.515 (7.127, 7.924) times greater among suicide deaths that involved IPPs compared to those that did not.

Adjusted for race/ethnicity, age, and sex (biological factors). After adjusting for biological demographic factors (race/ethnicity, age and sex) there were some changes in where the groups differed significantly. There were no longer a significant difference in suicide attempts, friend problems and recent criminal or legal activities between IPP-related suicides and non-IPP related suicides. Other substance abuse problems, which was a risk factor of IPP-related suicides under the unadjusted analysis, became a risk factor for non-IPP related suicides under the biological demographic adjusted analysis. Based upon the unadjusted analysis, the odds of a history of other substance abuse problems was 1.244 (1.201, 1.289) times greater among suicide deaths that involved IPPs compared to those that did not. However, after controlling for race/ethnicity, age and sex, the odds of a history of other substance abuse problems was .956 (.921, .992) times greater among suicide deaths that involved IPPs compared to those that did not.

Adjusted for race/ethnicity, age, sex, marital status, and education status (socio-demographic risk factors). When adjusting for all demographic variables, there was no longer a

significant difference in other substance abuse problems between IPP-related suicides and non-IPP related suicides. There became a significant difference in friend problems between IPP-related suicides and non-IPP related suicides. Controlling for race/ethnicity, sex, age, education and marital status, the odds of a history of friend problems was 1.110 (1.026, 1.180) times greater among suicide deaths that involved IPPs compared to those that did not.

Adjusted for all demographic and precipitating factors. After adjusting for all demographic variables and precipitating factors, the two groups differed significantly among all precipitating factors between IPP and non-IPP related suicides with the exception of friend problems. Even though there was a significant difference between IPP-related suicides and non-IPP related suicide regarding friend problems; when looking at the unadjusted model and the model that controlled for all demographic variables, the difference was no longer significant between the IPP-related suicides and non-IPP related suicide in the final model. The following variables were more likely to be experienced among suicide decedents with a history of IPP compared to non-IPP suicide decedents: current depressed mood, suicidal ideation, suicide attempts, alcohol abuse problems, arguments over money, property, or insult, financial problems, and precipitated by a crime. The following variables were more likely to be experienced among suicide decedents without a history of IPP compared to IPP suicide decedents: mental health problems, other substance abuse problems, physical illness, family problems, recent family or friend suicide, other death of family or friend, job problems, and recent criminal or legal problems. There was no significant difference between the two groups among suicide decedents with friend problems.

Comparing the unadjusted model to the adjusted model (where the model controls for all five demographic variables and all precipitating factors), the following factors changed from a

risk factor to a proactive factor for IPP-related suicides: other substance abuse problems, family problems, and recent criminal or legal problems.

Matched comparison

Table 4.5b used a matched case-control to compare differences between IPP-related and non-IPP relate suicide by using crude odds ratio and two adjusted models (controlling for marital status and educational status and the other controlling for marital status, educational status, and all precipitating factors). The r-squared for this model was .1348.

Crude odds ratio. Under the unadjusted matched comparison analysis, the two groups differed significantly for all the precipitating factors except for recent family or friend suicide and job problems. The odds of depressed mood, suicidal ideation, alcohol abuse problems, family problems, arguments over money, property or insult, financial problems and precipitated by a crime were higher among IPP-related suicides compared to non-IPP related suicides. The odds of mental health problems, suicide attempts, other substance abuse problems, physical illness, friend problems, other death of family or friend, and recent criminal or legal problems were lesser among IPP-related suicides compared to non-IPP related suicides.

Adjusted for marital status and education status. When controlling for marital and education status there was no longer a statistically significant difference between IPP and non-IPP related suicides for the following: suicide attempts, other substance abuse problems, and family problems. With the exception of the three factors that lost their significance under this adjusted model, the risk factors under the unadjusted model were the same for this adjusted model.

Adjusted for marital status, education status and all precipitating factors. After controlling for marital status, education and all precipitating factors, there was still not a

significant difference between the two groups regarding suicide attempts, recent family or friend and suicide. However, after not showing a significant difference in the education and marital status adjusted model, there was a significant difference in other substance abuse problems and job problems. People who died by suicide related to IPP were significantly less likely to have substance abuse or job-related problems than those who died by non-IPP suicide. In the final matched comparison model that controlled for education, marital status, and all precipitating factors, there were greater odds of depressed mood, suicidal ideation, alcohol abuse problems, arguments, financial problems and precipitated by a crime among IPP-related suicides compared to non-IPP relate suicides. The following factors were less likely to occur in IPP-relate suicides: mental health problems, other substance abuse problems, physical illness, family problems, friend problems, other death of family or friend, job problems, and recent criminal or legal problem.

Table 4.5a Demographic and incident characteristics for suicide decedents with and without a history of intimate partner problems, NVDRS, 2003-2014

