



## Intimate Partner Violence

# Differentiating among Attempted, Completed, and Multiple Nonfatal Strangulation in Women Experiencing Intimate Partner Violence



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## ABSTRACT

**Purpose:** Because identification of intimate partner violence (IPV) in health care settings is low and strangulation increases lethality risk among women experiencing IPV, we examined the prevalence and correlates of nonfatal strangulation among 1,008 women survivors of IPV.

**Methods:** Trained researchers conducted semistructured interviews with women survivors of IPV referred by police. Multinomial logistic regression examined differential correlates of attempted, completed, and multiple strangulation.

**Results:** Interviews were conducted with 71.14% of eligible women contacted by researchers. A high proportion (79.66%) of the women interviewed experienced attempted (11.70%), completed (30.16%), or multiple (37.80%) strangulation. Each form of strangulation was independently significantly associated with sexual violence when compared with no strangulation. African American women were at increased risk of attempted (adjusted relative risk ratio [ARR], 2.02;  $p < .05$ ), completed (ARR, 1.79;  $p < .05$ ), and multiple strangulation (ARR, 2.62;  $p < .001$ ). Compared with no strangulation, multiple strangulation was associated with more IPV injury and risk factors for homicide, including loss of consciousness (ARR, 2.95;  $p < .05$ ) and miscarriage (ARR, 5.08;  $p < .05$ ). Women who had lost consciousness owing to strangulation were more likely to seek medical care than those who had been strangled but had not lost consciousness ( $p < .01$ ).

**Conclusions:** Strangulation is a prevalent form of IPV that presents significant health risks to women. Women's health practitioners are optimally positioned to identify subtle signs and symptoms of strangulation, help women to understand the delayed sequelae and potential future fatality associated with strangulation, and connect them with appropriate resources to reduce the risk of morbidity and mortality.

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Almost 32% of adult women in the United States experience intimate partner violence (IPV) in their lifetime, and more than 22% report suffering severe forms of physical IPV, including being beaten, shot, stabbed, burned, or strangled (Breiding et al., 2014).

Strangulation, oxygen deprivation from external pressure on the neck leading to vascular and/or airway closure (Iserson, 1984; Pritchard, Reckenwald, & Nordham, 2015; Sauvageau & Boghossian, 2010), is a deadly and little-studied form of severe IPV. An international meta-analysis estimated IPV strangulation prevalence among women at 0.4% to 2.4% (past-year) to 3.0% to 9.7% (lifetime), with the United States reporting the highest rates (Sorenson, Joshi, & Sivitz, 2014). Two small studies suggest that this form of IPV seems to be particularly high—well over 50%—among abused women seeking help in domestic violence shelters or an emergency department (Malek et al., 2000; Wilbur et al., 2001).

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Strangulation has been recognized as a risk factor for a variety of serious injuries (Anscombe & Knight, 1996; Clarot, Vaz, Papin, & Proust, 2005; Davison & Williams, 2012; Fineron, Turnbull, & Busuttil, 1995; Hori et al., 1991; Iacovou, Nayar, Fleming, & Lew-Gor, 2011; Kwako et al., 2011; Le Blanc-Louvry, Papin, Vaz, & Proust, 2013; Malek et al., 2000; Oh, Min, Park, Lee, & Kim, 2007; Sethi, Sethi, Torgovnick, & Arsura, 2012; Stanley & Hanson, 1983; YadollahiKhales, Ghorbani, & Borhani-Haghighi, 2015), as well as intimate partner homicide (Dobash, Dobash, Cavanagh, & Medina-Ariza, 2007; Glass et al., 2008).

