

A systematic review of suicidal thoughts and behaviors among police officers, firefighters, EMTs, and paramedics



Ian H. Stanley ^{*}, Melanie A. Hom, Thomas E. Joiner

Department of Psychology, Florida State University, 1107 West Call Street, Tallahassee, FL 32306, United States

HIGHLIGHTS

- Police, firefighters, and EMTs/paramedics experience significant stressors.
- Suicide risk may be elevated among these first responders.
- We review studies examining rates and correlates of suicide among first responders.

ARTICLE INFO

Article history:

Received 3 August 2015
 Received in revised form 1 December 2015
 Accepted 7 December 2015
 Available online 12 December 2015

Keywords:

First responders
 Police
 Firefighters
 Emergency medical technicians
 Paramedics
 Suicide

ABSTRACT

First responders—police officers, firefighters, emergency medical technicians (EMTs), and paramedics—experience significant job-related stressors and exposures that may confer increased risk for mental health morbidities (e.g., posttraumatic stress disorder [PTSD], suicidal thoughts and behaviors) and hastened mortality (e.g., death by suicide). Inherent in these occupations, however, are also factors (e.g., camaraderie, pre-enlistment screening) that may inoculate against the development or maintenance of psychiatric conditions. Several reviews of the literature have documented the prevalence and potency of PTSD among first responders; the value of these extant reviews is considerable. Nonetheless, the literature has not been systematically described with regard to suicidality. In this systematic review, we present 63 quantitative studies examining suicidal thoughts, behaviors, and/or fatalities among first responders; identify population-specific risk and protective factors; and pinpoint strengths and weaknesses of the existing literature. Findings reveal elevated risk for suicide among first responders; however, studies utilizing more rigorous methodologies (e.g., longitudinal designs, probability sampling strategies) are sorely needed. First responders have an armamentarium of resources to take care of others; it is the duty of researchers, clinicians, and the public to aid in taking care of their health as well, in part by reducing suicide risk.

© 2015 Elsevier Ltd. All rights reserved.

Contents

1. Introduction	26
2. Methodology	26
3. Empirical foundations: results from the systematic review	27
3.1. Police officers	27
3.1.1. Suicidal ideation	27
3.1.2. Suicide attempts	37
3.1.3. Suicide deaths	37
3.2. Firefighters	38
3.2.1. Suicide ideation and behaviors	38
3.2.2. Suicide deaths	38
3.3. EMTs/paramedics	38
3.4. Hybrid studies	39

^{*} Corresponding author.
 E-mail address: stanley@psy.fsu.edu (I.H. Stanley).

4.	A synthesis of population-specific risk and protective correlates	39
4.1.	Risk correlates	39
4.1.1.	Posttraumatic stress disorder	39
4.1.2.	Occupational dissatisfaction, stress, and burnout	40
4.1.3.	Career transitions	40
4.1.4.	Marital problems	40
4.1.5.	Sleep disturbances	40
4.2.	Protective factors	40
5.	Evidentiary strengths, weaknesses, and future directions	41
6.	Strengths and limitations of the present review	41
7.	Conclusions	41
	Acknowledgments	42
	References	42

1. Introduction

In some jurisdictions within the United States, the ten-code (cf. radio code) for a police officer or other first responder who is in distress and in need of additional assistance is 10–13. Coincidentally, or perhaps purposely, this maps onto the exact chapter and verse of the following excerpt from the Epistle to the Romans: “For whosoever shall call upon the name of the Lord shall be saved” (Rom. 10:13 King James Version). The point here is not about religion but rather about an age-old recognition that our protectors—police officers, firefighters, emergency medical technicians (EMTs), and paramedics¹—need and are themselves deserving of protection and saving in all domains spanning both physical and mental health.

There have been several meta-analyses and scoping reviews of the literature regarding posttraumatic stress disorder (PTSD) among first responders (Berger et al., 2012; Faust & Ven, 2014; Haugen, Evces, & Weiss, 2012; Liu, Tarigan, Bromet, & Kim, 2014). These articles have revealed a dearth of population-specific intervention studies (Haugen et al., 2012) and highlighted the enduring sequelae in the years following the 9/11 terrorist attacks (Liu et al., 2014). These reviews have had an important effect on the field, spurring further inquiry into the causes, prevention, and treatment of PTSD among first responders, including the development of an integrative psychotherapy for the treatment of PTSD among 9/11 first responders (Haugen, Splaun, Evces, & Weiss, 2013; see also Whealin, Ruzek, & Southwick, 2008).

In addition to PTSD, first responders are also susceptible to other psychiatric consequences, including suicidal thoughts and behaviors. Within the general population, over 40,000 individuals die by suicide each year in the U.S. (Centers for Disease Control and Prevention [CDC], 2015); an estimated one million adults make a non-fatal suicide attempt and eight million adults experience serious thoughts of suicide annually (Crosby, Han, Ortega, Parks, & Gfroerer, 2011). Research has consistently demonstrated differential suicide risk across occupational groups (Boxer, Burnett, & Swanson, 1995; Milner, Spittal, Pirkis, & LaMontagne, 2013), with some studies finding relatively higher rates of fatalities among protective services workers (cf. first responders), in particular (Tiesman et al., 2015). However, establishment of a strong evidentiary base has been hampered by conflicting findings, with some studies finding no appreciable increase in risk (e.g., Marzuk, Nock, Leon, Portera, & Tardiff, 2002) and others finding lower rates of suicide as compared to the general population (e.g., Musk, Monson, Peters, & Peters, 1978). Thus, the abundant yet discrepant literature among first responders highlights the necessity of integrating findings across disciplines, research groups, and time periods.

¹ Although the roles of military service members are similar, this review will exclude military occupations due to the scope of existing studies and several reviews already published within this area (Bryan et al., 2015; Buckman et al., 2011; Kaylor, King, & King, 1987; Nock et al., 2013), as well as a focus of the current report on first responders. We acknowledge that many individuals will have concurrent or past military service experience.

First responders are immensely self-sacrificial and deserving of our deep veneration and careful attention. Several occupational considerations make the study of suicidality among these populations particularly compelling. First, first responder occupations carry inherent risks that pose acute and chronic dangers to one's health and safety: a police officer shields the public from deadly bullets; a firefighter runs into a burning building when everyone else is running out; and EMTs/paramedics are charged with saving someone from a life-threatening situation. Beyond the potential for loss of life, these experiences may also lower one's fear of death, creating conditions under which suicidality emerges (Van Orden et al., 2010). Second, shift-work may cause sleep disturbances and disruptions in familial social support (Vallières, Azaiez, Moreau, LeBlanc, & Morin, 2014), both of which are potent risk factors for suicide (Bernert, Kim, Iwata, & Perlis, 2015; Van Orden et al., 2010). Third, many of these individuals serve more than one of these roles (e.g., a full-time firefighter who is dually certified as an EMT), and these additional occupational hazards may confer additive risk. Fourth, these individuals have access to highly lethal suicide means (e.g., firearms in the case of police officers). Finally, though not exhaustively, first responder groups are overwhelmingly comprised of white males (U.S. Bureau of Labor Statistics, 2015)—the same demographic group that is also at the highest risk for suicide (CDC, 2015).

To the best of our knowledge, no systematic review of the literature exists examining the entire continuum of suicidality (i.e., ideation, attempts, and fatalities) among multiple—indeed, often overlapping—first responder populations. In the absence of a systematic review on these topics, it remains difficult to parse apart nuances within the literature, draw conclusions, and identify future research that is needed in order to better understand and prevent suicide among these important populations. As such, herein we review quantitative data examining suicide among first responders, inclusive of all ranks and titles of police officers, firefighters, EMTs, and paramedics. These handles will be used as general descriptors, though we recognize that essential distinctions exist within these occupations, including, for example, the importance of rank structures. Further, we identify risk (e.g., traumatic exposures), protective (e.g., camaraderie), and organizational (e.g., pre-enlistment screening) factors that are unique to these populations.

2. Methodology

We conducted a comprehensive, systematic search for articles published in English (searches were queried on July 19, 2015). We converged results from four leading databases—PubMed, MEDLINE, PsycINFO, and Sociological Abstracts—using the following search term categories and permutations thereof: *police* (police officer*, detective*, law enforcement), *firefighter* (firefighter*, fireman, firemen), *emergency medical technician/paramedic* (emergency medical technician*, EMT, EMTs, paramedic*, medics), and *suicide* (suicid*, non-suicidal self-injury, NSSI, self-harm). Within PubMed, we used the Medical Subject

Headings (MeSH; i.e., standardized nomenclature for indexing within PubMed) terms “Emergency Responders” and “Suicide.” To cast a wide net, we additionally searched the Cochrane Library, Google Scholar, and reference lists of identified review articles. Papers were selected for inclusion based on the following criteria: (1) published in English; (2) peer-reviewed; (3) examines one or more of the following first responder occupations: police officers, firefighters, EMTs, or paramedics; and (4) presents quantitative data examining suicidal thoughts and/or behaviors. In-press and under review papers of which we were aware at the time of the search were also included. Dissertations and theses were excluded because they were not vetted through formal peer-review processes. Two independent coders reviewed titles and abstracts, and disagreements were resolved via consensus; a third author was designated as a tiebreaker.