Characteristic	IPP-related suicides n=32,782 No. (%)	Non-IPP related suicides n=74,212 No. (%)	Crude Odds Ratio (95% Confidence interval)	Adjusted for Race/ethnicity, age, sex	Adjusted for Race/ethnicity, age, sex, marital status, education status	Adjusted for all demographic and all precipitating factors
Demographic						
Age group, years						
18-34	11,970 (36.5)	16,660 (22.4)	6.940 (6.553, 7.349)			
35-64	19,252 (58.7)	43,657 (58.5)	4.344 (4.111, 4.589)			
>=65	1,551 (4.7)	14,927 (20.1)	Referent			
Mean age, years (SD)	40.5 (13.6)	49.7 (17.7)	.967 (.966, .968)			
Race/Ethnicity[a]						
White	26,903 (82.1)	64,227 (86.5)	Referent			
Black	2,240 (6.8)	4,235 (5.7)	1.263 (1.197, 1.332)			
Hispanic	2,008 (6.1)	2,666 (3.6)	1.798 (1.694, 1.909)			
Other	940 (2.9)	1,809 (2.4)	1.241 (1.145, 1.344)			
Sex						
Male	26,494 (80.8)	56,581 (76.2)	Referent			
Female	6,287 (19.2)	17,631 (23.8)	.762 (.737-.787)			
Education status[a]						
High school	8,006 (24.4)	16,426 (22.2)	Referent			
<High school	3,215 (9.8)	7,299 (9.8)	.904 (.861, .950)			
>High school	8,319 (25.4)	19,752 (26.6)	.865 (.833, .897)			
Marital status[A]						
Never married, single nos, or widowed[b]	9,613 (29.3)	30,491 (41.1)	Referent			
Married	14,897 (45.4)	24,501 (33.0)	1.928 (1.870, 1.988)			
Separated or divorce	8,133 (24.8)	18,384 (24.8)	1.403 (1.355, 1.453)			
Health-related factors						
Current depressed mood	14,177 (43.2)	29,741 (40.1)	**1.139 (1.110, 1.170)**	**1.211 (1.178, 1.245)**	**1.208 (1.162, 1.255)**	**1.332 (1.277, 1.391)**
Mental health problems	13,445 (41.0)	36,229 (48.8)	**.729 (.710, .748)**	**.730 (.710, .751)**	**.740 (.711, .769)**	**.691 (.662, .721)**
Suicidal ideation	11,382 (34.7)	18,559 (25.0)	**1.595 (1.551, 1.641)**	**1.587 (1.541, 1.635)**	**1.589 (1.525, 1.655)**	**1.599 (1.531, 1.671)**
Suicide attempts	6,940 (21.2)	14,453 (19.5)	**1.110 (1.075, 1.147)**	1.017 (.983, 1.053)	1.030 (.982, 1.080)	**1.069 (1.016, 1.126)**

(Continued)

Table 4.5a
(*Continued*)

Characteristic	IPP-related suicides n=32,782 No. (%)	Non-IPP related suicides n=74,212 No. (%)	Crude Odds Ratio (95% Confidence interval)	Adjusted for Race/ethnicity, age, sex	Adjusted for Race/ethnicity, age, sex, marital status, education status	Adjusted for all demographic and precipitating factors
Alcohol abuse problem	7,709 (23.5)	11,753 (15.8)	**1.634 (1.582, 1.688)**	**1.550 (1.499, 1.603)**	**1.606 (1.532, 1.683)**	**1.520 (1.444, 1.600)**
Other substance abuse problems	5,637 (17.2)	10,614 (14.3)	**1.244 (1.201, 1.289)**	**.956 (.921, .992)**	.995 (.945, 1.047)	**.880 (.832, .930)**
Physical illness	3,316 (10.1)	20,391 (27.5)	**.297 (.286, .309)**	**.452 (.434, .472)**	**.443 (.418, 469)**	**.444 (.418, .472)**
						Life stressors
Family problems	2,301 (7.0)	3,736 (5.0)	**1.424 (1.350, 1.503)**	**1.349 (1.275, 1.426)**	**1.208 (1.119, 1.304)**	**.729 (.669, .794)**
Friend problems	2,632 (8.0)	4,921 (6.6)	**1.229 (1.170, 1.291)**	1.046 (.993, 1.101)	**1.110 (1.026, 1.180)**	.952 (.883, 1.025)
Recent family or friend suicide	610 (1.9)	1,334 (1.8)	1.036 (.941, 1.141)	.909 (.822, 1.006)	.934 (.815, 1.071)	**.849 (.735, .980)**
Other death of family or friend	1,442 (4.4)	5,51 (7.4)	**.580 (.547, .616)**	**.677 (.636, .720)**	**.873 (.802, .950)**	**.795 (.727, .869)**
Argument over money, property, or insult	5,619 (17.1)	1,988 (2.7)	**7.515 (7.127, 7.924)**	**6.844 (6.478, 7.230)**	**6.124 (5.706, 6.571)**	**6.119 (5.683 6.589**)
Financial problems	4,743 (14.5)	8,110 (10.9)	**1.379 (1.327, 1.433)**	**1.432 (1.376, 1.490)**	**1.374 (1.300, 1.452)**	**1.336 (1.256, 1.421)**
Job problems	4,863 (14.8)	9,068 (12.2)	**1.251 (1.205, 1.299)**	**1.137 (1.093, 1.182)**	**1.054 (.998, 1.112)**	**.886 (.834, .941)**
			Criminal or legal problems			
Precipitated by another serious crime	977 (3.0)	998 (1.3)	**2.253 (2.061, 2.464)**	**1.905 (1.736, 2.090)**	**1.960 (1.748, 2.199)**	**1.682 (1.483, 1.906)**
Recent criminal or legal problem	3,716 (11.3)	6,764 (9.1)	**1.275 (1.222, 1.330)**	.994 (.951, 1.039)	.950 (.892, 1.011)	**.850 (.795, .909)**

[a] Data were provided by the National Violent Death Reporting System. Unknown values are not presented; therefore, variables might not total 100%.
[b](Single nos (not otherwise specified) was used when it was not clear whether the person was never married, widowed, divorced, or separated
Bolded odds ratios are significant at *p* <.05 level

Table 4.5b Demographic and incident characteristics for suicide decedents with and without a history of intimate partner problems, a matched comparison NVDRS, 2003-2014

