

Examining Physical and Sexual Abuse Histories as Correlates of Suicide Risk Among Firefighters

Melanie A. Hom, Natalie L. Matheny, Ian H. Stanley, Megan L. Rogers, Jesse R. Cogle,
and Thomas E. Joiner

Department of Psychology, Florida State University, Tallahassee, Florida, USA

Research indicates that physical and sexual abuse are associated with increased suicide risk; however, these associations have not been investigated among firefighters—an occupational group that has been shown to be at elevated suicide risk. This study examined whether physical and sexual abuse histories are associated with (a) career suicide ideation, plans, and attempts; and (b) current suicide risk (controlling for theoretically relevant symptoms) in this occupational group. A sample of 929 U.S. firefighters completed self-report surveys that assessed lifetime history of physical and sexual abuse; career suicide ideation, plans, and attempts; current suicide risk; and theoretically relevant symptoms. Logistic regression analyses revealed that individuals who reported a history of physical abuse were significantly more likely to report career suicide ideation, adjusted odds ratio [AOR] = 6.12, plans, AOR = 13.05, and attempts, AOR = 23.81, than those who did not. A similar pattern of findings emerged for individuals who reported a sexual abuse history, AORs = 7.83, 18.35, and 29.58 respectively. Linear regression analyses revealed that physical and sexual abuse histories each significantly predicted current suicide risk, even after controlling for theoretically relevant symptoms and demographics, $pr^2 = .07$ and $.06$, respectively. Firefighters with a history of physical and/or sexual abuse may be at increased risk for suicidal thoughts and behaviors. A history of physical and sexual abuse were each significantly correlated with current suicide risk in this population, even after accounting for the effects of theoretically relevant symptoms. Thus, when conceptualizing suicide risk among firefighters, factors not necessarily related to one's firefighter career should be considered.

Research suggests that firefighters are an occupational group at increased suicide risk (Stanley, Hom, & Joiner, 2016). Thus, efforts to understand and, in turn, prevent suicide within the fire service are critical. One way to achieve this goal is to identify factors associated with increased suicide risk in this group. Thus far, the following risk correlates have been identified among firefighters: low social support (Carpenter et al., 2015), elevated depression symptoms (Martin, Tran, & Buser, 2016), elevated posttraumatic stress disorder (PTSD) symptoms (Boffa et al., 2017), and sleep disturbances (de Barros, Martins, Saitz, Bastos, & Ronzani, 2012). Theoretical frameworks—specifically, the interpersonal theory of suicide (Joiner, 2005;

Van Orden et al., 2010)—have also guided risk correlate identification among firefighters. This theory posits that suicidal desire emerges when social disconnection (cf. thwarted belongingness) and feelings of being a burden (cf. perceived burdensomeness) are viewed as intractable. Near-lethal and lethal suicide attempts are posited to occur when individuals additionally have the capability for suicide (i.e., fearlessness about death and elevated physical pain tolerance). Firefighters, in particular, may demonstrate elevated capability for suicide, as it develops in part through exposure to painful and provocative events. Such exposure is inherent to the firefighter occupation (e.g., responding to fatalities; Kimbrel et al., 2016; Stanley, Hom, Hagan, & Joiner, 2015). Indeed, a study of 863 U.S. firefighters found support for the propositions of the interpersonal theory (Chu, Buchman-Schmitt, Hom, Stanley, & Joiner, 2016), underscoring its constructs as risk indicators in this group.

Though research has examined factors that contribute to increased suicide risk among firefighters, several domains remain unexplored. One such domain is physical and sexual abuse, which has demonstrated strong associations with suicide risk in the general population. For example, in a meta-analysis of studies investigating suicide risk factors, Franklin and colleagues (2017) identified an abuse history of any kind as a top-five predictor of suicidal ideation. Meta-analytic studies have also identified childhood physical (Norman et al., 2012) and sexual

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Correspondence concerning this article should be addressed to Melanie A. Hom, Department of Psychology, Florida State University, 1107 West Call Street, Tallahassee, FL 32306-4301. E-mail: hom@psy.fsu.edu

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(Devries et al., 2014) abuse as key signals of risk for suicide attempts. Importantly, the impact of childhood physical and sexual abuse on suicide risk appears to extend to midlife (Stansfeld et al., 2016), and abuse in adulthood may similarly contribute to increased suicide risk (Tiet, Finney, & Moos, 2006). Physical and violent sexual abuse experiences, specifically, appear to be robust risk factors for suicidal behaviors (Bruffaerts et al., 2010; Joiner et al., 2007). Per the interpersonal theory, physical and violent sexual abuse may confer suicide risk by increasing an individual's fearlessness about death and pain tolerance (Joiner et al., 2007). Given the importance of understanding the transition from suicide ideation to attempts (Klonsky & May, 2014; Nock, Kessler, & Franklin, 2016), examination of abuse as a factor that may uniquely predict suicide attempts is critical. Together, physical and sexual abuse warrant further investigation among firefighters, a group at elevated risk for suicide.