The existing literature suggests that strangulation increases risk for injury and is often repetitive. In two small studies that measured the number of strangulation events, one-half of IPV survivors reported being strangled 3 to 20 times (Vella, 2013; Wilbur et al., 2001). Women strangled five or more times have also reported significantly more dizziness, tinnitus, weakness, muscle spasm, red linear marks, scratches, sore throats, pain and voice changes, and nightmares within 2 weeks of the event than those reporting one strangulation (Smith, Mills, & Taliaferro, 2001). Additionally, few women seek care after IPV strangulation (Shields, Corey, Weakley-Jones, & Stewart, 2010; Smith et al., 2001; Strack, McClane, & Hawley, 2001; Wilbur et al., 2001); when they do, they may not disclose prior assaults or the mechanism of injury, leading to misdiagnoses and less appropriate treatment plans (Joshi, Thomas, & Sorenson, 2012). Because strangulation often occurs with other severe forms of violence (Brink, 2009; Thomas, Joshi, & Sorenson, 2013; Wilbur et al., 2001), clinicians may focus on readily apparent injuries to the head, face, and body but miss symptoms of strangulation that are less evident or delayed (Brink, 2009).

Given the variety of challenging health care practice climates, including limited time for visits, high patient acuities and volumes, and complex multimorbidity issues, this research may support provider recognition of the potentially subtle presentation of IPV strangulation. We 1) describe the prevalence of attempted strangulation, completed strangulation, and multiple strangulation among 1,008 survivors in police-involved IPV cases; 2) identify differential correlates of attempted strangulation, completed strangulation, and multiple strangulation, with emphasis on examining associated violent victimization, injury, loss of consciousness, and risk factors for homicide; and 3) describe the proportion of women who sought health care owing to abuse and the association with loss of consciousness owing to strangulation.

## Material and Methods

### Study Design and Setting

The Oklahoma Lethality Assessment Study, a quasi-experimental field trial funded by the National Institute of Justice, was conducted between 2009 and 2013 to examine the effectiveness of the Lethality Assessment Program. The Lethality Assessment Program is a risk-informed collaborative intervention (Messing & Campbell, 2016) that was developed by the Maryland Network Against Domestic Violence ([www.mnadv.org/lethality](http://www.mnadv.org/lethality)), takes place at the scene of a police-involved IPV incident, and consists of two steps: 1) police officers use a risk assessment, the Lethality Screen (Messing, Campbell, Wilson, Brown, & Patchell, 2017), to determine if an IPV survivor is at high risk of homicide, and 2) if so, the officer places the survivor in telephone contact with a collaborating advocacy organization. Women in intervention and comparison groups participated in

structured telephone interviews at two time points approximately 7 months apart. This inquiry uses data from the first interview only, which was conducted as soon as possible after the police-involved IPV incident. The study received Institutional Review Board approval from Arizona State University, Johns Hopkins University, the University of Oklahoma Health Sciences Center, the Oklahoma State Department of Health, the Cherokee Nation, and the National Institute of Justice. Primary results were published in 2015, and indicate that the Lethality Assessment Program increased survivor protective actions and decreased IPV victimization (Messing et al., 2015).

### Selection of Participants

Police officers responding to the scene of IPV incidents in seven police jurisdictions in Oklahoma asked women survivors if they would be willing to be contacted as part of a research study. Figure 1 provides details of enrollment, with a final sample of 1,008 used for this analysis.

### Outcome Measurement

#### Strangulation

There were four questions about strangulation asked to each participant in the semi-structured interview to assess attempted strangulation, completed strangulation, and multiple strangulation. These questions are described in detail below. The term “choking” was used throughout the interview as this is the language that IPV survivors generally use to describe strangulation (Joshi et al., 2012). Because this term is technically incorrect (Sauvageau & Boghossian, 2010), we use the term strangulation in the literature review and when describing women’s responses in the results and discussion sections.

Attempted strangulation was defined as an intimate partner ever trying to strangle the participant, but not completing the violent act. This was assessed through two questions. The first question was taken from the Danger Assessment (DA; [www.dangerassessment.org](http://www.dangerassessment.org)), an IPV lethality risk assessment instrument: “Does your partner try to choke you?”