Characteristics	IPP-related suicides n=29,896 No. (%)	Non-IPP related suicides n=29,896 No. (%)	Crude Odds Ratio (95% Confidence interval)	Adjusted for marital status and education status	Adjusted for all demographic and precipitating factors
Demographic					
Age group, years					
18-34	10,377 (34.7)	10,901 (36.5)			
35-64	18,025 (60.3)	17,657 (59.1)			
>=65	1,494 (5.0)	1,338 (4.5)			
Mean age, years (SD)	41.1 (13.6)	40.3 (13.5)			
Race/Ethnicity[a]					
White	25,969 (87.8)	25,969 (87.8)			
Black	1,810 (6.1)	1,810 (6.1)			
Hispanic	1,334 (4.5)	1,334 (4.5)			
Other	454 (1.5)	454 (1.5)			
Sex					
Male	24,433 (81.7)	24,433 (81.7)			
Female	5,463 (18.3)	5,463 (18.3)			
Education status[a]					
High school	7,311 (24.4)	6,688 (22.4)	Referent		
<High school	2811 (9.4)	2,804 (9.4)	.924 (.863, .989)		
>High school	6,267 (21.0)	6,545 (21.9)	.861 (.818, .906)		
Marital status[A]					
Married					
Separated or divorce					
Never married,	13,756 (46.0)	8,103 (27.1)	**4.362 (4.147, 4.587)**		
single nos, or	7,573 (25.3)	6.971 (23.2)	**2.858 (2.709, 3.016)**		
widowed[b]	8,420 (28.2)	14,452 (48.3)	Referent		
Health-related factors					
Current depressed mood	12,932 (43.3)	11,879 (39.3)	**1.168 (1.129, 1.208)**	**1.202 (1.141, 1.268)**	**1.337 (1.258, 1.420)**
Mental health problems	12,399 (41.5)	14,985 (50.1)	**.686 (.663, .709)**	**.700 (.664, .738)**	**.676 (.637, .718)**
Suicidal ideation	10,358 (34.6)	7,686 (25.7)	**1.547 (1.492, 1.603)**	**1.513 (1.432, 1.599**)	**1.511 (1.421, 1.606)**
Suicide attempts	6,244 (20.9)	6,607 (22.1)	**.927 (.891, .965)**	.970 (.911, 1.032)	1.034 (.963, 1.110)
Alcohol abuse problem	7,106 (23.8)	5,548 (18.6)	**1.387 (1.332, 1.444)**	**1.496 (1.404, 1.594)**	**1.476 (1.375, 1.586)**
Other substance abuse problems	5,15 (17.2)	5,601 (18.7)	**.899 (.862, .939)**	.944 (.883, 1.009)	**.858 (.796, .926)**

(Continued)

Table 4.5b
(Continued)

Characteristics	IPP-related suicides n=29,896 No. (%)	Non-IPP related suicides n=29,896 No. (%)	Crude Odds Ratio (95% Confidence interval)	Adjusted for marital status and education status	Adjusted for all demographic and precipitating factors
Physical illness	3,105 (10.4)	5,404 (18.1)	**.482 (.458, .507)**	**.485 (.448, .525)**	**.489 (.449, .533)**
Life stressors					
Family problems	2,112 (7.1)	1,681 (5.6)	**1.303 (1.217, 1.396)**	1.092 (.984, 1.211)	**.834 (.740, .940)**
Friend problems	2,353 (7.9)	2,572 (8.6)	**.903 (.851,.959)**	**.888 (.812, .973)**	**.774 (.701, .854)**
Recent family or friend suicide	551 (1.8)	616 (2.1)	.890 (.792, 1.001)	.892 (.748, 1.062)	.839 (.692, 1.018)
Other death of family or friend	1,308 (4.3)	1,891 (6.3)	**.675 (.627, .726)**	**.796 (.713, .888)**	**.745 (.660, .840)**
Argument over money, property, or insult	5,127 (17.1)	917 (3.1)	**8.172 (7.501, 8.903)**	**7.047 (6.272, 7.917)**	**6.914 (6.128, 7.800)**
Financial problems	4,352 (14.6)	3,634 (12.2)	**1.244 (1.185, 1.305)**	**1.234 (1.146, 1.326)**	**1.230 (1.130, 1.338)**
Job problems	4,447 (14.9)	4,607 (15.4)	.958 (.915, 1.002)	.946 (.882, 1.014)	**.866 (.799, .938)**
Criminal or legal problems					
Precipitated by a crime	862 (2.9)	503 (1.7)	**1.779 (1.587, 1.994)**	**1.852 (1.590, 2.156)**	**1.807 (1.517, 2.151)**
Recent criminal or legal problem	3,324 (11.1)	3,824 (12.8)	**.848 (.806, .892)**	**.809 (.747, .876)**	**.729 (.667, .797)**

[a]Data were provided by the National Violent Death Reporting System. Unknown values are not presented; therefore, variables might not total 100%.
[b](Single nos (not otherwise specified) was used when it was not clear whether the person was never married, widowed, divorced, or separated
Bolded odds ratios are significant at *p* <.05 level

Interactions between age and risk factors and sex and precipitating factors

To determine if there were any interactions between sex or age and any of the precipitating factors associated with IPP-related suicides, I used logistic regression and stepwise selection. All 21 precipitating factors mentioned in Table 3.1 were included in the model. Interactions were examined by the 16 non-demographic risk factors also found in Table 3.1. Results showed two significant interactions with sex (financial problems and suicide being precipitated by a crime) and ten significant interactions with age (depressed mood, mental health problems, other substance abuse problems, physical illness, family problems, friend problems, argument over money, property, or insult, job problems, suicides precipitated by a crime and recent criminal problems) (Table 4.6).

Sex and financial problems. For males, the estimated odds ratio for IPP-related suicide between decedents with financial problems and those without was exp (.3893), while the estimated odds ratio for females is exp (.3893+.1617). Therefore, controlling for the other risk factors, the chance of IPP-related suicides with financial problems was higher for females than males.

Sex and other crimes. For males, the estimated odds ratio of IPP-related suicides between people with suicides precipitated by a crime compared to those who did not have suicides precipitated by a crime was exp (-.3653), while the estimated odds ratio for females was exp (-.3653+.2436). Therefore, being female increased the chances of IPP-related suicides that were precipitated by a crime.

Age and depressed mood. At any given age the estimated odds ratio for IPP-related suicide decedents between those with depressed mood and those without was exp (.7519-.0109*age). Up to the age of 68 years, suicide decedents with depressed mood were more likely

to die by IPP-related suicide than those without depressed mood and the odds decreased as age increased; depressed mood was a risk factor for IPP-related suicides. After the age of 69 (.7519/.0109), suicide decedents with depressed mood were less likely to die by IPP-related suicide and depressed mood became a risk factor for non-IPP-related suicides.

Age and mental health problems. At a given age, the estimated odds ratio of IPP-related suicide between decedents with mental health problems and those without was exp (-.6111+.0054*age). Suicide decedents with mental health problems were less likely to die by IPP-related suicide than those without mental health; however, the odds ratio decreased with age.