The computerized search yielded 700 papers. An additional 9 papers were identified through manual searches of the references; further, 1 recently published, 1 in-press, and 1 under review paper of which we were aware were included. Thus, a collective 712 papers were initially identified (see Fig. 1). Based on our review of titles/abstracts, we excluded 549 papers that were patently irrelevant, leaving 163 records to be screened. Of these, 47 were excluded because they represented duplicates (i.e., they were revealed by more than one database). As such, we conducted an initial review of 116 articles, 36 of which were subsequently excluded because their scope and/or content were not relevant (e.g., did not focus on first responder populations and/or suicide) and 17 of which were excluded because they did not present original, empirical data (e.g., commentaries, sections of reviews). Therefore, 63 articles were included in the current review, among which 48 specifically examined police officers, 9 examined firefighters, 2 examined EMTs/paramedics, and 4 centrally examined at least two of the aforementioned occupations (see Table 1 for a summary).

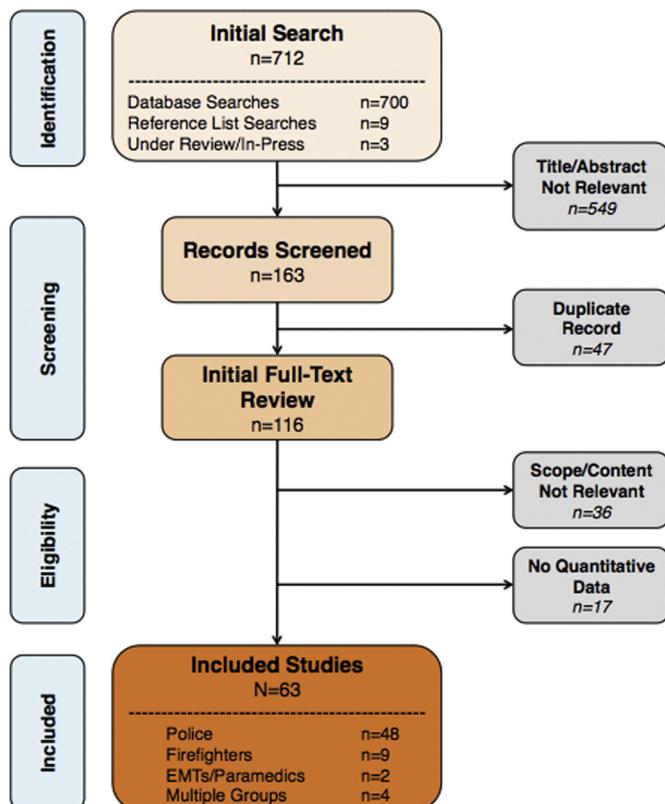


Fig. 1. Literature review flow diagram.

3. Empirical foundations: results from the systematic review

Before delving into results, it is important to ponder the groups to which rates of suicide among first responders are compared. Most of the following studies utilized the general population as a comparison group, with some adjusting general population rates for demographic characteristics to better reflect first responder demographics (e.g., predominately male). Comparing rates of first responder suicides to sex- and race-matched general population estimates serves as a useful indicator of relative risk; however, whereas first responders undergo pre-enlistment physical and mental health screening that results in a relatively healthy group, the general population is comprised of a more variegated set of individuals, including those who are unemployed and/or have an unremitting serious mental illness. Thus, due to this “healthy worker” effect (Li & Sung, 1999; Pearce, Checkoway, & Kriebel, 2007), it is emphasized that even comparable rates could indicate that rates may be de facto elevated among first responders, because one would expect lower rates among first responders compared to the general population (see Barron, 2010; Hem, Berg, & Ekeberg, 2001; Marzuk et al., 2002; Violanti, Vena, Marshall, & Petralia, 1996b).

3.1. Police officers

A relatively large body of research has examined suicide among police officers, with our systematic search yielding a collective 48 empirical studies (see Table 1).

3.1.1. Suicidal ideation

Twelve studies examining suicidal ideation among police officers were identified.² In one of the larger studies, Berg, Hem, Lau, Loeb, and Ekeberg (2003) surveyed 3272 Norwegian police officers (approximately half of the entire nation’s police force). Of these respondents, 24% reported having felt that life was not worth living and 6.4% had seriously considered suicide at some point during their lifetime. These rates align with findings from a U.S.-based sample of 105 police officers in a midsize, urban police department, revealing a lifetime prevalence of suicidal ideation of 25% and 23.1% for females and males, respectively (Violanti et al., 2009). Among the general U.S. population, approximately 13.5% of individuals report lifetime ideation (Kessler, Borges, & Walters, 1999). These studies utilized lifespan timeframes. When examining current suicidal ideation, one study of 1794 South African police officers, predominately male, found that 132 (7.4%) reported current suicidal ideation (Pienaar, Rothmann, & van de Vijver, 2007)—a rate comparable to those found among South African males in the general population (8.0%; Joe, Stein, Seedat, Herman, & Williams, 2008). Similarly, a study of 193 active duty officers serving in a Midwestern U.S. state found that approximately 8.8% of officers had experienced recent (i.e., past two-weeks) suicidal ideation (Chopko, Palmieri, & Facemire, 2014), which is higher than the 3.8% of U.S. adults reporting past-year ideation (Han, Compton, Gfroerer, & McKeon, 2015).

To establish temporality, longitudinal studies are needed to examine the onset, course, and resolution of suicidal ideation immediately prior to, during, and after a police officer’s career. Moreover, many of the studies examining suicidal ideation identified by this review did not report rates, and instead focused on risk correlates (e.g., PTSD). Although it is understandable that some researchers may have been reluctant to describe rates due to concerns about representativeness, a variegated set of samples is needed to triangulate the scope of the problem and inform next steps. Thus, in determining the prevalence of suicide ideation among police officers (and other first responders), researchers are encouraged to use empirically-validated instruments (e.g., Beck Scale for Suicide Ideation [BSS; Beck, Kovacs, & Weissman, 1979],

² Some studies examined more than one facet of suicidality (e.g., ideation and attempts); thus, here and elsewhere numbers may exceed 100%.

Table 1

Summary of studies examining suicidal thoughts and behaviors among police officers, firefighters, emergency medical technicians, and paramedics.

#	Citation	Geographic location	N	Study design	Index of suicidality assessed ¹	Rates of SI, SA, death	Key risk and protective correlates examined	Major findings	Strengths	Limitations
Police officers										
1	Arias et al. (2008)	–	2	Psychological Autopsy	Suicide Death	–	Risk: • Past SA	• Police officers who committed suicide-by-cop similar to civilians who died similarly	• Only study that examined suicide-by-cop among police	• Only two cases presented
2	Barron (2010)	New South Wales, Australia	247	Psychological Autopsy	Suicide Death	• 41/247 (16.6%) were deaths by suicide	Risk: • Substance use • Work performance issues	• 31.5% had work performance issues • 23% under investigation at time of death • Risk factors generally similar to civilians	• Thorough coding of risk factors across personal, occupation, psychological, and social domains	• Only police who were recorded to have died during employment included (no retired police)
3	Beehr et al. (1995)	Eastern U.S.	177	Self-Report Survey	SI	–	Risk: • Alcohol use • Somatic complaints • Spouse drinking	• Job satisfaction negatively associated with SI • Males more likely than females to attribute SI to work problems (e.g., problem-focused), which may inform future interventions	• Assessment of coping strategies	
4	Berg et al. (2006)	Norway	3272	Self-Report Survey	SI	–	Protective: • Help-seeking among individuals with serious SI (e.g., general practitioner, psychologist)	• 73.9% of individuals with serious SI visited a general practitioner within past year • 6.7% had contact with psychologist/psychiatrist during past year	• Convenience sample • SI measured with a single item (7-point scale) • Survey sent to all members of the department (about half responded) • Lifetime SI, but past-year help-seeking	• Help-seeking among police reporting SA not examined • Psychologist and psychiatrist collapsed into one category
5	Berg et al. (2003)	Norway	3272	Self-Report Survey	SI, SA	Lifetime: • Serious SI: 6.4% • SA: 0.7%	Risk: • Job dissatisfaction • Job burnout • Marital status (single) • Subjective health complaints	• Job dissatisfaction and burnout predicted SI in uncontrolled (but not controlled) analyses • Marital status and subjective health complaints predicted SI in all analyses	• Survey sent to all members of the department (about half responded)	• Frequency of SA dichotomized (never vs. any) • Few predictors of SA reported
6	Cantor et al. (1995)	Queensland, Australia	–	Records Review	Suicide Death	1980s: • 60 per 100,000 in 1800s “Recently:” • 20 per 100,000	Risk: • Service problems • Sick leave • Physical conditions • Psychiatric conditions • Alcohol use	• Sick leave elevated among decedents in year before death • Rates comparable to other employed males in region • Declining rates may be due to increased services available to police	• Offers historical perspectives (e.g., differences in police culture in the 1800s versus 1900s)	• Risk factor information not available for a substantial portion of decedents • Mental health problems not systematically assessed
7	Chopko et al. (2014)	Midwestern U.S.	193	Self-Report Survey	SI	Past Two-Weeks: • 8.8%: SI	Risk: • Depression symptoms • Posttraumatic Stress Disorder (PTSD) symptoms	• PTSD symptoms correlated with SI • Multivariate analyses revealed depression was only significant predictor of SI	• Recent SI (i.e., past two-weeks) assessed • One of only a few studies examining PTSD symptoms as a correlate	• Convenience sample • Sample comprised of mostly white males