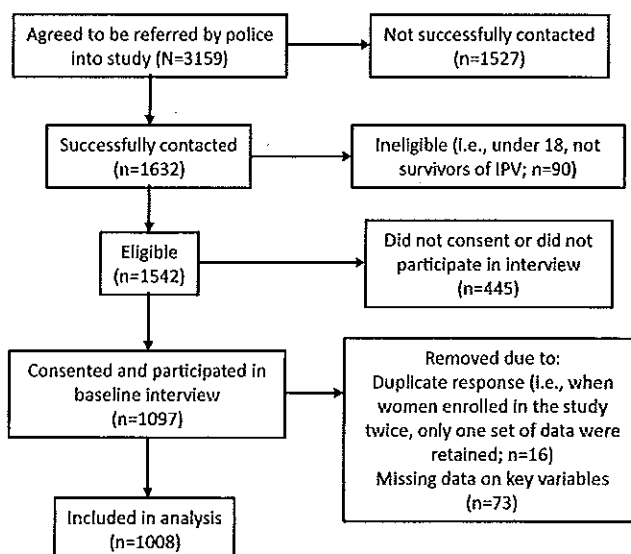


Figure 1. Enrollment details. Abbreviation: IPV, interpersonal violence.

(Campbell, Webster, & Glass, 2009; Campbell et al., 2003). The second question came from the Lethality Screen, a shortened version of the DA: "Has he/she ever tried to choke you?" (Messing et al., 2017).

The third and fourth strangulation items in the interview assessed the number of times that the participant's partner had strangled her. The third strangulation question asked participants how often "your partner choked you" and is from the Revised Conflict Tactics Scale (CTS-2; Straus et al., 1996). Response options were: this has not happened, has happened once, twice, three to five times, or six or more times in the past 6 months. A fourth and final item asked participants to describe the violent incident that led to police intervention on the day that they were referred to the study. If the participant reported that strangulation occurred during the incident that led to the police response, the interviewer asked a follow-up question regarding the number of times that strangulation occurred during this incident. For both of these questions, participants who reported being strangled one time were coded as having experienced completed strangulation and participants who responded that they were strangled more than once were coded as having experienced multiple strangulation.

Participant responses were combined into a single variable with four levels assessing strangulation: the participant did not experience either strangulation or attempted strangulation, the participant reported attempted strangulation but not completed strangulation, the participant reported a single completed strangulation but did not report multiple strangulation, and the participant reported multiple strangulation. Participants in the more severe categories of strangulation may have also reported less severe forms of strangulation, but are included only in the most severe category reported. For example, multiple strangulation survivors were necessarily strangled once by a partner.

#### *Independent Variable Measurement*

Victim and relationship characteristics collected during the interview included victim demographics, educational achievement, employment status, legal marital status, cohabitation status with the abusive partner, children under the age of 18 living in the household, and children in common with their partner.

#### *Severe IPV & Homicide Risk*

The CTS-2 (Straus et al., 1996) and the DA (Campbell et al., 2003) were used to assess severe IPV. One item from the CTS-2 assessed whether the participant had been assaulted and battered (without a weapon) by her partner: "Your partner beat you up" in the past 6 months. One question from the DA was used to ascertain whether a weapon was ever used to threaten or assault ("Has your partner ever used a weapon or threatened you with a weapon?"). Another question from the CTS-2 determined the type of weapon used to threaten or assault the victim (knife, gun). An affirmative response to either or both of these latter questions was coded as positive for weapon threat/use.

Sexual abuse/coercion was assessed with two items from the CTS-2: "Your partner made you have sex without a condom" and "Your partner insisted on sex when you did not want to (but did not use force)." Sexual assault was defined as an affirmative response to one of the following two items: "Your partner used force (like hitting you, holding you down, or using a weapon) to make you have sex" (Straus et al., 1996) and "Has your partner ever forced you into sex when you did

not wish to do so?" (Campbell et al., 2003). Data were categorized into one three-level variable: the participant did not report experiencing any sexual abuse/coercion or sexual assault/rape, the participant experienced only sexual abuse/coercion, and the participant experienced sexual assault/rape. Participants who reported that their partner had raped them and were coded as such may have had a partner who also sexually abused/coerced them.

Additional risk factors for homicide were assessed via questions from the DA (Campbell et al., 2003; Campbell et al., 2009; Messing & Thaller, 2013). The following individual items from the DA were used: "Has your partner avoided being arrested for domestic violence?", "Has the physical violence increased in frequency or severity over the past year?", and "Do you believe that your partner is capable of killing you?"