Finally, it is worth noting that there are several pathways by which abuse may confer suicide risk, including through psychiatric symptoms empirically linked to suicide risk. For example, research has found that the link between childhood sexual abuse and suicidal thoughts and behaviors is attenuated when considering the effects of depression and PTSD (Bedi et al., 2011). Fuller-Thomson, Baird, Dhrodia, and Brennenstuhl (2016) found that depression, anxiety, and substance abuse mediated the relationship between adverse childhood experiences and lifetime suicide attempts. Other theoretically relevant symptoms may also explain the association between abuse and suicidality; thus, in studying mechanisms that underlie this association in firefighters, it is useful to consider symptoms linked to abuse and suicide, including depression (Brown, Cohen, Johnson, & Smailes, 1999; Franklin et al., 2017), insomnia (Bader, Schafer, Schenkel, Nissen, & Schwander, 2007; Bernert, Kim, Iwata, & Perlis, 2015), PTSD (Brewin, Andrews, & Valentine, 2000; Cougle, Keough, Riccardi, & Sachs-Ericsson, 2009), and interpersonal theory constructs (Van Orden et al., 2010).

Although physical and sexual abuse have been identified as predictors of suicidality across populations, we are not aware of any studies that had examined these relationships among firefighters—a group at elevated suicide risk. Utilizing a sample of current and retired U.S. firefighters, this study aimed to (a) compare rates of career suicide ideation, plans, and attempts among firefighters with and without a history of physical and/or sexual abuse; and (b) evaluate whether a history of physical and sexual abuse each predicted current suicide risk, even after controlling for symptoms that might account for this relationship. We hypothesized that rates of career suicide ideation, plans, and attempts would be significantly higher among study participants with a physical and/or sexual abuse history. Given prior work, we hypothesized that physical and sexual abuse would not predict current suicide risk when accounting for theoretically relevant symptoms. As an exploratory aim, considering a growing interest in understanding the transition from suicide ideation to attempts (Klonsky & May, 2014; Nock et al., 2016), we examined whether abuse history differentiated who among

those with a history of career suicide ideation also reported a career attempt history. Finally, we examined whether theoretically relevant symptoms accounted for the association between abuse history and current suicide risk.

Method

Participants

Participants were 929 current ($n = 834, 89.8\%$) and retired ($n = 95, 10.2\%$) firefighters who completed a nationwide web-based survey of behavioral health. The sample was 91.5% male and ranged in age from 18 to 82 years ($M = 38.93, SD = 11.62$). In terms of race/ethnicity, 88.1% identified as White/Caucasian, 7.3% Native American/Alaska Native, and 4.6% Other. Participants reported an average of 12.60 years of service as a firefighter ($SD = 8.60, \text{range} = 0.5 \text{ to } 30.0$). Because this study examined lifetime abuse in association with career suicidality in a sample with similar occupational experiences, both current and retired firefighters were included.

Procedure

Data for this study were obtained as part of a larger investigation of firefighter behavioral health ($N = 1,027$; Stanley et al., 2015). Participants were primarily recruited via e-mail lists and social media outlets (e.g., Facebook pages) maintained by the National Fallen Firefighters Foundation, with study advertisements further shared and reposted by other fire service organizations and individuals. Informed consent was obtained electronically prior to study enrollment. All participants completed a 30-min battery of questionnaires via a secure electronic survey platform. After survey completion, participants were presented with a debriefing form that included information for national resources. Participants had the option to request a \$10 electronic gift card as compensation. The Florida State University Institutional Review Board approved this study. Of note, additional articles focused on other psychiatric symptoms clusters have been published using these data (see Chu et al., 2016; Chu et al., 2017; Boffa et al., 2017; Hom et al., 2016; Stanley, Boffa, Hom, Kimbrel, & Joiner, 2017).