8	Curran et al. (1988)	Ireland	–	Records Review	Suicide Death	1973–1979: • 11.7 per 100,000 1980–1987: • 32.9 per 100,000	Risk: • Suicide method	<ul style="list-style-type: none"> • Suicide fatality rates among police increased from 1973 to 1979 to 1980–1987 and remained higher than civilian rates • Majority (94%) of decedents used firearms 	<ul style="list-style-type: none"> • Included information on method of suicide 	<ul style="list-style-type: none"> • Limited to Northern Ireland • Police Federation supplied the data; unclear about quality of records
9	Dash and Reiser (1978)	Los Angeles, CA, (U.S.)	–	Records Review	Suicide Death	1970–1976 (average): • 8.1 per 100,000	–	<ul style="list-style-type: none"> • Suicide rate of police approximately half that of the general population in Los Angeles County during the same time period 	<ul style="list-style-type: none"> • Included discussion on the mental health services available to members in this department, specifically 	<ul style="list-style-type: none"> • Insufficient methodological reporting on how the data were obtained
10	Heiman (1975)	New York, NY (U.S.) and London	–	Records Review	Suicide Death	1960–1973 (average): • 19.1 per 100,000 (NY) • 5.8 per 100,000 (London)	–	<ul style="list-style-type: none"> • In NY, suicide rate of police nearly double that of the rate of general white male urban population • In London, no differences in suicide rates between police and non-police 	<ul style="list-style-type: none"> • Compared two separate departments 	<ul style="list-style-type: none"> • Insufficient methodological reporting on how the data were obtained
11	Heiman (1977)	New York, NY (U.S.) and London	93	Psychological Autopsy	Suicide Death	–	Risk: • Number of years of service • Suicide method	<ul style="list-style-type: none"> • 93 NY policemen died by suicide between 1934 and 1940 	<ul style="list-style-type: none"> • Illustrative case examples provided 	<ul style="list-style-type: none"> • Insufficient methodological reporting on how the data were obtained
12	Hem et al. (2005)	Norway	–	Records Review	Suicide Death	1960–2000 (average): • 19.5 per 100,000	–	<ul style="list-style-type: none"> • Male police suicide rates appear to be comparable to the general population 	<ul style="list-style-type: none"> • Compared police suicide rates to other occupations (e.g., physicians) • Stratified by sex and age 	<ul style="list-style-type: none"> • Suicide methods and other key associated features not examined
13	Hill and Clawson (1988)	Washington State (U.S.)	1586	Records Review	Suicide Death	1950–1971: Proportion Mortality Ratio (PMR): • 113	–	<ul style="list-style-type: none"> • Police more likely to die by suicide than by accidents, but less likely to die by suicide than by homicide • Relatively high rate of suicide among police, accounting for social class structure 	<ul style="list-style-type: none"> • Compared death by suicide with death by homicide • Compared police with other occupational groups 	<ul style="list-style-type: none"> • Authors conclude rates are elevated, but they do not appear to be statistically significantly elevated • Nonwhite males excluded
14	Janik and Kravitz (1994)	Midwestern U.S.	134	Records Review	SA	Lifetime: • 55%: SA	Risk: • Years of service • Marital problems • Suspension • Citizens' complaints • Substance use	<ul style="list-style-type: none"> • Attempters more likely to have marital problems and to have been suspended • No differences emerged in terms of substance use 	<ul style="list-style-type: none"> • Assessed range of key correlates 	<ul style="list-style-type: none"> • Assessed police officers at fitness-for-duty evaluation (which occur when commanders have concerns about officers' physical/mental health)
15	Josephson and Reiser (1990)	Los Angeles, CA (U.S.)	–	Records Review	Suicide Death	• 1977–1988 (average): • 12.0 per 100,000	Risk: • Rank • Marital problems • Alcohol use	<ul style="list-style-type: none"> • Police suicide rate lower than the rates of adults in the same county, state, and country 	<ul style="list-style-type: none"> • Provided brief illustration of each case's psychiatric profile 	<ul style="list-style-type: none"> • Insufficient methodological reporting on how the data were obtained

(continued on next page)

Table 1 (continued)

#	Citation	Geographic location	N	Study design	Index of suicidality assessed ¹	Rates of SI, SA, death	Key risk and protective correlates examined	Major findings	Strengths	Limitations
16	Kapusta et al. (2010)	Australia	91	Records Review	Suicide Death	1996–2006 (average): • 30.2 per 100,000 (males) • 1.8 per 100,000 (females)	Risk: • Method of suicide • Suicide note	• Police suicide rates comparable to age-adjusted general population (yet higher than expected due to “healthy worker effect”) • Majority of decedents used a firearm (77.8%) and 15.6% died at the department	• Strong methodological reporting on how data were obtained and the quality of data • Stratification by sex	• No comparisons to other occupational groups
17	Labovitz and Hagedorn (1971)	U.S.	–	Records Review	Suicide Death	Circa 1950: • 47.6 per 100,000	Risk: • Occupational prestige	• Police suicide rates markedly higher than clergymen but lower than self-employed manufacturing managers • Occupational prestige not strongly related to suicide rates • Alcohol abuse common	• Compared suicide rates across 36 different occupations	• Insufficient methodological reporting on how the data were obtained
18	Lester (1993)	New York, NY (U.S.)	92	Psychological Autopsy	Suicide Death	–	Risk: • Alcohol abuse • Depression • Job problems	• SI not associated with depression or locus of control	–	• Insufficient methodological reporting on the coding of files
19	Lester and Pitts (1990)	–	62	Self-Report Survey	SI	Lifetime • SI: 9.7%	Risk: • Depression • Locus of control	• SI not associated with depression or locus of control	–	• Insufficient methodological reporting
20	Lindsay and Lester (2001)	Northeastern U.S.	–	Records Review	Suicide Death	1987–1993 (average): • 44 per 100,000 1987–1999 (average):	Risk: • Suicide method	• Majority of decedents used a firearm	–	• Insufficient methodological reporting (e.g., “memory and records”)
21	Loo (1986)	Canada	–	Records Review	Suicide Death	• 25 per 100,000 1960–1983 (average): • 14.1 per 100,000	Risk: • Suicide method • Disciplinary problems	• Police suicide rate approximately half that of the general population • 77% of decedents used their service revolver	• Assessed decedents across several demographic and occupational dimensions	• Only members who died while serving on the force included (no retired officers)

22	Loo (2003)	Worldwide	101 Studies	Meta-Analysis	Suicide Death	–	Risk: <ul style="list-style-type: none"> • Region (Americas) • Type of police force (regional) 	<ul style="list-style-type: none"> • Suicide rates based on short time frames significantly higher as compared to long time frames • Regional differences (e.g., higher rates in the Americas) • Police force differences (e.g., regional higher than federal) 	<ul style="list-style-type: none"> • Strong methodological reporting 	<ul style="list-style-type: none"> • Inclusion of nonscientific sources (e.g., news magazines)
23	Maia et al. (2007)	Brazil	157	Self-Report Survey	SI	Lifetime <ul style="list-style-type: none"> • SI: 35.7% (with PTSD) • SI: 5.2% (without PTSD) 	Risk: <ul style="list-style-type: none"> • PTSD symptoms 	<ul style="list-style-type: none"> • Officers who had elevated PTSD symptoms significantly more likely to report lifetime SI 	<ul style="list-style-type: none"> • Examined a key psychiatric risk factor for suicide (i.e., PTSD) 	<ul style="list-style-type: none"> • PTSD not clinician-assessed
24	Marzuk et al. (2002)	New York, NY (U.S.)	–	Records Review	Suicide Death	1977–1996 (average): <ul style="list-style-type: none"> • 14.9 per 100,000 	–	<ul style="list-style-type: none"> • Police suicide rate comparable (possibly lower) than the demographically adjusted general population 	<ul style="list-style-type: none"> • Strong methodological reporting 	<ul style="list-style-type: none"> • Suicide methods and other key associated features not examined
25	Mishara and Martin (2012)	Montreal, Canada	4178	Intervention	Suicide Death	1986–1996 (average): <ul style="list-style-type: none"> • 30.5 per 100,000 1997–2008 (average): • 6.4 per 100,000 	–	<ul style="list-style-type: none"> • The intervention comprised officer and supervisor training, establishment of a volunteer helpline, and publicity campaigns • Suicide rates in the department decreased across 12 years 	<ul style="list-style-type: none"> • Examined the effects of an intervention on suicide rates • All police officers in the department participated in the intervention 	<ul style="list-style-type: none"> • Not a randomized controlled trial
26	Nelson and Smith (1970)	Wyoming (U.S.)	–	Records Review	Suicide Death	1960–1968 (average): <ul style="list-style-type: none"> • 203.7 per 100,000 	Risk: <ul style="list-style-type: none"> • Suicide method • Marital status (married) 	<ul style="list-style-type: none"> • Police officers had the highest suicide rate of all occupations listed • All police officers used firearms 	<ul style="list-style-type: none"> • Compared police suicide rates to other occupations (e.g., physicians) 	<ul style="list-style-type: none"> • Insufficient methodological reporting on how the data were obtained
27	O'Hara et al. (2013)	U.S.	–	Records Review	Suicide Death	–	Risk: <ul style="list-style-type: none"> • Years of service • Suicide method • Work-associated legal problems • Veteran status 	<ul style="list-style-type: none"> • Police suicides declined 11.9% from 2009 to 2012 • Firearms most common suicide method • 11% of decedents were military veterans 	<ul style="list-style-type: none"> • Novel methodological approach (i.e., canvassing police websites, forums, blogs) that revealed 55,000 police suicide articles 	<ul style="list-style-type: none"> • Representativeness of findings may be limited
28	O'Hara and Violanti (2009)	U.S.	–	Records Review	Suicide Death	–	Risk: <ul style="list-style-type: none"> • Years of service • Suicide method 	<ul style="list-style-type: none"> • Police in lower ranks may be at elevated risk • Guns most common method 	<ul style="list-style-type: none"> • Novel methodological approach (i.e., canvassing police websites & forums) 	<ul style="list-style-type: none"> • Representativeness of findings may be limited • One year (i.e., 2008)
29	Pienaar et al. (2007)	South Africa	1794	Self-Report Survey	SI	Current <ul style="list-style-type: none"> • SI: 7.4% 	Risk: <ul style="list-style-type: none"> • Personality dimensions (e.g., conscientiousness) 	<ul style="list-style-type: none"> • Police who had lower conscientiousness and approach coping scores more likely to report SI 	<ul style="list-style-type: none"> • Used thorough assessment of SI (i.e., the Adult Suicide Ideation Questionnaire) 	<ul style="list-style-type: none"> • Few police-specific variables (e.g., rank) were examined