Age and substance abuse problems. At a given age, the estimated odds ratio of IPP-related suicide between decedents with substance abuse problems and those without was exp(-.7809+.0171*age). As age increased, the odds ratio of IPP-related suicides between suicide decedents with substance abuse problems and those without also increased. Up to the age of 45 (.7809/.0171), suicide decedents with substance abuse problems were less likely to die by IPP-related suicide than those without substance abuse problem. While for decedents 46 and older, non-IPP related suicide decedents with substance abuse problem were more likely to die by IPP-related suicide than those without substance abuse problem.

Age and physical illness. At a given age, the estimated odds ratio of IPP-related suicide between decedents with physical illness and those without was exp(-.1521-.0123*age). The chance of decedents with physical illness was lower among IPP-related suicides. IPP-related suicide decedents with physical illness are more were less likely to die by IPP-related suicide than those without physical illness. As age increased, the odds ratio decreased.

Age and family problems. At a given age, the estimated odds ratio of IPP-related suicide between decedents with family problems and those without was exp(-.7914+.0111*age). The

odds ratio of IPP-related suicides between suicide decedents with family problems and those without also increased. For decedents =<71 years old, suicide decedents with family problems were less likely to die by IPP-related suicide than those without substance abuse problem. While for IPP-related suicide decedents >72 years old with family problems were more likely to die by IPP-related suicide than those without substance abuse problems.

Age and friend problems. At a given age, the estimated odds ratio of IPP-related suicide between decedents with friend problems and those without was exp(-.8480+.0197*age). The odds ratio of decedents with friend problems was lower among IPP-related suicides. As age increased, the odds ratio of friend problems among IPP-related suicides increased. Friend problems was a risk factor for non-IPP related suicide decedents =<43 years old. After the age of 44 years, friend problems became a risk factor for IPP-related suicides.

Age and arguments over money, property, or insult. At any given age, the estimated odds ratio of IPP-related suicide between decedents with a history of arguments prior to suicide and those without was exp(1.3308+.0116*age). The odds ratio for arguments among IPP-related suicides was higher compared to non-IPP related suicides. As age increased, the chance of arguments among IPP-related suicides increased.

Age and job problems. At any given age, the estimated odds ratio of IPP-related suicide between decedents with job problems and those without was exp(.1176-.0059*age). Among IPP-related suicides, younger decedents had a higher odds ratio of job problems, however as age increased the odds ratio of job problems decreased.

Age and precipitated by a crime. At any given age, the estimated odds ratio of IPP-related suicide precipitated by a crime and those without was exp(-.3653+.0269*age). Suicides that were precipitated by a crime were more likely to be associated with IPP-related suicides compared to

non-IPP related suicides. As age increased, so did the odds ratio of IPP-related suicides being precipitated by a crime.

Age and recent criminal or legal problem. At any given age, the estimated odds ratio of IPP-related suicide with recent criminal or legal problems and those without was exp(-.5329+.0093*age). Suicide decedents with recent criminal or legal problems were less likely to die by IPP-related suicides. As age increased, the odds ratio of IPP-related suicides and recent criminal or legal problems increased. Recent criminal or legal problems was a risk factor of non-IPP related suicides for decedents =<57 years old, however it became a risk factor for IPP-related suicide decedents >58 years old. Table 4.6 Interactions between sex, age, and risk factors for IPP, NVDRS, 2003 – 2014.

Table 4.6 Interactions between sex, age, and risk factors for IPP, NVDRS, 2003 – 2014

Parameter	Estimate (Standard error)	P-value	
Demographic			
Age	-.0456 (.0013)	<.0001	
Sex (Female)	-.1883 (.0142)	<.0001	
Health-related factors			
Depressed mood	.7519 (.0664)	<.0001	
Mental health problems	-.6111 (.0657)	<.0001	
Suicidal ideation	.4738 (.0224)	<.0001	
Suicide attempts	.0609 (.0264)	.0211	
Alcohol abuse problem	.4032 (.0262)	<.0001	
Other substance abuse problems	-.7809 (.0891)	<.0001	
Physical illness	-.1521 (.1067)	.1540	
Life stressors			
Family problems	-.7914 (.1301)	<.0001	
Friend problems	-.8480 (.1022)	<.0001	
Recent family or friend suicide	-.1732 (.0738)	.0189	
Other death of family or friend	-.2461 (.0457)	<.0001	
Argument over money, property, or insult	1.3308 (.1082)	<.0001	
Financial problems	.3893 (.0400)	<.0001	
Job problems	.1176 (.1048)	.2618	
Criminal or legal problems			
Precipitated by a crime	-.3653 (.1591)	.0217	
Recent criminal or legal problem	-.5329 (.1065)	<.0001	
Interactions			**Estimated OR**
Financial problems*sex (Female)	.1617 (.0386)	<.0001	Males: exp(.3893) Females: exp(.3893+.1671)
Precipitated by a crime *sex	.2436 (.1099)	.0267	Males: exp(-.3653) Females: exp(-.3653+.2436)
Depressed mood*age	-.0109 (.0015)	<.0001	exp(.7519-.0109*age)
Mental health problems*age	.0054 (.0015)	.0002	exp(-.6111+.0054*age)
Other substance abuse problems*age	.0171 (.0022)	<.0001	exp(-.7809+.0171*age)
Physical illness*age	-.0123 (.0021)	<.0001	exp(-.1521-.0123*age)
Family problems*age	.0111 (.0029)	.0001	exp(-.7914+.0111*age)
Friend problems*age	.0197 (.0023)	<.0001	exp(-.8480+.0197*age)
Argument over money, property, or insult*age	.0116 (.0025)	<.0001	exp(1.3308+.0116*age)
Job problems*age	-.0059 (.0023)	.0127	exp(.1176-.0059*age)
Precipitated by a crime *age	.0269 (.0028)	<.0001	exp(-.3653+.0269*age)
Recent criminal or legal problem*age	.0093 (.0025)	.0003	exp(-.5329+.0093*age)

Cumulative risk

This study focused on examining the factors that precipitated IPP-related suicides, in addition to IPP, which in itself is a risk factor for suicide. Furthermore, other risk factors were included in NVDRS, but the risk factors included in this analysis were 16 non-demographic precipitating factors based upon literature review articles that identified risk factors for IPV and IPP. Therefore, some suicide decedents could have 0 risk factors.