Measures

Painful and Provocative Events Scale (PPES; Bender, Gordon, Bresin, & Joiner, 2011). This 26-item measure assesses the frequency with which the respondent has encountered painful or provocative events. Items 6 (“Have you been a victim of physical abuse?”) and 7 (“Have you been a victim of sexual abuse?”) were used to assess lifetime physical and sexual abuse history, respectively. Participants were given five response options: *never*, *once*, *2–3 times*, *4–20 times*, and *more than 20 times*. Because PPES individual items are not designed for use as linear scales, responses were dichotomized to test the study's primary aims, with responses of *never* coded as *no abuse history* and all other responses coded as *abuse history*

present. The PPES's total score has demonstrated adequate internal consistency and reliability (Bender et al., 2011).

Self-Injurious Thoughts and Behaviors Interview–Short Form (SITBI-SF; Nock, Holmberg, Photos, & Michel, 2007). The SITBI-SF is a 72-item clinician-administered interview that assesses details regarding the presence, timing, and nature of past suicidal thoughts and behaviors. Similar to previous studies (e.g., Zetterqvist, Lundh, Dahlström, & Svedin, 2013), the SITBI-SF was modified for use as a self-report measure. Three of the 72 SITBI-SF questions that assess the presence or absence of lifetime suicide ideation, plans, and attempts were modified to instead obtain information regarding the presence or absence of career suicide ideation, plans, and attempts. The SITBI-SF's item scores have demonstrated strong psychometric properties, including high test-retest reliability (Nock et al., 2007).

Suicidal Behaviors Questionnaire (SBQ-R; Osman et al., 2001). The SBQ-R is a 4-item self-report measure that assesses *current* suicide risk and proneness based on lifetime suicide ideation and attempts, past-year suicidal ideation frequency, suicide attempt threats, and self-reported likelihood of future suicidal behavior. Total scores range from 3 to 18, and scores ≥ 7 signal current clinically significant suicide risk. Research supports the SBQ-R total score's psychometric properties (Osman et al., 2001), and the internal consistency of the SBQ-R's total score in this study was good (Cronbach's $\alpha = .83$). In this study, the SBQ-R was utilized as a measure of current suicide risk rather suicidality history.

Acquired Capability for Suicide Scale–Fearlessness About Death (ACSS-FAD; Ribeiro et al., 2014). The ACSS-FAD is a 7-item self-report measure of individuals' perceived fearlessness about death. Items are rated on a 5-point Likert scale (0 = *not at all like me*, 4 = *very much like me*), with higher scores indicating greater fearlessness about death and total scores ranging from 0 to 28. The ACSS-FAD's total score has demonstrated strong psychometric properties (Ribeiro et al., 2014). The internal consistency of the ACSS-FAD's total score was questionable for the present study (Cronbach's $\alpha = .69$).

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item self-report measure that assesses depression symptom severity. Individuals rate how frequently they have experienced various depression symptoms in the past week on a 4-point Likert scale. Total scores range from 0 to 60, with higher scores indicating more severe depression symptoms and a total score ≥ 16 indicating clinical significance. The CES-D's total score has been shown to have strong psychometric properties (Devins et al., 1988; Hann, Winter, & Jacobsen, 1999; Radloff, 1977), and the CES-D's total score demonstrated good internal consistency in this study (Cronbach's $\alpha = .82$).

Interpersonal Needs Questionnaire (INQ-15; Van Orden, Cukrowicz, Witte, & Joiner, 2012). The INQ-15 is a 15-item self-report measure of thwarted belongingness (INQ-TB; 9 items) and perceived burdensomeness (INQ-PB; 6 items). Items are rated on a 7-point Likert scale from 1 (*not at all true for me*) to 7 (*very true for me*), with higher scores reflecting greater thwarted belongingness (range: 9 to 63) and perceived burdensomeness (range: 6 to 42). The INQ-15's subscale scores have shown strong psychometric properties (Van Orden et al., 2012), and the INQ-15's subscale scores demonstrated excellent internal consistency in this study (INQ-TB: Cronbach's $\alpha = .91$; INQ-PB: Cronbach's $\alpha = .97$).

Insomnia Severity Index (ISI; Bastien, Vallières, & Morin, 2001). The ISI is a 7-item self-report measure of insomnia symptom severity. Individuals rate the severity of various sleep complaints on a 0 to 4 scale. Higher scores reflect more severe insomnia symptoms (range: 0 to 28), and total scores ≥ 10 indicate clinically significant insomnia symptoms. The ISI's total score has demonstrated strong psychometric properties (Bastien et al., 2001; Morin, Belleville, Bélanger, & Ivers, 2011), and the ISI total score's internal consistency was excellent in the current sample (Cronbach's $\alpha = .91$).