Table 1 (continued)

#	Citation	Geographic location	N	Study design	Index of suicidality assessed ¹	Rates of SI, SA, death	Key risk and protective correlates examined	Major findings	Strengths	Limitations
30	Plani et al. (2003)	South Africa	134	Records Review	SA	–	Risk: • Suicide method	• Of the 134 police admitted to a trauma center, 3 were admitted for a suicide attempt (all by firearm)	• Cross-national investigation	• 14% of overall sample died from their injuries, but unclear if suicide attempters are captured by this number • Key associated features of SA not examined
31	Quinet et al. (1997)	U.S.	–	Records Review	Suicide Death	–	–	• Police more likely to die by suicide than by homicide	• Compared different causes of police fatalities	• Insufficient methodological reporting of data on police suicide rates
32	Rouse et al. (2015)	–	8	Psychological Autopsy	Suicide Death	–	Risk: • Substance abuse • Exposure to trauma • Disclosure of SI • Sick leave	• Pre-enlistment factors relevant to suicide fatalities (e.g., family psychiatric history) • Exposure to on-duty traumatic incidents not implicated in suicide deaths • Police decedents generally similar to civilians	• Illustrative case examples provided	• Small sample of decedents, thus limiting generalizability
33	Schmidtke et al. (1999)	Germany	–	Records Review	Suicide Death	1997: • 25 per 100,000	Risk: • Suicide method • Type of police force	• Police rates comparable to general population rates • Firearms most common method used	• Compared rates across different police forces within a single country	• Insufficient methodological reporting on how the data were obtained
34	Steyn et al. (2013)	South Africa	217	Self-Report Survey	SI	–	Risk: • PTSD symptoms	• PTSD, specifically the hyperarousal symptom cluster, was strongly associated with SI	• Examined specific symptom clusters of PTSD that may confer unique risk for SI	• PTSD not clinician-assessed • Other key features (e.g., demographics) not examined
35	Tiesman et al. (2010)	U.S.	–	Records Review	Suicide Death	1992–2002 (average): • 0.6 per 100,000	Risk: • Suicide method	• Homicides and transportation-related deaths more common than suicides • Firearms most common method	• Strong methodological reporting • Included data from across the entire U.S.	• Data likely do not capture suicide fatalities that occur outside of the workplace • Data from some cities (e.g., New York City) not included
36	Vena et al. (1986)	Buffalo, NY (U.S.)	–	Records Review	Suicide Death	Standardized Mortality Ratio (SMR): • 94 (95% CI = 47–169)	–	• Police suicide was comparable to the general U.S. population but elevated as compared to other municipal employees	• Compared rates of mortality across different causes of death	• Key features (e.g., methods used) not examined
37	Violanti, Vena, and Marshall (1996a)	Buffalo, NY (U.S.)	–	Records Review	Suicide Death	–	–	• Police more likely to die by suicide than by homicide or accidents	• Several sources of vital status were utilized (e.g., National Death Index)	• Key features (e.g., methods used) not examined
38	Violanti, Vena, Marshall, and Petralia (1996b)	Buffalo, NY (U.S.)	–	Records Review	Suicide Death	–	–	• Misclassification of suicide fatalities may be more common among police than other municipal workers	• Sought to examine the validity of police suicide statistics	• Proposed mathematical “correction” to rates to due to misclassification based on findings from only one department

39	Violanti (1995)	Buffalo, NY (U.S.)	-	Records Review	Suicide Death	-	-	-	<ul style="list-style-type: none"> Suggests that police suicide rates have remained relatively stable across 40 year observation period Some evidence for recent increase in rates 	<ul style="list-style-type: none"> Sought to examine trends in police suicide rates 	<ul style="list-style-type: none"> Insufficient methodological reporting on how the data were obtained Key features (e.g., methods used) not examined
40	Violanti (2007)	-	29	Records Review	Suicide Death	-	Risk:	<ul style="list-style-type: none"> Suicide method Type of police department 	<ul style="list-style-type: none"> Features of homicide-suicides among police are comparable to the general population Police service firearm used in majority (90%) of cases Most incidents occurred at local police level 	<ul style="list-style-type: none"> Illustrative case examples of homicide-suicide provided 	<ul style="list-style-type: none"> Data were obtained via solicitation to a web-based forum as well as newspaper reports, thus limiting representativeness
41	Violanti et al. (2011)	Buffalo, NY (U.S.)	3228	Records Review	Suicide Death	1950–2005:	Risk:	<ul style="list-style-type: none"> Employment status Years of service 	<ul style="list-style-type: none"> Police suicide rates elevated among currently working officers as compared to those separated or retired 	<ul style="list-style-type: none"> Examined career-related factors (e.g., years of service) 	<ul style="list-style-type: none"> Sample excluded individuals who worked less than 5 years
42	Violanti et al. (2012)	U.S.	-	Questionnaire & Records Review	Suicide Death	<ul style="list-style-type: none"> 110.5 per 100,000 (working) 13.1 per 100,000 (separated or retired) 15.3 per 100,000 (overall) 43.78 per 100,000 (smallest) 13.67 per 100,000 (small) 26.39 per 100,000 (medium) 12.46 per 100,000 (largest) 	Risk:	<ul style="list-style-type: none"> Suicide method Department size Location of suicide Employment status 	<ul style="list-style-type: none"> Police suicide rates were higher in smaller (versus larger) departments Majority (91.4%) of decedents used a firearm 11% of suicides occurred at the worksite 	<ul style="list-style-type: none"> Examined suicide among police officers service in small departments and compared rates to larger departments (the latter of which has been the focus of most studies) 	<ul style="list-style-type: none"> Demographic information not available Data were obtained based on “recollections of chiefs and higher order personnel who were in the department for at least ten years” (p. 161), and thus subject to recall biases
43	Violanti et al. (2013)	U.S.	-	Records Review	Suicide Death	Proportionate mortality ratio (PMR):	Risk:	<ul style="list-style-type: none"> Type of officer (detectives) 	<ul style="list-style-type: none"> Law enforcement had higher suicide rates than the general working population Detectives and police had higher suicide rates than correctional officers White males had higher rates than other 	<ul style="list-style-type: none"> Examined rates across multiple years (i.e., 1999, 2003–2004, 2007) 	<ul style="list-style-type: none"> Only individuals for whom law enforcement was listed as their “usual occupation” on their death certificate included
44	Violanti et al. (1998)	Buffalo, NY (U.S.)	2593	Records Review	Suicide Death	1950–1990 SMR:	Risk:	<ul style="list-style-type: none"> Years of service (more) 	<ul style="list-style-type: none"> Highest suicide rate observed in those with ≥ 40 years of service 	<ul style="list-style-type: none"> Compared rates of mortality across different causes of death 	<ul style="list-style-type: none"> Key features (e.g., methods used) not examined

Table 1 (continued)

#	Citation	Geographic location	N	Study design	Index of suicidality assessed ¹	Rates of SI, SA, death	Key risk and protective correlates examined	Major findings	Strengths	Limitations
45	Violanti et al. (2008)	U.S.	111	Self-Report Survey	SI	Lifetime: • 25% (females) • 23.1% (males)	Risk: • Depressive symptoms • PTSD symptoms • Shift work	• SI more common among those with more severe depressive symptoms (for women) and PTSD symptoms (for women and men)	• Examined the role of depressive and PTSD symptoms • Examined the influence of shift work schedules	• Small sample size limits representativeness • Depressive and PTSD symptoms not clinician-assessed
46	Violanti et al. (2009)	U.S.	105	Self-Report Survey	SI	Lifetime: • 25% (females) • 23.1% (males)	Risk: • Depressive symptoms Protective: • Marital status (married female)	• SI more common among those with more severe depressive symptoms • Association between depressive symptoms and SI stronger among unmarried females	• Examined the role of depressive symptoms	• Small sample size limits representativeness • Depressive symptoms not clinician-assessed
47	Violanti et al. (2006)	U.S.	–	Records Review	SI	–	Risk: • Change in employment status	• Calls to a police crisis line (Cop 2 Cop) increased from pre-9/11 to post-9/11 • 10% of callers were retired officers	• Examined help-seeking behaviors among at-risk police	• Limited to officers who reported working in the proximity of the 9/11 terrorist attacked • Limited to just one crisis hotline in New Jersey
48	Violanti (2004)	Northeastern U.S.	115	Self-Report Survey	SI	Lifetime: • 23%	Risk: • Alcohol use • PTSD symptoms • Years of service (fewer)	• PTSD and alcohol use confer risk for SI • Police with more years of service reported less SI	• Examined the role of PTSD symptoms and alcohol use	• Small sample size limits representativeness • PTSD symptoms not clinician-assessed
Firefighters										
49	Baris et al. (2001)	Philadelphia, PA (U.S.)	7789	Records Review	Suicide Death	SMR: • 0.66 (95% CI = 0.48–0.92)	–	• Firefighter suicide rates comparable to the general population, a finding that persists across number of years of service and type of department	• Compared rates of mortality across different causes of death	• Key features (e.g., methods used) not examined
50	Carpenter et al. (2015)	U.S.	334	Self-Report Survey	SI	–	Risk: • Occupational stress Protective: • Social support	• Occupational stress significantly positively associated with SI • Social support attenuated this association	• Identified social support as a buffer against suicide risk	• Similarities between occupational distress and PTSD symptoms unclear
51	Chu et al. (under review)	U.S.	863	Self-Report Survey	SI, SA	–	Risk: • Thwarted belongingness • Perceived burdensomeness • Capability for suicide	• A three-way interaction between thwarted belongingness, perceived burdensomeness, and capability for suicide was significantly related to suicide attempts	• Provided empirical corroboration for the interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010)	• Temporality of the theory variables cannot be ascertained • Only career SI and SA assessed (i.e., pre-enlistment and recent SI and SA not assessed)