Injury related to violence perpetrated by an intimate partner was assessed by asking whether the participant had ever "suffered a miscarriage" (Straus et al., 1996), "lost consciousness due to a head injury," "lost consciousness due to your partner choking you," and/or sought medical care for injuries owing to abuse (Campbell, O'Sullivan, Roehl, & Webster, 2005).

Feelings of powerlessness were assessed by a question from the Women's Experience of Battering Scale (Smith, Earp, & DeVellis, 1995). Participants indicated disagreement or agreement with the statement: My partner "makes me feel like I have no control over my life, no power, no protection."

#### *Analysis*

Univariate statistics describe the sample. Multinomial logistic regression analysis was used to determine the strength of association between independent variables and strangulation (attempted strangulation, completed strangulation, and multiple strangulation) when compared with no strangulation. Independent variables associated with strangulation at the  $p < .10$  level in bivariate analyses were considered for inclusion in the final model. Given prior research demonstrating associations between IPV and age (Black et al., 2011), relationship status (Coker, Smith, McKeown, & King, 2000), education and employment (Smith, Thornton, DeVellis, Earp, & Coker, 2002), these variables were retained in the final model as control variables, along with intervention group status. Other variables included in the final model were those significant at the  $p < .05$  level. Relative risk ratios were calculated to describe the association between injury, risk factors for homicide on the DA, and other forms of IPV with the four levels of strangulation. Binary logistic regression was used to assess the strength of association of multiple strangulation with unconsciousness (Long & Freese, 2014). We also examined the association between strangulation and a linear DA score calculated without the risk factor of attempted strangulation (Campbell et al., 2009).

#### *Results*

The sample is described in Table 1. Participants in this sample reported risk factors for homicide, including 57.44% of participants who reported an increase in the frequency and/or severity of violence, 67.16% who reported that their partner had avoided arrest for domestic violence, 33.33% who reported being threatened or assaulted with a weapon, and 58.22% who reported a belief that their partner is capable of killing them. Women also reported severe violence by their abusive partners, including being beaten up (63.39%), sexual abuse (17.66%), and/or sexual

**Table 1**  
Participant, Relationship, and Violence Characteristics (n = 1,008)

Variables	n (%) or Mean ± SD
Age (y)	32.32 ± 9.84
Race/ethnicity	
White	370 (36.71)
African American	319 (31.65)
Native American	133 (13.19)
Latina	91 (9.03)
Multiracial	31 (3.08)
Other	64 (6.35)
Legal marital status	
Single	606 (60.12)
Married	243 (24.11)
Separated/divorced	159 (15.77)
Partner living with participant	
Yes	206 (20.44)
Children	
None	300 (29.76)
Children not with perpetrator	229 (22.72)
Children with perpetrator	479 (47.52)
Education	
Less than a high school degree	230 (22.82)
High school graduate or higher	778 (77.18)
Victim employed part or full time (yes)	417 (41.37)
Frequency/severity of physical violence has increased (yes)	579 (57.44)
Partner has avoided arrest for domestic violence (yes)	677 (67.16)
Partner has used a weapon to abuse or threaten participant (yes)	336 (33.33)
Partner has beat up participant (yes)	639 (63.39)
Partner has perpetrated sexual violence	
None	533 (52.88)
Sexual abuse/coercion	178 (17.66)
Sexual assault/rape	297 (29.46)
Participant believes partner is capable of killing her (yes)	588 (58.33)
Participant suffered a miscarriage owing to violence (yes)	80 (7.94)
Lost consciousness for more than an hour owing to a head injury (yes)	39 (3.87)
Feel powerless (yes)	615 (61.01)
Strangulation	
None	205 (20.34)
Attempted strangulation	118 (11.71)
Strangulation	304 (30.16)
Multiple strangulation	381 (37.80)

assault (29.46%). Severe injuries owing to abuse—such as suffering a miscarriage owing to violence (7.94%) and losing consciousness owing to a head injury (3.87%)—were also reported by the women in this sample. A majority of women (61.01%) reported feeling powerless in their relationship with their abusive partners.