PTSD Checklist–Civilian Version (PCL-C; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). The PCL-C is a 17-item measure of posttraumatic stress symptom severity. Items are rated on a Likert scale from 1 (*not at all*) to 5 (*extremely*), with higher scores signaling more severe symptoms (range: 17 to 85). A total score ≥ 39 has been identified as the cutoff for probable PTSD diagnosis among firefighters (Chiu et al., 2011). The PCL-C's total score has demonstrated strong psychometric properties (Blanchard et al., 1996), and its total score's internal consistency was excellent in this study (Cronbach's $\alpha = .95$).

Data Analysis

Of the original sample ($N = 1,027$), data were missing for 15.8% of cases. Missing data for symptom measures were addressed using multiple imputation (10 imputations), allowing for the inclusion of an additional 6.2% of cases. Missing data could not be imputed for the PPES abuse history items because they were used as dichotomous variables, and the rounding of imputed variables yields biased results (Allison, 2005). Thus, a remaining 9.6% of cases were excluded based on listwise deletion. Descriptive statistics were utilized to characterize the sample. Then, a series of logistic regression analyses was used to examine whether a PPES history of physical abuse was associated with an increased likelihood of reporting SITBI-SF career suicide ideation, plans, and attempts, controlling for demographic variables (i.e., sex, race/ethnicity, age, years of service, and current firefighter status). The same analytic strategy was used

Table 1
Means, Standard Deviations, and Intercorrelations of Self-Report Measures

Self-Report Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. ACSS-FAD	—	-.08*	-.03	-.07*	-.08*	-.07*	-.01	-.03	-.05	-.10**	-.03	-.06
2. CES-D		—	.75**	.75**	.70**	.85**	.70**	.53**	.53**	.51**	.42**	.43**
3. INQ-PB			—	.56**	.49**	.74**	.76**	.51**	.71**	.72**	.50**	.53**
4. INQ-TB				—	.52**	.65**	.57**	.44**	.37**	.32**	.33**	.30**
5. ISI					—	.72**	.46**	.43**	.32**	.32**	.34**	.30**
6. PCL-C						—	.67**	.53**	.56**	.54**	.47**	.45**
7. SBQ-R							—	.74**	.73**	.68**	.53**	.53**
8. SITBI-SF ideation ^a								—	.50**	.44**	.40**	.39**
9. SITBI-SF plans ^a									—	.78**	.48**	.55**
10. SITBI-SF attempts ^a										—	.48**	.56**
11. PPES physical abuse ^a											—	.58**
12. PPES sexual abuse ^a												—
<i>M</i>	16.83	15.22	10.38	24.15	10.13	34.16	5.84	0.46	0.18	0.15	0.33	0.25
<i>SD</i>	5.27	12.02	7.92	12.60	6.37	15.28	3.06	0.50	0.39	0.35	0.47	0.43
Minimum	3	0	6	9	0	17	3	0	0	0	0	0
Maximum	28	55	42	62	28	85	18	1	1	1	1	1

Note. ACSS-FAD = Acquired Capability for Suicide Scale–Fearlessness About Death; CES-D = Center for Epidemiologic Studies Depression Scale; INQ-PB = Interpersonal Needs Questionnaire–Perceived Burdensomeness Subscale; INQ-TB = Interpersonal Needs Questionnaire–Thwarted Belongingness Subscale; ISI = Insomnia Severity Index; PCL-C = PTSD Check List–Civilian Version; SBQ-R = Suicidal Behaviors Questionnaire–Revised; SITBI-SF = Self-Injurious Thoughts and Behaviors Interview–Short Form; PPES = Painful and Provocative Events Scale.

^aDichotomous, Yes = 1, No = 0.