52	Daniels et al. (2013)	U.S.	–	Records Review	Suicide Death	SMR: • 0.87 (95% CI = 0.75–1.00)	–	<ul style="list-style-type: none"> • Firefighter suicide rates comparable to the general population, a finding that persists across all three departments 	<ul style="list-style-type: none"> • Examined rates across three separate fire departments • Compared rates of mortality across different causes of death 	<ul style="list-style-type: none"> • Smaller departments are not represented in these findings
53	de Barros et al. (2012)	Brazil	303	Self-Report Survey	SI	–	Risk: • Sleep disturbances • Alcohol use	<ul style="list-style-type: none"> • Sleep disturbances were marginally associated with SI ($p < .085$) 	<ul style="list-style-type: none"> • Examined a potent risk factor for suicide (i.e., sleep disturbances) 	<ul style="list-style-type: none"> • Sleep disturbances not assessed with objective indices
54	Hom et al. (in press)	U.S.	483	Self-Report Survey	SI, SA	–	Risk: • Barriers to care • Years of service Protective: • Use of mental health services	<ul style="list-style-type: none"> • Among firefighters with career SI and/or SA, 76.8% reported connection with mental health services during their career • Stigma a barrier to care 	<ul style="list-style-type: none"> • Examined help-seeking among at-risk firefighters 	<ul style="list-style-type: none"> • Unknown if help-seeking was for SI or SA, specifically
55	Ide (1998)	Scotland	–	Records Review	Suicide Death	SMR: • 41	–	<ul style="list-style-type: none"> • Firefighter suicide rates were lower than the general population 	<ul style="list-style-type: none"> • Compared rates of mortality across different causes of death 	<ul style="list-style-type: none"> • Key features (e.g., methods used) not examined
56	Musk et al. (1978)	Boston, MA (U.S.)	–	Records Review	Suicide Death	SMR: • 19	–	<ul style="list-style-type: none"> • Firefighter suicide rates were lower than the general population 	<ul style="list-style-type: none"> • Compared rates of mortality across different causes of death 	<ul style="list-style-type: none"> • Key features (e.g., methods used) not examined
57	Stanley et al. (2015b)	U.S.	1027	Self-Report Survey	SI, SA	Career: • SI: 46.8% • SA: 15.5%	Risk: • Occupational factors (volunteer) • Physical health	<ul style="list-style-type: none"> • Increased risk of reporting SI and/or SA found among: volunteer (vs. full-time), younger, fewer years of service, active duty military status, professionally responded to SA or suicide death 	<ul style="list-style-type: none"> • Inclusive of volunteer, full-time, current, and retired firefighters • Examined suicide plans as well as non-suicidal self-injury (NSSI) 	<ul style="list-style-type: none"> • Only career SI and SA assessed (i.e., pre-enlistment and recent SI and SA not assessed)
<i>EMTs/paramedics</i>										
58	Mitchell (1995)	New York, NY (U.S.)	–	Records Review	Suicide Death	–	–	<ul style="list-style-type: none"> • Reported that three emergency medical services personnel died by suicide in New York City in 1992 	–	<ul style="list-style-type: none"> • Insufficient methodological reporting
59	Sterud et al. (2008)	Norway	1180	Self-Report Survey	SI, SA	Lifetime: • Serious SI: 10.4% • SA: 3.1% Past-year: • Serious SI: 1.9% • SA: 0.4%	Risk: • Marital status (single) • Depression symptoms • Job dissatisfaction Protective: • Help-seeking	<ul style="list-style-type: none"> • Being unmarried, younger, and having elevated depression symptoms more likely to report SI • Job dissatisfaction not associated with SI in adjusted models • Among those with lifetime SI, 51% had not sought professional help 	<ul style="list-style-type: none"> • First comprehensive assessment (i.e., spanning psychiatric symptoms to help-seeking behaviors) of a large sample of ambulance personnel 	<ul style="list-style-type: none"> • Depression symptoms not clinician-assessed

(continued on next page)

Table 1 (continued)

#	Citation	Geographic location	N	Study design	Index of suicidality assessed ¹	Rates of SI, SA, death	Key risk and protective correlates examined	Major findings	Strengths	Limitations
<i>Multiple groups</i>										
60	Feuer and Rosenman (1986)	New Jersey (U.S.)	–	Records Review	Suicide Death	PMR: • 0.62 (firefighters) • 0.84 (police)	Risk: • Employment status	• Firefighters and police suicide rates are comparable to the general population	• Compared rates of mortality across different causes of death	• Suicide rates are combined with other causes of death (i.e., accidents, homicides)
61	Tiesman et al. (2015)	U.S.	–	Records Review	Suicide Death	2003–2010 • 5.3 per 1,000,000	Risk: • Suicide method	• Protective service workers had the highest workplace suicide rate • 84% of suicides used a firearm	• Compared rates of suicide across different occupations	• Protective service workers is not exclusive to firefighters or police • Only workplace suicides captured in these data
62	Violanti (2010a)	U.S.	–	Records Review	Suicide Death	White male PMRs: Police: • 120 (95% CI = 113–128) Firefighters: • 103 (95% CI = 91–116)	–	• Police suicide rate higher than firefighter suicide rate	• Compared rates of suicide across different occupations	• Key features (e.g., methods used) not examined
63	Violanti (2010b)	U.S.	–	Records Review	Suicide Death	–	–	• Police and firefighter suicide rates may be an underrepresentation due to misclassification	• Sought to examine the validity of police and firefighter suicide rates	• An “undetermined” death classification does not provide evidence for misclassification

Note. Citations are listed alphabetically and stratified by population studied (i.e., firefighters, police officers, EMTs/paramedics, and multiple groups). CI = Confidence Interval; EMT = Emergency Medical Technician; PMR = Proportional Mortality Ratio; SMR = Standardized Mortality Ratio | ¹SI = Suicidal Ideation; SA = (Non-Fatal) Suicide Attempt.

Depressive Symptom Inventory—Suicidality Subscale [DSI-SS; Joiner, Pfaff, & Acres, 2002], or Self-Injurious Thoughts and Behaviors Interview [SITBI; Nock, Holmberg, Photos, & Michel, 2007]).

3.1.2. Suicide attempts

Less is known, however, about the prevalence and methods used in nonfatal suicide attempts among police officers. In this domain, three studies were identified. Among the previously mentioned sample of 3272 Norwegian police officers, 0.7% reported a lifetime history of a suicide attempt (Berg et al., 2003). This finding starkly contrasts with another study of 134 police officers in a Midwestern U.S. sample, in which 55% reported a previous suicide attempt (Janik & Kravitz, 1994). Nationally representative studies in the U.S. indicate a lifetime prevalence of suicide attempts of approximately 4.6% in the general population (Kessler et al., 1999). In a separate sample of 134 South African police officers admitted to a trauma center, a retrospective chart review revealed that three (2.2%) officers had a suicide attempt history (Plani, Bowley, & Goosen, 2003). Given the different sampling methodologies and populations of these three studies, a reliable estimate of suicide attempts among police officers is not yet available.

3.1.3. Suicide deaths

In terms of suicide fatalities, 34 empirical studies were identified. With the exception of one evaluation of the effects of an intervention on suicide rates (Mishara & Martin, 2012), all employed a retrospective design.

We begin with studies utilizing U.S.-based samples. Indeed, studies utilizing single police departments have been equivocal, with some finding higher rates (Heiman, 1975; Hill & Clawson, 1988; Lindsay & Lester, 2001; Nelson & Smith, 1970), comparable rates (Marzuk et al., 2002), and lower rates (Dash & Reiser, 1978; Josephson & Reiser, 1990) of suicide among police officers as compared to general population comparisons. Differences in the rigor of methodological approaches (e.g., reliance on “memories and records” [Lindsay & Lester, 2001] versus full departmental records review [Marzuk et al., 2002]) may in part account for these discrepant findings. Further, although a small number of female suicides were observed across studies, likely in part due to the predominantly male composition of police forces, one study found that female officers had a statistically significantly higher risk of death by suicide than females in the general population (Marzuk et al., 2002). Notably, in the general population, males are more likely to die by suicide than females (CDC, 2015).

Studies utilizing samples of officers aggregated across multiple states have generally suggested that police officers die by suicide at higher rates compared to the general population. Among 23 states reporting to the CDC’s National Institute for Occupational Safety and Health (NIOSH) National Occupational Mortality Surveillance (NOMS) system for the years 1999, 2003–2004, and 2007, rates among police were significantly elevated, with higher rates among Caucasian officers and a non-significant trend for higher rates among female officers (Violanti, Robinson, & Shen, 2013). It should be noted, however, that occupations were determined according to review of death certificates, which list the “usual occupation” (i.e., longest/lifetime occupation) provided by survivors. Thus, this approach might not capture individuals who were in the police service at one point, and due to stress (to take one example), transitioned into a different career that may have lasted longer or was, in the view of their surviving family, a more representative component of their identity (and thus reflected as such on a death certificate).