In the unmatched dataset, the total number of risk factors for both IPP-related suicides and non-IPP related suicides ranged from 0 to 12 (Table 4.7a). For a small proportion of decedents (6.3% of non-IPP and 10.8% of IPP), none of the precipitating factors were identified. The highest proportion of total number of risk factors for non-IPP related suicides was 26.0% of the decedents had two risk factors; the second highest proportion was 23.8% having one risk factor. Among IPP-related suicides, the highest proportion of total number of risk factors was 21.4% having two risk factors followed by 18.5% having three risk factors (Table 4.7a). Using t-test, the mean number of cumulative risk factors was 2.73 for IPP-related suicides and 2.48 of non-IPP related suicides (F-value=1.45, $p<.0001$). Therefore, among the unmatched analysis there was a significant difference in cumulative risk factors between IPP-related suicides and non-IPP related suicides. Based upon using logistic regression when cumulative risk was a covariate, when there were 7 or more risk factors, the odds of suicidal death among those with a history of IPP was 1.327 (1.214, 1.450) times the odds among those suicidal deaths without a history of IPP.

In the matched dataset, the total number of risk factors ranged between 0 to 11 for non-IPP related suicides and between 0 and 12 for IPP-related suicides (Table 4.7b). The highest proportion of total number of risk factors for non-IPP related suicides was 24.0% of the

decedents had two risk factors; the second highest proportion was 22.0% having one risk factor. Among IPP-related suicides, the highest proportion of total number of risk factors was 21.4% having two risk factors followed by 18.6% having three risk factors (Table 4.7b). Using t-test, the mean number of cumulative risk factors was 2.73 for IPP-related suicides and 2.61 of non-IPP related suicides (F-value=1.30, p<.0001). Therefore, among the matched comparison analysis, there was a significant difference in cumulative risk factors between IPP-related suicides and non-IPP related suicides. Using logistic regression and cumulative risk as a covariate, when there were 9 or more risk factors, the odds of suicidal death among those with a history of IPP was 1.480 (1..098, 1.995) times the odds among those suicidal deaths without a history of IPP.

Table 4.7a. Cumulative risk factors for intimate partner problems vs non- intimate partner problems related suicides, NVDRS 2004-2013

# Risk	Non-IPP suicide		IPP suicide		Total
Factors	N	%	N	%	N
0	4,700	6.3%	3,525	10.8%	8,225
1	17,693	23.8%	5,973	18.2%	23,666
2	19,272	26.0%	7,015	21.4%	26,287
3	15,420	20.8%	6,071	18.5%	21,491
4	9,135	12.3%	4,516	13.8%	13,651
5	4,698	6.3%	2,856	8.7%	7,554
6	2,019	2.7%	1,557	4.7%	3,576
7	862	1.2%	765	2.3%	1,627
8	308	0.4%	340	1.0%	648
9	86	0.1%	120	0.4%	206
10	13	0.0%	34	0.1%	47
11	5	0.0%	8	0.0%	13
12	1	0.0%	2	0.0%	3
Total	74,212	100%	32,782		106,994

Table 4.7b. Cumulative risk factors for intimate partner problems vs non- intimate partner problems related suicides, a matched comparison NVDRS 2004-2013

# Risk	Non-IPP suicide		IPP suicide		
Factors	N	%	N	%	N
0	1,935	6.5%	3,194	10.7%	5,129
1	6,564	22.0%	5,426	18.2%	11,990
2	7,361	24.0%	6,403	21.4%	13,764
3	6,120	20.5%	5,563	18.6%	11,683
4	3,967	13.3%	4,146	13.9%	8,113
5	2,239	7.5%	2,589	8.7%	4,828
6	1,026	3.4%	1,406	4.7%	2,432
7	457	1.5%	704	2.3%	1,161
8	164	0.5%	311	1.0%	475
9	65	0.2%	113	0.4%	167
10	6	0.0%	33	0.1%	39
11	3	0.0%	6	0.0%	9
12	0	0.0%	2	0.0%	2
Total	29,896	100%	29,896		59,792

Final summary of results

When reviewing both the unmatched and matched comparison bivariate analysis, IPP-related suicide decedents were more likely to be younger, white males, had a high school diploma or less, and were married. They were more likely to experience depressed mood, suicidal ideation, and alcohol abuse problems, family problems, friend problems, argument over money, property or insult, financial problems, and problems precipitated by a crime. Among life stressors, the highest reported precipitating factor was arguments over money, property or insult followed by financial problems.

Contrary to the hypothesis, not all of the health-related factors, life stressors, and criminal/legal problems were stronger risk factors for IPP-related suicides than non-IPP. Seven risk factors associated with IPP-related suicides were identified from the unmatched sample: current depressed mood, suicide ideation, suicide attempts, alcohol abuse problems, arguments

over money, property, or insult, financial problems, and precipitated by another serious crime. The matched comparison identified six risk factors. With the exception of suicide attempts, the risk factors from the matched comparison were identical to the unmatched sample. Non-IPP suicides were more likely to have the following risk factors: mental health problems, other substance abuse problems, physical illness, family problems, recent family or friend suicide, other death of family or friend, job problems, and recent legal or criminal problems. The r-square for the unmatched analysis was .1948 and the matched analysis was .1348, which is low.

As hypothesized, IPP-related suicides had more risk factors than non-IPP related suicides. The mean number of cumulative risk factors for the unmatched analysis was 2.73 (Sd=1.88) for IPP-related suicides and 2.48 (Sd=1.57) for non-IPP related suicides. Among the matched comparison, the mean of cumulative risk factors for IPP-related suicides was 2.73 (Sd=1.89) and 2.61 (Sd=1.66) for non-IPP related suicides.