* $p < .05$. ** $p < .01$.

to examine whether a PPES history of sexual abuse and PPES history of both physical and sexual abuse were each correlated with an increased likelihood of reporting SITBI-SF career suicide ideation, plans, and attempts. Next, multiple linear regression analyses were utilized to examine PPES physical abuse history as a predictor of SBQ-R suicide risk, controlling for theoretically relevant symptoms and demographic variables. The same analytic strategy was employed with PPES sexual abuse history as a predictor of SBQ-R suicide risk. Exploratory logistic regression analyses were conducted to examine whether, among those reporting a career history of suicidal ideation, physical and sexual abuse histories differentiated between those with and without career suicide attempts, controlling for demographic variables. Finally, two bias-corrected bootstrap mediation models (1,000 bootstrap samples) were used to examine and compare all theoretically relevant symptoms as mediators of the relationship between (a) physical abuse history and SBQ-R suicide risk and (b) sexual abuse history and SBQ-R suicide risk, controlling for demographic variables. For analyses across imputed models, variance inflation factors (VIF) were < 5 , indicating an acceptable degree of multicollinearity. Given the sample’s small proportion of females, we were underpowered to examine differences between male and female participants; further, moderation analyses examining sex as a moderator in all previously described analyses yielded nonsignificant findings ($ps = .073$ to $.442$). Analyses were conducted using SPSS version 20.

Results

Descriptive Statistics and Intercorrelations

Means, standard deviations, and intercorrelations for self-report measures are presented in Table 1. A total of 309 participants (33.3%) reported a history of physical abuse, 230 (24.8%) reported a history of sexual abuse, and 185 (19.9%) reported a history of both (see Table 2). Rates of self-reported SITBI-SF career suicide ideation, plans, and attempts were 45.9% ($n = 426$), 18.3% ($n = 170$), and 14.6% ($n = 136$), respectively. Based on established clinical cutoffs, 31.8% of participants ($n = 295$) reported clinically significant SBQ-R suicide risk, 39.1% ($n = 362$) clinically significant CES-D depression symptoms, 51.9% ($n = 482$) clinically significant ISI insomnia symptoms, and 30.4% ($n = 282$) a severity of PCL-C post-traumatic stress symptoms consistent with a probable PTSD diagnosis. Histories of physical and sexual abuse were each significantly associated with greater SBQ-R suicide risk, $r = .53, p < .001$ and $r = .53, p < .001$, respectively. SBQ-R suicide risk was also significantly associated with all self-report symptom measures, with the exception of ACSS-FAD fearlessness about death.

Physical Abuse History

Participants who reported a history of physical abuse were significantly more likely to report a history of career suicide

Table 2
History of Physical Abuse and Sexual Abuse in Association with Career Suicidality

	Ideation, Plan, or Attempt				Nagelkerke R^2	AOR ^a	95% CI
	No		Yes				
	<i>n</i>	%	<i>n</i>	%			
SUICIDE IDEATION							
Physical abuse					.23	6.12**	[4.45, 8.42]
No	423	68.2	197	31.8			
Yes	80	25.9	229	74.1			
Sexual abuse					.22	7.83**	[5.32, 11.51]
No	456	65.2	243	34.8			
Yes	47	20.4	183	79.6			
Both					.24	12.27**	[7.64, 19.71]
No	478	64.2	266	35.8			
Yes	25	13.5	160	86.5			
SUICIDE PLANS							
Physical abuse					.43	13.05**	[8.37, 20.34]
No	588	94.8	32	5.2			
Yes	171	55.3	138	44.7			
Sexual abuse					.47	18.35**	[11.72, 28.73]
No	656	93.8	43	6.2			
Yes	103	44.8	127	55.2			
Both					.51	27.41**	[16.92, 44.41]
No	697	93.7	47	6.3			
Yes	62	33.5	123	66.5			
SUICIDE ATTEMPT							
Physical abuse					.54	23.81**	[13.04, 43.48]
No	604	97.4	16	2.6			
Yes	189	61.2	120	38.8			
Sexual abuse					.57	29.58**	[16.73, 52.31]
No	676	96.7	23	3.3			
Yes	117	50.9	113	49.1			
Both					.63	51.02**	[27.75, 93.81]
No	721	96.9	23	3.1			
Yes	72	38.9	113	61.1			

Note. AOR = adjusted odds ratio; CI = confidence interval.

^aAll analyses controlled for sex, age, race/ethnicity, firefighter status, and years of service as a firefighter.

** $p < .01$.

ideation, adjusted odds ratio [AOR] = 6.12, 95% confidence interval [CI] [4.45, 8.42]; plans, AOR = 13.05, 95% CI [8.37, 20.34]; and attempts, AOR = 23.81, 95% CI [13.04, 43.48]; than those without this history, controlling for demographic variables (see Table 2). The overall regression model examining physical abuse history as a predictor of SBQ-R suicide risk, controlling for theoretically relevant symptoms and demographic variables, was significant, $F(12, 917) = 136.53$, $p < .001$, $R^2 = .65$. Physical abuse history significantly predicted more severe SBQ-R suicide risk in this model, $B = 1.21$, $SE = 0.15$, $p < .001$, $pr^2 = .07$ (see Table 3). This pattern of findings remained after controlling for sexual abuse history.