Among participants, 803 (79.66%) reported some form of strangulation: 118 (11.70%) reported attempted strangulation, 304 (30.16%) reported completed strangulation, and 381 (37.80%) reported multiple strangulation (see Table 1). Results of the multinomial logistic regression are shown in Table 2. Women who had been victimized by completed strangulation were more likely to report having children in common with their abusive partner (adjusted relative risk ratio [ARR], 1.46), that their partner had avoided arrest for IPV (ARR, 2.15), and that their partner had sexually abused/coerced them (ARR, 2.09). African American women in this sample had higher relative risk of attempted strangulation (ARR, 2.02), completed strangulation (ARR, 1.79), and multiple strangulation (ARR, 2.62) when compared with White women. Small cell sizes among other racial/ethnic groups, with the number of participants per cell ranging from 3 to 38, may have impacted our ability to detect differences between groups.

Women in all strangulation groups were significantly more likely to be sexually assaulted (ARR, 2.48–2.99) by their intimate partners than women who had not been strangled. Women who were victimized by completed strangulation or multiple strangulation were more likely than women who were not strangled to have a partner who had abused or threatened them with a weapon and “beat them up.”

Multiple strangulation survivors were more likely than those not strangled to report that their partner's violence had increased in severity or frequency over the past year (ARR, 2.05), their partner was capable of killing them (ARR, 1.81), they had suffered a miscarriage owing to abuse (ARR, 2.95), they had lost consciousness for more than 1 hour owing to head injury (ARR, 5.08), and they felt powerless (ARR, 2.62).

Table 3 presents the results of the logistic regression examining associations with loss of consciousness owing to strangulation among women whose partners had completed one strangulation or strangled them multiple times. Compared with women who had not lost consciousness owing to strangulation, women who lost consciousness owing to strangulation were more likely to have been strangled multiple times (adjusted odds ratio [AOR], 2.90), and were more likely to seek medical care owing to IPV (AOR, 2.19; Table 3). In addition, Native American women were more likely than White women to report loss of consciousness owing to strangulation (AOR, 1.72).

Given the association with homicide risk presented, the relationship between DA score (after removing attempted strangulation; range, 0–35; with higher numbers indicating increased risk) and strangulation was assessed using an ANOVA ( $F = 66.59$  [ $df = 3$ ];  $p < .001$ ; see Table 4). Participants who reported attempted strangulation had a significantly higher average DA score (13.72) than participants who reported no strangulation (11.38), and those who reported multiple strangulation had a significantly higher average DA score (19.56) than participants who reported completed strangulation (15.33). There was no difference in average DA score between participants who reported attempted strangulation and those who reported completed strangulation.

## Discussion

This study adds to the science on IPV strangulation by examining factors associated with attempted strangulation, completed strangulation, and multiple strangulation as well as strangulation to unconsciousness among a large sample of community-dwelling women who were recruited through contact with police for IPV. The high rates of strangulation in this sample, with 67.96% of the women reporting completed or multiple IPV strangulation (and an additional 11.70% reporting attempted strangulation), is similar to the prevalence found in a small study of women from two domestic violence shelters (Wilbur et al., 2001), but higher than the prevalence of strangulation (43%–45%) among a sample of urban women who were either killed or nearly killed by their intimate partners (Glass et al., 2008) and much higher than strangulation identified by police (e.g., 11.5% in Pritchard, Reckdenwald, Nordham, & Holton, 2016). Multiple strangulation prevalence has seldom been reported, and the high prevalence (37.80%) found here is particularly noteworthy given our finding of increased homicide risk in this group and because of the health implications for women experiencing repeated strangulation (Campbell et al., 2017; Kwako et al., 2011).