Whereas a sizable portion of the aforementioned studies examined suicide among larger departments (e.g., NYPD), it is notable that smaller departments may have higher rates of suicide than larger departments, potentially due to fewer resources and mental health professionals per capita in smaller regions (Violanti, Mnatsakanova, Burchfiel, Hartley, & Andrew, 2012).

Several other remarkable findings emerged from the literature. A comparison of suicide rates among 3228 police officers who worked between 1950 and 2005 in the Buffalo, NY department revealed that currently employed officers have a suicide rate over eight times that of separated/retired officers (Violanti et al., 2011), and compared to the general population, suicide among police in this department appears to have increased from the years 1970–1990 (Violanti, 1995).

Further, several lines of inquiry have found that police officers are more likely to die by suicide than by homicide or accidents (Quinet, Bordua, & Lassiter, 1997; Violanti, Vena, & Marshall, 1996a); yet, a separate study of on-the-job deaths among 2280 officers from 1992 to 2002 found that, whereas 47% died by homicide, 5% died by suicide in the workplace (Tiesman, Hendricks, Bell, & Amandus, 2010). Instances of suicide-by-cop (in which a suicidal individual intentionally behaves in a threatening manner towards police officers to elicit a lethal response) among police officers (i.e., an officer provokes another officer to shoot; Arias et al., 2008) as well as homicide-suicide (Violanti, 2007) were noted in the literature. It has also been suggested that police officers are more likely than other municipal workers to die by suicide (Vena, Violanti, Marshall, & Fiedler, 1986; Violanti, Vena, & Marshall, 1996a), yet it is unclear whom exactly these municipal workers are.

In terms of cross-national findings, a psychological autopsy of 247 officer deaths within the New South Wales (Australia) police force from 1999 to 2008 classified 41 (16.6%) deaths as suicides (Barron, 2010). In another Australian study, 59 suicide deaths were observed over a period of 122 years, for a rate of approximately 60 per 100,000 in the 1800s to about 20 per 100,000 in more recent years—rates comparable to other employed males in the region (i.e., average of 20.6 per 100,000 from 1990–1992; Cantor, Tyman, & Slater, 1995). The authors speculate that the decrease in suicide rate could be due to increasing services available to officers (e.g., employee assistance programs), highlighting the importance of connecting at-risk individuals to care (see Hom, Stanley, & Joiner, 2015a).

Among male police officers in Ireland, there was a rise in the mean annual suicide rate from 11.7 per 100,000 (1973–1979) to 32.9 per 100,000 (1980–1987), rates approximately double that of the general adult male population during the same time frames (Curran, Finlay, & McGarry, 1988). Comparable rates among police and the general population (i.e., 25 per 100,000 and 20 per 100,000, respectively) were found among German police officers (Schmidtke, Fricke, & Lester, 1999). Similarly, 90 suicide deaths were observed between 1996 and 2006 among males in the Federal Austrian Police Force, a rate of 30.2 per 100,000, which is comparable to the age-adjusted general population rate (i.e., 30.5 per 100,000; Kapusta et al., 2010). In Norway, too, police suicide rates appeared comparable to those of the general population (Hem et al., 2005). In contrast, among the Royal Canadian Mounted Police, a suicide rate of about half that of the general population was observed (Loo, 1986), and, intriguingly, a service revolver was used in 77% of the 35 suicide deaths observed during the study timeframe (i.e., 1960–1983).

A portion of the above mentioned studies have been synthesized within a meta-analysis (Loo, 2003). Indeed, consistent with the above synthesis, the meta-analysis found differential suicide rates both by region and police force type (e.g., federal, regional, municipal). Further, suicide rates based on shorter time frames were statistically significantly higher than those examining rates over a longer period of time. Although this meta-analysis also utilized unpublished rates (e.g., from dissertations, magazine news articles), several strengths are noted, including its call for future studies to employ and report more sophisticated methodological approaches and to also utilize samples of female police officers who are increasingly being represented within police forces (Hem et al., 2001).

Some researchers have suggested that suicide rates among police officers, specifically, could be underestimated. At least two studies corroborate this hypothesis, noting high rates of underdetermined

death classifications among police officers, which, as the authors note, is curious given the high profile nature of police fatalities and the resources allotted to investigations of this sort (Violanti, Vena, Marshall, & Petralia, 1996b; Violanti, 2010b). Further, although findings regarding suicide mortality rates have been discrepant within the literature—likely due to regional variation in rates, as well as different methodologies of obtaining and analyzing data—it is clear that suicide among police officers needs to be addressed.

On this front, one suicide prevention intervention—Together for Life—has been found to be efficacious (Mishara & Martin, 2012). In this study, all 4178 members of the Montreal Police Department participated in a series of trainings regarding how to identify and intervene upon at-risk officers. A police officer-specific hotline was activated, and publicity campaigns were employed. In the 12 years following the implementation of the program, the suicide rate among Montreal police decreased by 79%. This did not appear to simply be an artifact of time, however, as the police suicide rates in other Quebec provinces did not decrease (and in fact, had a slight, albeit not statistically significant, increase of 11% across the same time period).

As will be described further below, the above findings regarding suicide deaths among police are discrepant, in part due to regional differences as well as insufficient sampling strategies (e.g., examining single departments) and comparison groups (cf. “healthy worker” effect when compared to general populations).

3.2. Firefighters

There are relatively fewer data on suicidal thoughts and behaviors among firefighters, despite the identified importance of this topic for the fire service (Finney, Buser, Schwartz, Archibald, & Swanson, 2015; Gist, Taylor, & Raak, 2011). Overall, nine studies were identified (see Table 1).

3.2.1. Suicide ideation and behaviors

Our search yielded five articles focusing on suicidal ideation, three of which additionally focused on suicide attempts among firefighters. Existing evidence suggests that firefighters experience elevated rates of suicidality compared to the general population, with a recent study of 1027 current and retired U.S. firefighters revealing career prevalence estimates of suicidal ideation, plans, and attempts to be 46.8%, 19.2%, and 15.5%, respectively (Stanley, Hom, Hagan, & Joiner, 2015b). As noted, among the general U.S. population, lifetime rates of ideation, plan, and attempt are 13.5%, 3.9%, and 4.6% (Kessler et al., 1999); it is emphasized that lifetime prevalence rates encompass a longer duration than career prevalence rates. The large sample size makes these data compelling; however, the convenience sample is subject to several limitations (e.g., differential responding biases).

Two other studies have evaluated suicidal ideation, specifically, though neither reported prevalence rates (Carpenter et al., 2015; de Barros, Martins, Saitz, Bastos, & Ronzani, 2012).

Further, de Barros et al. (2012) examined sleep disturbances among 303 firefighters in Brazil, and found suicidal ideation to be marginally significantly related ($p < .10$), but in line with other research demonstrating a potent link between sleep disturbances and suicide risk (see Bernert et al., 2015 for review). Again, both studies utilized convenience samples, highlighting the necessity for future research into suicide and suicide-related conditions among firefighters to utilize more representative sampling strategies.

Understanding how firefighters at elevated risk for suicide interface with mental health care services is of particular importance. One study of 483 current and retired U.S. firefighters reporting suicidal thoughts and/or behaviors throughout their career revealed that 77% also utilized mental health services during that time frame (Hom, Stanley, Moberg & Joiner, in press). These data do not indicate if treatment was sought specifically for suicidality; nonetheless,

these findings underscore the need for evidence-based treatments to be developed and tested for firefighters and other first responders, specifically (Haugen et al., 2012).

3.2.2. Suicide deaths

Four studies were identified examining suicide mortality among firefighters, specifically. Findings were equivocal, with one study of Boston firefighters revealing lower rates compared to the general population (Musk et al., 1978) and one study that utilized pooled data from the Philadelphia, San Francisco, and Chicago fire departments indicating no elevated suicide rate in firefighters as compared to the general population (Daniels et al., 2013; see Supplementary Data). Moreover, among 7789 firefighters employed in Philadelphia between 1925 and 1986, 37 suicide deaths were observed—a rate lower than the general population (Baris et al., 2001). Among retired firefighters in Scotland as well, rates were found to be lower than those found among the general population (Ide, 1998). It remains difficult to extrapolate generalizable findings from these studies, as Boston firefighters in the 1970s, for example, may represent a distinct group, and the pooled data represent fire departments from major cities and may not generalize to rural and/or volunteer departments (e.g., Stanley and colleagues (2015b) found higher rates of suicide ideation and attempts among volunteers).

Overall, studies suggest that firefighters may be at elevated risk of suicide. Additional research is certainly needed within this area, including studies employing a random probability sampling strategy and a longitudinal design to increase generalizability and to determine the relative contribution of pre-career and career factors in conferring risk.

3.3. EMTs/paramedics

In contrast to the large body of research on suicide among police officers and the emerging literature with regards to firefighters, few studies have evaluated suicide among EMTs and paramedics. Only two studies met our inclusionary criteria (see Table 1). However, as noted, EMTs often have concurrent careers as either a police officer or firefighter, either as part of their career or a separate volunteer affiliation. Thus, below we will review the scant data on EMTs and paramedics specifically, and also discuss ancillary findings within other reports that have relevance to these populations. Due to the similarities in job duties between EMTs and paramedics, and the similarities identified within the literature, these two occupations will be reviewed together. We acknowledge, however, that these occupations have distinct experiences—e.g., paramedics undergo more hours of education to receive certification.