Sexual Abuse History

Participants who reported a history of sexual abuse were significantly more likely to report a history of career suicide ideation, AOR = 7.83, 95% CI [5.32, 11.51]; plans, AOR = 18.35, 95% CI [11.72, 28.73]; and attempts, AOR = 29.58, 95% CI [16.73, 52.31], than those without this history, controlling for demographic variables (see Table 2). The overall regression model examining the association between sexual abuse history and SBQ-R suicide risk, controlling for theoretically relevant symptoms and demographic variables, was significant, $F(12, 917) = 138.84$, $p < .001$, $R^2 = .64$. Sexual abuse history significantly predicted more severe SBQ-R suicide risk in this model,

Table 3

Physical Abuse and Sexual Abuse as Predictors of Suicidal Behaviors Questionnaire–Revised (SBQ-R) Current Suicide Risk, Controlling for Theoretically Relevant Symptoms

	<i>B</i>	<i>SE</i>	<i>t</i>	partial r^2
Physical abuse ($F[12, 917] = 136.53, p < .001, R^2 = .65$)				
PPES physical abuse	1.21	0.15	7.96	.07**
ACSS-FAD fearlessness about death	0.02	0.01	1.36	< .01
CES-D depression	0.05	0.01	3.79	.02**
INQ-PB perceived burdensomeness	0.18	0.01	12.88	.16**
INQ-TB thwarted belongingness	0.02	0.01	3.33	.01**
ISI insomnia	−0.03	0.02	−1.69	< .01
PCL-C posttraumatic stress	0.01	0.01	1.53	< .01
Sexual abuse ($F[12, 917] = 138.84, p < .001, R^2 = .64$)				
PPES physical abuse	1.26	0.17	7.28	.06**
ACSS-FAD fearlessness about death	0.02	0.01	1.74	< .01
CES-D depression	0.04	0.01	3.30	.01**
INQ-PB perceived burdensomeness	0.17	0.01	12.44	.15**
INQ-TB thwarted belongingness	0.03	0.01	3.79	.02**
ISI insomnia	−0.02	0.02	−1.27	< .01
PCL-C posttraumatic stress	0.02	0.01	1.94	< .01

^aNote. All analyses controlled for sex, age, race/ethnicity, firefighter status, and years of service as a firefighter. PPES = Painful and Provocative Events Scale; ACSS-FAD = Acquired Capability for Suicide Scale–Fearlessness About Death; CES-D = Center for Epidemiologic Studies Depression Scale; INQ-PB = Interpersonal Needs Questionnaire–Perceived Burdensomeness Subscale; INQ-TB = Interpersonal Needs Questionnaire–Thwarted Belongingness Subscale; ISI = Insomnia Severity Index; PCL-C = PTSD Check List–Civilian Version; SBQ-R = Suicidal Behaviors Questionnaire–Revised.

** $p < .01$.

$B = 1.26, SE = 0.17, p < .001, pr^2 = .06$ (see Table 3). This pattern of findings remained after controlling for physical abuse history.

Physical and Sexual Abuse History

Participants who reported a history of both physical and sexual abuse were significantly more likely to report a history of career suicide ideation, $AOR = 12.27, 95\% CI [7.64, 19.71]$; plans, $AOR = 27.41, 95\% CI [16.92, 44.41]$; and attempts, $AOR = 51.02, 95\% CI [27.75, 93.81]$, than those without this history, controlling for demographic variables (see Table 2).

Exploratory Analyses

Individuals reporting career suicide ideation who additionally reported a physical abuse history were significantly more likely to report a career suicide attempt than those without this history, controlling for demographics, Nagelkerke $R^2 = .54, AOR = 9.96, 95\% CI [5.03, 19.73]$. The same pattern of results emerged for sexual abuse history, Nagelkerke $R^2 = .58, AOR = 14.60, 95\% CI [7.52, 28.38]$. For mediation analyses, the following significantly accounted for the relationship between physical abuse history and SBQ-R suicide risk, as well as sexual abuse history and SBQ-R suicide risk, controlling for demographics (a bootstrapped 95% CI that does not cross zero indicates a statistically significant indirect effect): CES-D depression symptoms, 95% CIs [0.14, 0.66] and [0.11, 0.69], re-

spectively; INQ-PB perceived burdensomeness, 95% CIs [0.81, 1.33] and [0.94, 1.57], respectively; and INQ-TB thwarted belongingness, 95% CI [0.69, 0.34] and [0.09, 0.36], respectively. For both models, INQ-PB perceived burdensomeness was a significantly stronger mediator than CES-D depression symptoms, 95% CIs [−1.02, −0.30] and [0.61, 0.34], respectively; and INQ-TB thwarted belongingness, 95% CIs [0.61, 1.17] and [0.74, 1.38], respectively.