It is important that women's health practitioners be alert for nonfatal strangulation by a partner because of its importance as a

**Table 2**  
Multinomial Logistic Regression Examining Attempted Strangulation, Completed Strangulation, and Multiple Strangulation (n = 1,008)

Variables	Attempted Strangulation (n = 118) ARR (95% CI)	Completed Strangulation (n = 304) ARR (95% CI)	Multiple Strangulation (n = 381) ARR (95% CI)
Age (y), linear	1.00 (0.97-1.03)	1.02 (1.00-1.04)	0.98 (0.96-1.01)
Race/ethnicity			
White	Referent	Referent	Referent
African American	2.02 (1.13-3.62)*	1.79 (1.11-2.89)*	2.62 (1.59-4.31)***
Native American	1.08 (0.51-2.26)	1.22 (0.68-2.19)	0.80 (0.43-1.52)
Latina	1.02 (0.44-2.38)	1.16 (0.59-2.28)	0.80 (0.39-1.67)
Multiracial	1.71 (0.19-15.5)	1.52 (0.26-8.80)	0.58 (0.09-3.85)
Other	1.50 (0.36-6.26)	2.32 (0.72-7.41)	2.96 (0.86-10.2)
Legal marital status			
Single	Referent	Referent	Referent
Married	0.70 (0.37-1.30)	0.94 (0.57-1.53)	0.86 (0.52-1.33)
Separated/divorced	0.73 (0.35-1.53)	0.88 (0.50-1.54)	0.62 (0.34-1.14)
Partner living with participant (yes)	1.31 (0.72-2.39)	1.19 (0.73-1.94)	1.34 (0.79-2.27)
Children			
None	Referent	Referent	Referent
Children not with perpetrator	0.98 (0.48-1.99)	1.47 (0.83-2.61)	1.56 (0.87-2.79)
Children with perpetrator	1.21 (0.66-2.24)	2.15 (1.29-3.57)**	1.23 (0.73-2.07)
Education			
Less than high school grad	Referent	Referent	Referent
High school graduate or more	1.08 (0.59-2.00)	1.08 (0.65-1.80)	0.64 (0.38-1.08)
Victim employed part or full time (yes)	0.68 (0.41-1.11)	1.00 (0.67-1.50)	0.76 (0.49-1.16)
Partner has avoided arrest for domestic violence (yes)	0.97 (0.58-1.62)	1.60 (1.06-2.43)*	1.41 (0.91-2.20)
Increase in severity/frequency of violence (yes)	0.79 (0.47-1.35)	0.84 (0.55-1.27)	2.05 (1.31-3.22)**
Participant believes partner is capable of killing her (yes)	1.29 (0.75-2.23)	1.42 (0.92-2.19)	1.81 (1.15-2.84)*
Partner has used a weapon to abuse or threaten participant (yes)	1.69 (0.88-3.24)	1.97 (1.16-3.36)*	2.57 (1.51-4.37)***
Partner has beat up participant (yes)	1.14 (0.67-1.92)	3.13 (2.06-4.75)**	4.30 (2.75-6.74)***
Partner has perpetrated sexual violence			
None	Referent	Referent	Referent
Sexual abuse/coercion	1.71 (0.83-3.54)	2.09 (1.18-3.70)*	1.80 (0.99-3.26)
Sexual assault/rape	2.59 (1.30-5.16)**	2.48 (1.39-4.42)**	2.99 (1.68-5.32)***
Participant has had a miscarriage owing to violence (yes)		1.40 (0.49-4.06)	2.95 (1.06-8.23)*
Loss of consciousness owing to head injury (yes)	2.10 (0.32-13.9)	1.63 (0.31-8.50)	5.08 (1.06-24.3)*
Participant feels like they have no power (yes)	1.22 (0.71-2.10)	1.41 (0.92-2.17)	2.62 (1.66-4.13)***

Abbreviation: ARR, adjusted relative risk ratio.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

risk factor for future homicide by that partner as well as other health consequences for the victim. Of women who reported completed or multiple strangulation, 26.57% reported loss of

**Table 3**  
Logistic Regression Examining Loss of Consciousness Owing to Strangulation Among Those Strangled Once and Multiple Times (n = 677)

Variables	Adjusted Odds Ratio (95% Confidence Interval)
Age (y), linear	0.99 (0.97-1.01)
Race/ethnicity	
White	Referent
African American	0.78 (0.51-1.18)
Native American	1.72 (1.02-2.93)*
Latina	1.24 (0.64-2.42)
Multiracial	0.28 (0.06-1.33)
Other	1.06 (0.40-2.80)
Legal marital status	
Single	Referent
Married	0.68 (0.42-1.09)
Separated/divorced	1.13 (0.66-1.94)
Partner living with participant (yes)	1.08 (0.67-1.74)
Education	
Less than high school graduate	Referent
High school graduate or more	0.99 (0.64-1.53)
Victim employed part or full time (yes)	0.96 (0.65-1.42)
Partner has strangled participant multiple times (yes)	2.90 (1.96-4.30)***
Participant sought medical care owing to IPV (yes)	2.19 (1.48-3.24)***

Abbreviation: IPV, intimate partner violence.