Chapter 5:

DISCUSSION

The purpose of this study was to identify risk factors associated with IPP-related suicides and to examine the differences in risk factors between IPP-related suicides and non-IPP related suicides. This study advances scientific understanding of the relation between precipitating factors and IPP-related suicides. One major finding was that not all precipitating factors included in this study were risk factors of IPP-related suicides. Seven risk factors were identified in the unmatched analysis and six risk factors were identified in the matched analysis for IPP-related suicides. Non-IPP related suicides had more risk factors than IPP related suicides. Of note, IPP is a risk factor in itself. Furthermore, IPP has a strong association with suicides and could be the only risk factor, which might explain why non-IPP related suicides had more risk factors. This chapter is organized in three sections: discussion of key findings, limitations, and conclusion.

Discussion of key findings

Socio-demographic characteristics

There were significant interactions between age and ten risk factors and between sex and two risk factors on whether the suicidal death was IPP-related or not. IPP-related female suicide decedents were more likely to experience financial problems and suicides were precipitated by a crime compared to males. This was an interesting finding considering there was a significantly lower prevalence of female suicides compared to males. Previous research has identified low income as a risk factor for IPP-related suicides for female decedents (Alhusen et al., 2015; Cavanaugh et al., 2015) however, there is limited research that focuses on the impact of criminal

problems on IPP-related female suicide decedents. When research discusses IPP, suicides and crime, it mainly focuses on male perpetrators of IPV who were in court for IPV (Conner et al., 2002; Wolford-Clevenger et al., 2015); therefore it was unexpected that IPP-related suicides involving females were more likely to be precipitated by a crime. It is not clear why this outcome occurred, but the definition of crime varies in the NVDRS database. The women in this study could have be involved in drug transactions, robbery and other crimes outside of IPV. Because women were more likely to have financial problems there is a possibility the crimes could have been related to gaining financial resources to remove themselves from the IPP relationship. More research that focuses on identifying what types of crimes were committed should be done to better understand the relationship between IPP-related suicides among females having higher rates of suicides precipitated by a crime.

Age affected the risk of IPP-related suicides in multiple ways. Younger decedents were more likely to have mental health problems and job problems. Older decedents were more likely to have current depressed mood, substance abuse problems, family problems, friend problems, arguments, suicide precipitated by a crime, and recent criminal or legal problems. Even though there was a higher prevalence of younger IPP-related suicide decedents, this study suggests that older decedents have more risk factors for IPP. While it is unclear why this difference exists, this information is helpful for intervention development and identifying individuals with IPPs.

Health problems

This study's data supported the hypothesis that the following would be risk factors for IPP-related suicides: current depressed mood, suicidal ideation, suicidal attempts, and alcohol use problems. The matched comparison dataset had the same risk factors with the exception of suicidal attempts, which was not a statistically significant risk factor for IPP-related suicides.

Even though previous research has identified mental health problems as a predictor of IPP-related suicides (Comiford et al., 2016) this study found mental health problems to be a risk factor for non-IPP related suicides. One possible explanation for this outcome is that Comiford et al. (2016) defined mental health problems as having current depressed mood, current treatment for mental illness or was ever treated for mental illness. Whereas, for this study, current treatment for mental illness or ever treated for mental illness was consolidated into health problems and current depressed mood was not included in this definition. For the purpose of this study, mental health was considered an on-going problems and current depressed mood was considered to be temporary. Therefore, these two factors were not consolidated into one variable. Separating ongoing mental health problems from current depressed mood is important for interventions. Most likely, many of those with on-going mental health problems have sought treatment at some point since their diagnosis. Potentially, they could have been receiving treatment weeks or months prior to suicide. This provides an opportunity for mental health providers to assess the signs for IPP and intervene which could potentially prevent IPP-related suicides.

Other substance abuse problems, contrary to the hypothesis, was a risk factor of non-IPP related suicides instead of it being a risk factor for IPP-related suicides. There could be a few possible explanations for this outcome. Past research has found associations between battered women and suicide attempts and drug and/or alcohol use (Bergman & Brismar, 1991; Kaslow, Thompson, Meadows, et al., 2000). One potential explanation for the difference between this study and past research is that past studies focused on battered women; therefore, other substance abuse could be a risk factor for women IPP-related victims but not men. However, when conducting interaction analysis for this study, I did not find a significant interaction between age

and substance abuse problems among IPP-related suicides. A second explanation could be that past studies combined alcohol and substance use into one variable. Alcohol abuse was a risk factor for IPP-related suicide for this current study. The prevalence of alcohol abuse in previous studies could override substance use, which could explain the significant association between the IPV, suicide, and alcohol/drug use.

Contrary to the hypothesis, physical illness had a stronger association with non-IPP-related suicides than IPP-related suicides. Physical illness had one of the largest differences in prevalence when comparing IPP-related suicides to non-IPP related suicides (17% difference for the unmatched analysis and 8% for the matched comparison). Prior studies that focused on physical illness impact on suicide are inconsistent. For instance, Kaplan, McFarland, Huguet, and Newsom (2007) found that individuals with functional limitations were at higher risk for suicide compared to those without such limitations. However, Kaplan et al. (2007) found that chronic conditions [defined by International Classification of Disease (ICD)-9 codes 001-289 and 320-779] did not predict death by suicide. Other studies have found that physical illness can increase marital satisfaction. For instance, among breast cancer patients and their partners, some couples indicated that the cancer diagnosis brought them closer together. Patients reported more affection from their spouses 3 month post diagnosis (Dorval et al., 2005). Perhaps, physical illness can decrease the risk of IPP-related suicides because the illness can lead to more empathy, affection and less intimate partner problems.

Life stressors

As hypothesized, the prevalence of arguments and financial problems were higher for IPP-related suicides than non-IPP-related suicides. Arguments over money, property or insult had one of the highest differences in prevalence between IPP (17%) and non-IPP related suicides

(3%). Interestingly, age interacted the relationship between arguments and IPP-related suicides. Further research should further explore the relation between IPP-related suicides and arguments. Considering financial problems was also a risk factor for IPP-related suicides, there is a possibility that a significant percentage of arguments were over money. Knowing specifically what the arguments were about could provide additional insight about IPP-related suicides and how to mitigate them.