Discussion

This study examined lifetime physical and sexual abuse as correlates of suicide risk among current and retired U.S. firefighters. Firefighters who reported a physical abuse history were significantly more likely to report career suicide ideation, plans, and attempts, controlling for demographic variables. A physical abuse history also significantly predicted current suicide risk, even after controlling for theoretically relevant symptoms and demographic variables. The same pattern of findings was yielded for a history of sexual abuse.

These results are consistent with prior literature demonstrating robust associations between physical abuse history and suicide risk (Norman et al., 2012) and sexual abuse history and suicide risk (Devries et al., 2014). Notably, the extent to which abuse history was associated with suicidal thoughts and behaviors appeared to be greater for more severe forms of suicidality. That is, a physical abuse history was associated with

approximately a 6-, 13-, and 24-fold greater likelihood of reporting career suicide ideation, plans, and attempts, respectively. Similarly, for those reporting a sexual abuse history, the likelihood of reporting career ideation, plans, and attempts was approximately 8-, 18-, and 30-fold greater, respectively. The same pattern emerged for a history of both forms of abuse. These results mirror those yielded by a cross-national investigation of childhood adversities and suicide risk (Bruffaerts et al., 2010).

That our findings align with those from studies conducted in the general population is worthy of comment. Our findings may signal that firefighter status ultimately does not uniquely impact the relationship between abuse and suicidality. However, in contrast to the general population, firefighters typically undergo preenlistment screening, which results in a relatively healthy occupational group (cf. the health worker effect; Li & Sung, 1999). It might be expected, then, that firefighters would demonstrate greater resilience to the effects of abuse and that, as a result, associations between abuse history and suicide risk would be relatively weak in this group compared to those observed in the general population. Our findings, notably, suggest the opposite. Given that repeated trauma, specifically, has been shown to confer increased suicide risk (Nock & Kessler, 2006), it is possible that occupational stressors and responsibilities inherent to the firefighter occupation (i.e., repeated exposure to trauma) may exacerbate the effects of physical and sexual abuse on suicide risk in this occupational group. Further studies are needed, though, to test this conjecture and to examine whether firefighters may differ in this regard from other occupational groups that might experience exposure to trauma.

Strikingly, exploratory analyses revealed that, among firefighters in our sample with a career history of suicide ideation, abuse history predicted who had made a career suicide attempt. These findings align with the interpersonal theory (Joiner, 2005; Van Orden et al., 2010), which posits that capability for suicide confers risk for lethal and near-lethal suicidal behaviors among those with suicidal desire. These results also highlight abuse history as a potentially useful indicator of whom among those considering suicide will go on to make an attempt, a crucial area of inquiry for suicide prevention (Klonsky & May, 2014). Together, these results suggest that abuse history may serve as a useful indicator of risk among firefighters, particularly risk for more severe suicidal behaviors. Indeed, given that rates of suicide attempts in this sample were notably higher than those found within the general population (Nock et al., 2008), an identification of suicide risk factors in this occupational group is critical (Henderson, Van Hasselt, LeDuc, & Couwels, 2016). Though our cross-sectional data limit our ability to identify the temporal relationship between abuse history and career suicide risk, these findings represent an important first step in understanding the role of abuse history in conferring suicide risk among firefighters.

Also consistent with prior research, histories of physical and sexual abuse were significantly associated with a range of elevated psychiatric symptoms in our sample. Though the focus of this study was on the association between abuse history

and suicide risk, these findings suggest that firefighters with an abuse history may be at increased risk for other distressing and impairing psychiatric symptoms. Our rates of probable psychiatric disorders were higher than those found in other studies (e.g., Haslam & Mallon, 2003), which may have been a result of our recruitment strategy (i.e., description of the study as a study of suicide and behavioral health); however, in line with general population studies (Weissman et al., 2017), our findings may reflect increasing behavioral health problems among firefighters over time, given that many studies were conducted over a decade ago. A detailed discussion of the patterns of PTSD symptoms, depression symptoms, and suicidality found in this sample are provided elsewhere (Boffa et al., 2017; Chu et al., 2016; Hom et al., 2016).