\* $p < .05$ , \*\*\* $p < .001$ .

consciousness owing to strangulation. Furthermore, women in this sample who reported multiple strangulation had 2.9 times greater odds of reporting loss of consciousness owing to strangulation than those who reported completed strangulation, with 15.46% of women who reported completed strangulation and 35.43% of women who reported multiple strangulation indicating that they had lost consciousness owing to strangulation. Multiple strangulation was also associated with other important injuries such as having suffered a miscarriage owing to abuse and having experienced loss of consciousness for more than 1 hour owing to head injury. Although it is unclear whether these injuries were directly due to strangulation, these associations clearly support the seriousness of an abusive relationship characterized by multiple strangulation and an urgent need for comprehensive health care and follow-up for women thus victimized.

In bivariate analyses, as the severity of strangulation incidents increases, so does the likelihood of the survivor seeking medical treatment for IPV-related injuries. Indeed, 29.92% of multiple strangulation survivors, 21.38% of completed strangulation

**Table 4**  
One-way Analysis of Variance of Strangulation by Danger Assessment (DA) score

Source	df	SS	MS	F	p
Between groups	3	9949.90	3316.63	66.59	.00
Within groups	1003	50006.65	49.81		
Total	1007	59956.55			

survivors, 13.56% of attempted strangulation survivors, and 8.78% of women who had not been strangled reported doctor/nurse visits. This is consistent with previous research that has found medical treatment after intimate partner nonfatal strangulation ranges from 5% to 40% (Smith et al., 2001; Strack et al., 2001; Wilbur et al., 2001). Although medical treatment and levels of strangulation are associated in bivariate analyses, they were not associated in the multinomial logistic regression model. This lack of association is likely because the question regarding medical treatment is not specific to treatment for strangulation and there are confounding associations between levels of strangulation, severe forms of violence, and IPV injury. Because women who are strangled also experience other severe forms of violence and injury, they are seeking medical care, but perhaps not specifically owing to strangulation. Women's health practitioners in all care settings should assess for IPV routinely (especially among women presenting with an injury); it is additionally important that care providers assess for strangulation among those identified as IPV survivors to adequately treat all their health conditions (Houry et al., 2008; Schulman & Hohler, 2012).

Previous research has indicated that attempted strangulation is a risk factor for homicide (Campbell et al., 2003; Glass et al., 2008). Although more research is needed, given the significant association between multiple strangulation and known homicide risk factors, this study provides preliminary evidence that multiple strangulation is more predictive of IPV homicide than attempted strangulation. Considering the variables associated with multiple strangulation in this sample—severe injury, sexual assault, an increase in the frequency and severity of violence, beatings, threats with a deadly weapon, the victim's assertion of powerlessness, and her belief that her partner is capable of killing her—as a constellation of abusive and controlling acts as opposed to individual indicators of violence (Myhill & Hohl, 2016), the web of abuse that characterizes the cases of multiple strangulation suggests heightened homicide risk. Future research should seek to determine the differential impact of attempted strangulation, strangulation and multiple strangulation on women's risk for IPV homicide, with consideration given to adding multiple strangulation for additional weighting on IPV risk and lethality assessments such as the DA (Messing, Campbell, & Snider, 2017).

### Limitations

Although multiple queries about strangulation were included in this study, measures of strangulation that are more specific, precise, incident based, and detailed would have provided additional important information. Future research should examine multiple strangulation within and across incidents and with former partners, examine associations between loss of consciousness and medical care specific to strangulation events, and use a calendar to examine the frequency of multiple strangulation. Longitudinal studies are needed to understand whether attempted strangulation, completed strangulation, and multiple strangulation are part of a progression of violence or distinct and perpetrator specific.