In a study of 1180 Norwegian ambulance personnel, Sterud, Hem, Lau, and Ekeberg (2008) found a lifetime prevalence rate of 28% for individuals reporting feeling life is not worth living, 10.4% for serious suicidal ideation, and 3.1% for a past suicide attempt. Past-year estimates were 8.3%, 1.9%, and 0.4%, respectively. These rates are approximately half that of Norwegian medical students and young physicians (Tyssen, Vaglum, Grønvold, & Ekeberg, 2001). Sterud et al. (2008) reported that, among ambulance personnel, only 1.8% of respondents attributed suicidal ideation solely to workplace problems, with 4% of females and 11% of males indicating work problems as a relevant but not singular factor. Within the U.S., one study reported that three EMTs in NYC died by suicide in 1992, with three others likely a suicide but documented as undetermined causes (Mitchell, 1995). Neither rates nor comparison groups were provided in this report.

There is a clear need for research into suicidal thoughts and behaviors among EMTs and paramedics. In this context, it is notable that healthcare professionals, more broadly, have elevated risk for suicide (Boxer et al., 1995; Platt, Hawton, Simkin, Dean, & Mellanby, 2012). In their study focused primarily on firefighters, Stanley and colleagues (2015b) found that firefighters who were members of departments that also responded to emergency medical

services calls were nearly six times more likely to report having made a career suicide attempt. Thus, EMT/paramedic duties may confer additive risk when considered in combination with other first responder occupations (e.g., firefighters).

3.4. Hybrid studies

Given that first responders belonging to more than one subgroup appear to be at additively elevated risk, studies centrally examining more than one first responder group are especially useful. Four studies were identified that examined more than one of the aforementioned occupational groups (see Table 1). Under the larger umbrella term “protective service occupations,” rates of workplace suicide fatalities between 2003 and 2010 were higher among firefighters and police officers (Tiesman et al., 2015). Of note, however, statistics on workplace suicides do not capture suicide fatalities that occur outside of the work setting (e.g., at home). In contrast, among 615 police officers and 271 firefighters fatalities in New Jersey between 1974 and 1980, rates of suicide for both occupations appeared lower than those of the general population of white males (Feuer & Rosenman, 1986). A separate study utilizing NOMS data from 1984–1998 found that police officers die by suicide at a rate approximately four times that of firefighters (Violanti, 2010a). Moreover, police officer deaths have a higher risk of misclassification than firefighters (Violanti, 2010b). This latter point is particularly intriguing in light of the resources and interest police departments have to investigate the deaths of their own.

4. A synthesis of population-specific risk and protective correlates

4.1. Risk correlates

Why might first responders, in particular, be at increased risk for suicide? In reviewing the aforementioned findings, several themes with regard to risk correlates emerge.³ Although these correlates have relevance to the general population as well, that these risk correlates are salient across these first responder occupations is important to consider. A non-exhaustive list includes: (1) occupational hazards and exposures; (2) access to firearms and other lethal methods (e.g., service revolver); (3) capability for suicide (e.g., elevated physical pain tolerance); (4) erratic shift schedules (e.g., sleep disturbances, disrupted family lives); (5) stigma preventing utilization of services; (6) a focus on helping others at the expense of focusing on personal needs; (7) multiple high-risk roles (e.g., a police officer who is also an EMT); (8) role transitions (e.g., younger, fewer years of service); (9) smaller departments (e.g., due to fewer mental health resources); and (10) concurrent or past military service experience (e.g., combat exposure).

This latter point—concurrent or past military service experience—is worth pondering, especially in light of the risk correlates listed previously (e.g., access to firearms, erratic and fragmented sleep schedules, etc.). Indeed, many of these risk correlates mirror risk correlates for suicide found in military populations. For example, in their scoping review of risk and protective factors for suicide among soldiers, Nock et al. (2013) highlight how combat can lead to marked sleep deprivation and PTSD, and moreover, that these are modifiable risk factors amenable to therapeutic intervention. Further, in a systematic review and meta-analysis, Bryan et al. (2015) found that combat exposure conferred greater risk for suicide than deployment alone. This finding has implications for first responders because it may be that first responder duties (cf. deployments) do not confer increased risk per se, unless if coupled with exposure to significant vocational

atrocities (cf. combat exposure). Thus, an understanding of suicide among first responders may bidirectionally inform suicide research among military service members.

Some of these factors are reflected in Nelson and Smith's (1970) six-factor account of why police officers, specifically, die by suicide. Of note, Nelson and Smith (1970) suggest that one salient reason that police officers may be at risk for suicide is their constant confrontation with death—of both themselves (cf. prey) and others (cf. predators). This conjecture is in line with past literature demonstrating the potency of exposure to painful and provocative events in conferring increased risk (Joiner, 2005; Van Orden et al., 2010), as well as emerging accounts of serious suicidal crises resembling antipredator defensive reactions in which soon-to-be suicide decedents are simultaneously victim and killer (Joiner & Stanley, under review; cf. Joiner, Hom, Hagan & Silva, in press). Further, if, as Joiner et al. (in press) contend, suicide is indeed a derangement of the self-sacrificial behavioral suite seen among defenders in other cooperative species (e.g., ants, bees), it is plausible that defenders within the cooperative human social structure (e.g., firefighters, police officers, EMTs, paramedics) who routinely and voluntarily risk their lives for the sake of society at large would demonstrate elevated risk for suicide.

4.1.1. Posttraumatic stress disorder

Psychiatric risk factors are especially important, as they signal points of intervention. PTSD is emphasized since, surprisingly, few studies have empirically examined PTSD as a risk correlate for suicide among first responders (Panagioti, Gooding, & Tarrier, 2009). Among police, our review yielded only five studies examining this conjecture, with two utilizing a U.S. sample, and all finding a statistically significant relationship between PTSD and suicidality (Chopko et al., 2014; Maia et al., 2007; Steyn, Vawda, Wyatt, Williams, & Madu, 2013; Violanti, 2004; Violanti et al., 2008). For example, one study of 157 Brazilian police officers who were part of an elite unit found that, of the 8.9% who met criteria for PTSD, 35.7% reported lifetime suicidal ideation (Maia et al., 2007). In the same study, only 5.2% of those not meeting criteria for PTSD reported lifetime ideation. Steyn et al. (2013) examined PTSD symptom clusters among 217 South African police officers and found that hyperarousal (e.g., difficulty falling or staying asleep, anger) was the primary predictor of suicidal ideation, accounting for approximately 25% of the variance. Among the general population, hyperarousal has been shown to increase suicide risk in some studies (Ben-Ya'acov & Amir, 2004), but not all (Davis, Witte, Weathers, & Blewins, 2014). Further, for male officers, the presence of PTSD appears to potentiate the relationship between shift-work and suicidal ideation (Violanti et al., 2008).

Related to trauma exposure, in examining data from Cop 2 Cop, a crisis hotline for police officers, calls related to suicidal ideation among police officers who served in the immediate geographic area of the September 11th World Trade Center attacks significantly increased from pre-9/11 to post-9/11 (Violanti, Castellano, Rourke, & Paton, 2006). Contrast these findings with results from a crisis hotline for the general population (i.e., 1-800-SUICIDE), which received a marked reduction in the number of calls in the days following the 9/11 attacks (Joiner, 2005, p. 128). It could be that these trauma-exposed officers experienced significant distress; indeed, disasters have potent effects on first responders, including increased risk for PTSD (Neria, Nandi, & Galea, 2008).

Of concern, no studies identified examined the relationship between PTSD and suicide among firefighters, EMTs, or paramedics. As a proxy for the role of trauma exposure in conferring suicide risk among firefighters, Stanley and colleagues (2015b) found that active duty military service members and those reporting having professionally responded to a suicide attempt or fatality were significantly more likely to report lifetime suicidal behaviors.

It is notable that, although rates of PTSD among first responders appear to be elevated (pooled rate in North America: 12%; Berger

³ We have decided to use the term *risk correlate* rather than *risk factor* because few studies utilized a longitudinal design (see Kraemer et al., 1997 for a discussion of risk nomenclature). However, in some instances, we have retained the term *risk factor* to emphasize the need for prospective research.

et al., 2012), upwards of 25% of individuals in the general population exposed to a traumatic event have been shown to develop PTSD (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Given that first responders are repeatedly exposed to traumatic events, the dearth of research in this area is particularly concerning. Notably, PTSD was not classified as an official, distinct psychiatric diagnosis until the publication of the DSM-III in 1980. This could in part account for the dearth of research in this area, given that many of the studies reviewed were published before or around that time period. Interestingly, among the general population, treatment of PTSD also appears to reduce suicidal ideation (Gradus, Suvak, Wisco, Marx, & Resick, 2013), although data among first responders, in particular, are sparse (Haugen et al., 2012). Thus, it is imperative that future research examines the role of PTSD, in particular, in conferring suicide risk among first responders.