It especially noteworthy, then, that physical and sexual abuse histories each predicted current suicide risk even after accounting for the effects of theoretically relevant symptoms. Depression symptoms, thwarted belongingness, and perceived burdensomeness did partially mediate the relationship between abuse history and suicide risk in our sample; however, these symptoms did not fully explain this relationship. Together with our linear regression analyses, these findings suggest that abuse history is not related to increased suicide risk simply due to its associations with depression symptoms, insomnia symptoms, PTSD symptoms, or interpersonal theory constructs. What, then, may account for the robust relationships observed between abuse history and suicide risk? According to the interpersonal theory, physical and sexual abuse may confer risk for suicide specifically by increasing an individual's fearlessness about death and elevated physical pain tolerance (Joiner, 2005; Van Orden et al., 2010). Though fearlessness about death did not mediate the relationship between abuse history and current suicide risk in this study, elevated physical pain tolerance—not assessed—may have explained this link. Indeed, pain tolerance has been found to mediate the relationship between painful and provocative events and capability for suicide (Franklin, Hessel, & Prinstein, 2011). Thus, it will be useful for future studies to examine physical pain tolerance as a mediator of the relationship between abuse history and suicide risk among firefighters. The internal consistency of the ACSS-FAD in this sample was also questionable; thus, it may not have served as a useful metric of fearlessness about death. Other factors not included in this study, such as biological processes, impulsivity, aggression, and low distress tolerance, have also been posited to explain this relationship and warrant further investigation. For instance, Sachs-Ericsson, Rushing, Stanley, and Sheffler (2016) hypothesize that childhood abuse may impact neurological development, resulting in greater physiological sensitivity to subsequent negative life events, increasing risk for suicide. They also hypothesize that abuse may yield maladaptive coping strategies, similarly resulting in increased suicide risk.

Finally, these findings underscore the importance of considering physical and sexual abuse histories in firefighter suicide prevention initiatives. Notably, unlike other painful and provocative events inherent to the firefighter occupation

(e.g., responding to fatalities), physical and sexual abuse are not specifically related to one's firefighter duties. Thus, our findings emphasize the potential salience of nonoccupational factors to suicide prevention efforts in this occupational group. Research among military personnel indicates that preenlistment factors (e.g., prior suicidal behaviors) predict postenlistment suicidal behaviors (Nock et al., 2015). Similar lines of inquiry may be useful among firefighters.

This study was not without limitations. First, only cross-sectional data were collected. To delineate the temporal relationship between abuse and suicide risk among firefighters, and fully test mediators of this relationship, prospective studies with at least three time points will be critical. Second, the PPES does not provide definitions of physical and sexual abuse, which may be operationalized differentially between individuals and may have resulted in underreporting of abuse. Additionally, only a single item was used to assess each type of abuse history. Results from past studies suggest that other abuse characteristics (e.g., age/developmental period experienced, extent of exposure, severity) may influence associations with suicide risk (Lopez-Castroman et al., 2013). Thus, per Stoltenborgh, van Ijzendoorn, Euser, and Bakermans-Kranenburg's (2011) recommendations, it may be useful to incorporate multiple behaviorally specific questions when assessing abuse history. Specifically, it will be useful to assess time since abuse to allow for a better understanding of the enduring impact of abuse and differential impacts of abuse experienced in childhood versus adulthood. Third, self-report symptom measures assessed various time frames of interest (e.g., past week versus past two weeks), which may challenge interpretability of findings. Fourth, it is recommended that other mechanisms that may account for the relationship between abuse and suicide (e.g., biological factors associated with these constructs; see Sachs-Ericsson et al., 2016, for review) be included in future studies. Fifth, several factors may have led to a biased sample (e.g., convenience sample; barriers to participation for those without internet access; exclusion of firefighters who quit/were fired and may have had more serious psychopathology), which could have led to issues with generalizability and interpretability. Finally, replication of this study using firefighter samples of greater sociodemographic diversity and analog occupational groups may bolster generalizability.

This study highlighted the robust association between abuse history and suicide risk among firefighters, an occupational group at elevated suicide risk. Most strikingly, a history of physical and sexual abuse each significantly predicted current suicide risk in this group, even after controlling for theoretically relevant symptoms. We look forward to prospective studies to delineate the temporal relationship between these variables. Overall, findings signal a critical need to consider physical and sexual abuse histories in fire service suicide prevention efforts.

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