The sample, although large, is not representative. Women were recruited from seven police departments in a single state in the Southwestern United States due to IPV, yet many IPV survivors never come into contact with the criminal justice system. Researchers were unable to contact 48.34% of referred women, and those IPV survivors choosing to participate in the research may have been different than those choosing not to participate. Although there was some racial/ethnic diversity in the sample,

small cell counts among some groups may have made it difficult to detect differences between groups.

### Implications for Policy and/or Practice

These data suggest that first responders, health care professionals, advocates, and other practitioners who serve survivors of IPV should have strangulation protocols (Bergin & Berkowitz, 2012; Brink, 2009; Faugno, Waszak, Strack, Brooks, & Gwinn, 2013; McClane, Strack, & Hawley, 2001). Women's health practitioners should screen for strangulation using terms that survivors understand, such as "choked," "blacked out," "jacked-up," or "choked-off" (Bergin & Berkowitz, 2012; Joshi et al., 2012). Because of imprecise definitions and understandings of strangulation, screening questions framed behaviorally or according to the strangulation mechanism and not the modality of the injury may elicit better information (e.g., "Did the offender press against your throat until you couldn't breathe or until you passed out?") (Faugno, et al., 2013; Pritchard et al., 2015). Health care practitioners should have a high index of suspicion for strangulation in women presenting with neurological symptoms, memory problems, difficulty concentrating, seizures, or stroke symptoms. Screening questions must be specific (Purvin, 1997), and should include number of strangulations in the same incident as well as in other incidents with present and past partners. Given the association between multiple strangulation and loss of consciousness found in this sample, practitioners should also ask about loss of consciousness and loss of bladder and/or bowel function (Faugno et al., 2013). Affirmative responses to these questions may indicate more extreme homicide risk, a greater need for victim-centered risk-informed safety interventions, and additional assessment by a health care professional for the immediate and long term effects of strangulation. Head, neck, and facial injuries should be considered markers for violence that need additional assessment for diagnosis, precise legal documentation, and targeted prevention services (Brink, 2009; Faugno et al., 2013; Perciaccante et al., 1999; Wu, Huff & Bhandari, 2010).

Survivors of strangulation, particularly those strangled to unconsciousness or strangled multiple times within the last 24 to 48 hours, must be rapidly evaluated for evolving sequelae such as airway compromise. Practitioners are also cautioned that minor or no signs of IPV injuries on the neck do not mean that strangulation has not occurred or that there are not serious internal injuries (McClane et al., 2001; Faugno et al., 2013). The use of an alternative light source (Holbrook & Jackson, 2013) and imaging (Christe et al., 2009; McClane et al., 2001; Yen et al., 2005) to detect soft tissue, vascular, and neurological damage, and delayed responses (such as blood-brain barrier damage) has been recommended, although more study is needed to support a specific protocol for IPV strangulation. The findings of this study that African American women are at higher risk for all measured forms of strangulation and Native American women are at higher risk for loss of consciousness owing to strangulation, combined with the difficulty identifying external signs of strangulation on dark skin, makes it imperative that appropriate screening is conducted and forensic exams with proper technology are used to identify injury.

### Conclusions

Strangulation, and particularly multiple strangulation, is an emerging acute health care system issue of extreme importance

given the number of IPV survivors affected in this sample, the potential lethality of the act, and the association with the most severe forms of IPV and risk for homicide. Women seeking health care for injuries owing to IPV may not disclose strangulation; thus, women's health care practitioners must screen for IPV, strangulation, and homicide risk to treat injuries and enhance the safety of IPV survivors. The use of an instrument such as the DA-5 with an accompanying strangulation protocol has the potential to save the lives of IPV survivors through identification, treatment, and prevention of strangulation (Messing, Campbell & Snyder, 2017). Women's health practitioners are optimally positioned to identify subtle signs and symptoms of strangulation, help women understand delayed sequelae and potential future fatality associated with strangulation, and connect them with appropriate resources to reduce risk of morbidity and mortality in this vulnerable population.

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