Contrary to the hypothesis, IPP-related suicides had lower prevalence of family problems, recent family or friend suicide, other death of family or friend and job problems. Friend problems was not statistically significant. This result is surprising, considering that family problems, friend problems, recent family or friend suicide, other death of family or friend could be indicators of thwarted belongingness, specifically social isolation (a strong indicator of suicide) (Joiner et al., 2009; Van Orden et al., 2010) . Research has suggested that social isolation is a risk factor for IPV and suicides (Coker et al., 2002; Daniels, 2005). While it is unclear why these social isolation indications were not a risk for IPP, perhaps, family problems, friend problems, recent family or friend suicide, other death of family or friend might not be the best indicators for social isolation. These life stressor variables could be a recent problem with family or friends. It does not necessarily mean the decedents had on-going problems with their family and friends, nor do these variables mean that the decedents had problems with all of their family members and friends. Social isolation is not having any support from family or friends; it exceeds a single problem with a single individual.

Comiford et al. (2016) did not find a significant difference in prevalence of recent family or friend suicide and other death of family between IPP non IPP-related suicides. Perhaps, the differences between this study and Comiford et al was due to geographical differences.

Comiford's study took place in Kentucky while this study included various states across the U.S. Regarding family and friend problems, age interacted with the two factors among IPP-related suicides. Family problems were a risk factor for non-IPP related suicide decedents =<71 years. Since a majority of the decedents were 71 years or younger (approximately 90%) and family problems was a risk factor for non-IPP related suicides at 71 or younger years, this explains why family problems was not a risk factor of IPP-related suicide.

Friend problems were a risk factor for non-IPP related suicide decedents 43 years and younger. Almost half of the suicide decedents were 43 years or younger. Since friend problems were a risk factor for non-IPP suicide decedents up until 43 years of age and a risk factor for IPP suicide decedent after 44 years, friend problems was a risk factor for half of both IPP and non-IPP related suicides. This could explain why friend problems was not a statistically significant factor of IPP-related suicides.

Even though previous research has indicated that unemployment—one indicator of job problems—was a predictor of IPP-related suicides (Cavanaugh et al., 2011; Cavanaugh et al., 2015), this study found that job problems was a risk factor for non-IPP related suicides. Another study that focused on precipitating circumstances of suicide among active duty US Army personnel versus US civilians found that job problems was not a statistically significant indicator of suicidal death (Logan et al., 2015). While the reason is unclear about why this current study found job problems to not be a risk factor of IPP-related suicides and other research found job problems to be a risk factor or non-significant indicator of suicide, one plausible explanation is the target population. This current study focused on IPP-related suicide decedents while one study focused on suicides from military personnel (Logan et al., 2015). There are various

differences between these two population and it would be inaccurate to compare these two populations.

While unemployment is one indicator of job problems, there are many others such as co-worker problems, poor performance, and increased pressure (Schiff et al., 2015). Perhaps one of the other areas of job problems is more frequently reported in this analysis than unemployment and this explains why job problems is not a risk factor for IPP-related suicides.

Criminal or legal problems

Suicide precipitated by a crime was a risk factor for IPP-related suicides however, contrary to the hypothesis, recent criminal or legal problems was a risk factor for non-IPP related suicides. Research about the impact of criminal or legal problems on IPP-related suicides is limited. However Comiford et al. (2016) also found suicides precipitated by a crime to be a risk factor of IPP-related suicides. Precipitated by a crime interacted with age and sex. Being female and older age increased the chance of IPP-related suicides being precipitated by a crime.

Under the unmatched analysis, the crude odds ratio showed that recent criminal or legal problems was a risk factor for IPP-related suicides. However, under the final model controlling for all factors, recent or legal problems became a risk factor associated with non-IPP related suicides (the matched comparison had recent criminal or legal problems as a risk factor for non-IPP related suicides under the adjusted and unadjusted models). Interestingly, there was an interaction between recent criminal and legal problems and age and its influence on IPP-related suicides. For decedents 57 or younger years recent criminal or legal problems was a risk factor for non-IPP related suicides; however for those older than 58 years, it was a risk factor for IPP-related suicides. Prior research has indicated that younger suicide decedents have multiple strains such as IPP, financial, legal and occupational problems (Kaplan et al., 2012), which based upon

the strain theory of suicide would influence death by suicide (Zhang, 2016). If young adults have a lot of strain, then one would think recent criminal or legal problems would be a risk factor for young individuals in addition to older individuals. Therefore, it is not clear why recent criminal or legal problems was not a risk factor for younger IPP-related suicide decedents and a risk factor for older decedents.

Cumulative risk

Strain theory posits that two or more psychological strain can precede suicide. This study hypothesized that IPP-related suicides would have more risk factors than non-IPP related suicides and the data supports this hypothesis. Cumulative risk has been documented in research that focus on adolescents and suicidal ideation. When adolescents have multiple strains e.g. problems with family, conflicts with friends, and lack of support from teachers, they have greater chance of having suicidal ideation (Orpinas & Horne, 2014). Similar to cumulative risks being associated with suicidal ideation, the higher number of risk factors resulted in the higher odds ratio for IPP-related suicides.

Study Strengths and Limitations

The greatest strength of this study was the large sample size which included 18 states from 2003-2014. Only one other study has focused on identifying IPP-related risk factors that included multiple years (2005-2012), but it only included one state which used the Kentucky Violent Deaths Reporting Systems data (Comiford et al., 2016). This large sample size from multiple states could be the foundation for identifying IPP-related suicide risk factors for other populations. Another strength of this study was that it included precipitating factors that are not studied as frequently as socio-demographic factors which were health –related factors, life

stressors and criminal or legal problems. Including additional precipitating factors may provide more understanding for the development of interventions targeting individuals with IPPs.

This study has some limitations. First, this study is limited by the confines that exist within the NVDRS. While NVDRS has a significant amount of information pertaining to suicides, it does not contain all the risk and protective factors relating to suicides. Therefore, some potential confounding variables may not have been accounted for. In addition, data were collected from only 18 states; not all IPP- related suicides in the U.S. were captured in the surveillance system. Second, NVDRS data consist only of "known" circumstances—typically information obtained through next-of-kin interviews, suicide notes, death scene investigations—so factors unknown to interviewees (e.g., sexual orientation, whether the victim was experiencing financial problems, etc.) will not show in reports. Even though family and friends can provide some important information about decedent, the accuracy and completeness of their knowledge is unknown. Underreporting may also occur. Third, some categories are very broad. For example, job problems is one of those broad categories. Without reviewing the narrative data, the type of problem is unknown. Possible job problems are so divers as unemployment or sexual harassment in the workplace.

Recommendations

Individuals at risk for IPP-related suicides exhibit warning signs; thus, interventions in early stages could lower risk of suicide by reducing IPP (Knox et al., 2010). The Air Force Suicide Prevention Program used 11 policy and education initiatives designed to change the Air Force culture regarding suicide. This prevention program encouraged community engagement to promote suicide prevention efforts, which has reduced suicide and other risk factors associated with suicide such as domestic violence among airforce (Knox et al., 2010; Stone et al., 2017).

Another method to reduce IPP-related suicides is to train gatekeepers, that is, people trained to identify people who are at risk for suicide. Isaac et al. (2009) showed that gatekeepers have an important function in substance abuse treatment programs, court settings, emergency rooms and suicide hotlines. The Applied Suicide Intervention Skill training (ASIST) also used gatekeepers successfully to prevent suicides, reduce depressed mood and increase hopefulness. ASIST is a gatekeeping program for hotline counselors, emergency workers, and other personnel to identify suicidal individuals, understand the reason a person wants to live and die and connect that person with available resources (Gould, Cross, Pisani, Munfakh, & Kleinman, 2013). Results from this study could be used to train gatekeepers.

Because financial problems was a risk factor for IPP, there is a need for more economic support for individuals experiencing IPP. Housing stabilization policies aim to keep people in their homes and provide housing options during financial insecurity, which could reduce suicide risk (Turecki, 2014). Additionally, unemployment benefits have helped reduced suicide risk. Studies have shown that states that provide greater unemployment benefits offset rates of suicide (Stone et al., 2017).

Even though the indicators for social isolation (friend problems, family problems, family or friend suicide, or other death of family or friend) were risk factors for non-IPP related suicides, these factors do occur with some IPP-related suicides. As explained by theory, social isolation can lead to the desire to die by suicide (Joiner, 2005; Joiner et al., 2009). Promoting social connectedness can reduce social isolation and the desire to die by suicide. Gatekeepers can help identify IPP suicidal individuals and determine the seriousness of the social isolation and whether it is related to having suicidal thoughts or attempts. If social isolation is a problem, then

gatekeepers can help individuals find social groups where they can become an integral part and enhance connectedness.

This study justifies the need for interventions in non-traditional venues. The statistically significant risk factors: financial problems and suicides precipitated by a serious crime justifies the need for interventions and counseling at the judicial level including family and criminal courts. Court representatives could trained to identify individuals with IPPs and connect them with resources to help mitigate IPP. With the high prevalence of alcohol abuse reported in this study, Alcoholics Anonymous programs and other substance abuse treatment facilities could develop tools to identify and address IPPs and, consequently, prevent suicides. Because IPP-related suicide decedents had a high prevalence of suicidal ideation and suicide attempts, mental health care providers and personnel working in hospitals and emergency rooms could screen for IPP (e.g., Are you having relationship problems? Have you been arguing with your significant other more than usual over the past month?) and provide referrals as needed.

Conclusion

The present study adds to the scant literature on risk factors associated with IPP-related suicides, using the NVDRS data from 18 reporting states. Only one prior study examined this topic, but used data from just one state (Comiford et al., 2016) The results from this study can provide insight when developing effective and appropriate suicide prevention programs for people with IPPs. Cumulative risks were associated with IPP-related suicides. Therefore, when developing interventions, addressing multiple risk factors could be most effective. In addition, because the prevalence IPP-related suicides and related risk factors vary by age and sex, interventions need to be age and gender appropriate.

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Appendix A: Suicide deaths and rates for all races, both sexes, ages 18 years and older—United States 1999 – 2015

Year	Total Suicides	Total Population	Crude Rate per 100,000
1999	28,179	207,094,130	13.61
2000	28,254	209,128,094	13.51
2001	29,580	212,297,780	13.93
2002	30,671	214,688,736	14.29
2003	30,559	217,007,175	14.08
2004	31,399	219,507,563	14.30
2005	31,610	221,992,930	14.24
2006	32,352	224,622,198	14.40
2007	33,754	227,211,802	14.86
2008	35,045	229,989,364	15.24
2009	35,839	232,637,362	15.41
2010	37,348	234,564,071	15.92
2011	38,379	237,801,767	16.14
2012	39,426	240,392,551	16.40
2013	39,894	242,834,652	16.43
2014	41,425	245,308,220	16.89

Produced by: National Center for Injury Prevention and Control, CDC
Data Source: NCHS Vital Statistics System for numbers of deaths. Bureau of Census for population estimates https://webappa.cdc.gov/sasweb/ncipc/mortrate10_us.html

Appendix B. Sources from which data on different topics are recorded

Data Topic	DC	CME	LE	CFR	LAB	USER	HOSP
1. Case Status						X	
2. Incident narrative		X	X	X			
3. Document tracking						X	
4. Person type	X	X	X				
5. Name, zip code, county	X	X	X				
6. Demographics	X	X	X				
7. When and where (injury/death)	X	X	X				
8. Type of medical treatment (inpatient or emergency)							X
9. Cause of death ICD-10- code(s)	X						
10. External injury ICD-9-CM							X
11. Manner of death	X	X		X		X	
12. Additional person descriptors	X	X	X	X			
13. Alcohol and drug tests		X					
14. Wounds		X	X				
15. Associated circumstances (health-related, life stressors, criminal or legal problems)		X	X	X			
16. Victim-suspect relationship		X	X	X			
17. History of victim abuse		X	X	X			
18. Suspect was victim caretaker		X	X	X			
19. Weapon type	X	X	X			X	
20. Firearm descriptors		X	X		X		
21. Poison details		X	X				

DC= Death Certificate; CME= Coroner/Medical Examiner; LE= Law Enforcement report; CFR= Child Fatality Review; LAB= Crime lab; USER= User of NVDRS software/Abstractor(s); HOSP=Hospital (Centers for Disease Control and Prevention, 2015c)