4.1.2. Occupational dissatisfaction, stress, and burnout

A number of studies suggest that occupational factors may contribute to risk for suicidal ideation. For example, a study of Norwegian police officers found that both job dissatisfaction and burnout predicted suicidal ideation, but this effect disappeared when statistically adjusting for depression (Berg et al., 2003). Likewise, in a study of 177 police officers in the Eastern U.S., job satisfaction was negatively associated with suicidal ideation (Beehr, Johnson, & Nieva, 1995). In this same sample, males were more likely than females to attribute their suicidality to work problems. Occupational factors may also play a role in conferring risk for death by suicide among police officers. In a novel methodological approach to studying the phenomena—including canvassing and analyzing tens of thousands of web articles related to police suicides—it was revealed that work-associated legal problems were implicated in about 13% of police suicides in 2012 (O'Hara, Violanti, Levenson, & Clark, 2013). In another study of police officer suicide decedents, 31.5% had work performance issues and 23% were under investigation at the time of the death (Barron, 2010). Studies have also revealed that a notable proportion of police officers die by suicide at their location of employment and using a firearm. For instance, one study of police officer suicide decedents found that 15.6% died by suicide at the police department (Kapusta et al., 2010). The study authors argue that this statistic illustrates the potency of occupational factors in conferring risk. Further, in a study of 93 suspected suicide fatalities among NYPD officers between 1934 and 1940, Heiman (1977) notes the high prevalence of firearm usage among police suicides, which may reflect a process of socialization. Most suicide decedents had a psychiatric disorder, which is consistent with findings among the general population (Cavanagh, Carson, Sharpe, & Lawrie, 2003). Given these findings, it appears that occupational factors may be important to consider (see Labovitz & Hagedorn, 1971); yet, in an analysis of officer suicides in NYC from 1934–1939, Lester (1993) suggested that work-related stress had a trivial role in the suicides. Likewise, a psychological autopsy of eight police suicide decedents between 2000 and 2010 did not identify on-duty traumatic incidents as a primary theme (Rouse et al., 2015). Thus, further work is needed to delineate the role of occupational factors in conferring risk for suicide among police officers.

4.1.3. Career transitions

Among police, several studies found that the majority of decedents were of lower rank and, correspondingly, had fewer years of service (Cantor et al., 1995; O'Hara & Violanti, 2009; Violanti, 2004). Among firefighters, Stanley and colleagues (2015b) reported increased suicide risk among volunteer firefighters (vs. career) and those who were younger and/or reporting fewer years of firefighter service. Taken together, these preliminary data suggest that career transitions—either at the outset of one's career, or shifting back-and-forth into one's role as a volunteer—may be important factors to consider in conceptualizing suicide risk among first responders.

4.1.4. Marital problems

Janik and Kravitz (1994) reported that officers reporting marital problems were nearly five times more likely to have made a suicide attempt than those not reporting marital problems. A separate study examining suicide mortality among police officers found that marital discord may also be a salient precipitating factor (Josephson & Reiser, 1990).

4.1.5. Sleep disturbances

Among firefighters, sleep disturbances appear to increase risk for suicide (de Barros et al., 2012). Although no studies identified by this review directly examined this relationship among police officers, as noted, Steyn et al. (2013) found that, of the PTSD symptom clusters, the hyperarousal cluster (which includes symptoms such as difficulty falling or staying asleep) was the primary predictor of suicidal ideation among police officers. Given that shiftwork confers risk for insomnia (Vallières et al., 2014), further delineation of the role of sleep disturbances in conferring suicide risk among first responders, in particular, is needed (see also Hom et al., 2015b).

4.2. Protective factors

These occupations also carry unique potential protective factors. A non-exhaustive list includes: (1) camaraderie; (2) familial social support; (3) organizational support; and (4) sense of purpose. These factors are in line with current theoretical models of suicide risk (Joiner, 2005; Klonsky & May, 2015; O'Connor, 2011; Van Orden et al., 2010), which, as noted, highlight the salubrity of social connectedness in protecting against suicide risk. For example, among female (but not male) police officers, marriage appeared to be a protective factor for the development of suicidal ideation (Violanti et al., 2009). This finding is interesting in light of data from the general U.S. population suggesting that marriage is a protective factor against suicide for males, but not females (Kposowa, 2000). Carpenter et al. (2015) conducted a survey of 334 professional firefighters in the U.S. to examine the moderating role of social support from colleagues on the association between occupational stress and suicidal ideation. Indeed, social support was shown to attenuate this association, suggesting that increasing social support among at-risk firefighters may be one avenue to decrease suicide within the fire service.

These findings align with current theoretical models of suicidal behavior,⁴ including the interpersonal-psychological theory of suicide (IPTS; Joiner, 2005; Van Orden et al., 2010; see also Joiner et al., *in press*), the three-step theory (3ST; Klonsky & May, 2015), and the integrated motivational-volitional model of suicidal behavior (IMV; O'Connor, 2011)—each of which posit a central role of connectedness in buffering against suicide risk. Indeed, one study found support for the interpersonal theory of suicide, specifically, among current firefighters (Chu et al., *under review*). As one example, a core component of the interpersonal theory is perceived burdensomeness, which is the incorrect mental calculation made by suicidal individuals that their death is worth more than their life to others (see Joiner, 2005). It is emphasized here that a sense of purpose may buffer some first responders against the development of suicidal thoughts and behaviors, since by virtue of these occupations, these individuals may feel that their life is worth *more* than their death to others (indeed, their services are needed to protect others).⁵ Nevertheless, protective factors can be relatively weak and/or irrelevant in the face of multiple ominous risk factors.

⁴ The reader is referred to Selby, Joiner, and Ribeiro (2014) and Stanley, Hom, Rogers, Hagan, and Joiner (2015c) for comprehensive reviews of extant theories of suicide.

⁵ On firefighters, Musk et al. (1978) wrote, "It may also be that a career devoted to saving property and lives from fire may lead to a value system where suicide has no place as an alternative."

5. Evidentiary strengths, weaknesses, and future directions

Building on the strengths and weaknesses of studies included in this systematic review, several areas for future directions were identified—use of longitudinal designs, examination of the full continuum of suicidality (i.e., ideation, plans, attempts, death), further delineation of the role of PTSD and other psychiatric illnesses in conferring suicide risk, use of different comparison groups, rigorous testing of interventions, consistent reporting of effect sizes, and a focus on mental health services use—each of which will be reviewed in turn below.

A host of studies have examined suicide mortality among police, but all except one have utilized retrospective analyses of existing data. Future research utilizing longitudinal designs and systematic records reviews (e.g., through the CDC's National Death Index; Cowper, Kubal, Maynard, & Hynes, 2002) are clearly indicated across first responder populations. Similarly, although no national database of suicide fatalities among first responders currently exists, one model database is Law Enforcement Assaulted Officers Killed and Assaulted (LEOKA), maintained by the Federal Bureau of Investigations. However, data on officer suicides are not captured in this database (see O'Hara et al., 2013), nor are fatalities by other first responder groups. A more cohesive and comprehensive mortality database would provide valuable insights into the scope of suicide among first responders, as well as which subgroups are most at risk. Moreover, a central database that records suicide fatalities among first responders could yield insights regarding risk among volunteers—a group underrepresented in the aforementioned studies, in part due to the difficulties in tracking and compiling meaningful data among smaller, non-career departments. Importantly, the current review revealed that many of the studies examining rates of suicide mortality among first responders did not report associated features (i.e., risk and protective factors) of the decedents. This represents an important area for future inquiry.

Beyond mortality as an outcome, there is a notable dearth of studies examining the full continuum of suicidality among EMTs and paramedics. Also, across groups, there were few studies on suicide attempts, an arguably more meaningful outcome than ideation alone. Examining the full continuum of suicidality is important, as factors associated with suicide ideation are likely distinct from those associated with attempts (see Klonsky & May, 2014 for a discussion of the ideation-to-action framework). More nuanced assessments of suicidal thoughts and behaviors should also be employed, and mixed quantitative-qualitative methodological approaches should be considered. Further, it is especially important to parse apart specific first responder roles, as many first responders have more than one role within this domain, and multiple roles may have an additive effect (see Stanley, Hom, Hagan, & Joiner, 2015b).

Several considerations regarding risk and protective factors are worth emphasizing in this section. As noted, there is an enormous body of literature examining PTSD among first responders (Berger et al., 2012; Haugen et al., 2012). Further, a separate body of literature has demonstrated that PTSD is a risk factor for suicide (Cogle, Keough, et al., 2009a; Cogle, Resnick, & Kilpatrick, 2009b; Gradus et al., 2010), and that the treatment of PTSD may therapeutically impact suicide risk (Gradus et al., 2013). There exists a fissure, however, between these two important, complementary lines of inquiry. As noted, it is imperative that future research more systematically examine the role of PTSD in conferring suicide risk among first responders, including delineating which specific clusters are implicated (see Steyn et al., 2013). Note here, too, the dialectic of family providing support but also serving as a stressor due to erratic call schedules. The role of families in either buffering against or potentiating risk for suicide among first responders deserves further empirical inquiry.

While comparisons of fatalities rates to the general population provide a useful metric to gauge the relative scope of the problem in particular occupational groups, as noted, interpretations of differences in rates are complicated by the “healthy worker” effect. Thus, researchers

should carefully consider comparison groups (e.g., comparing suicide rates of police officers to non-deployed military service members may provide a more useful metric of relative risk). It is also known that these occupations undergo pre-enlistment psychological testing, but little is known about how this information can inform vulnerability over the course of one's career. Considering that these individuals are high functioning and mental health problems are largely screened out/addressed at the outset, data revealing higher rates are even more compelling. Relatedly, effect sizes for significant results should always be reported in order to determine the practical utility of findings.

There were few studies examining interventions to decrease suicide and suicide-related morbidities among first responders. Drawing from other related literature, it is clear that interventions designed to reduce suicide risk in specific populations are needed (Peñalba, McGuire, & Leite, 2008; Rudd et al., 2015). One fruitful attendant area of inquiry is mental health services use. Although data among suicidal firefighters, specifically, are promising with regards to treatment engagement (Hom, Stanley, Moberg and Joiner, *in press*), data among at-risk police officers suggest a concerning underutilization of services (Berg, Hem, Lau, & Ekeberg, 2006). Given the importance of connecting suicidal individuals to care in order to mitigate symptoms and prevent preventable loss of life (Bruffaerts et al., 2011; Hom et al., 2015a; Stanley, Hom, & Joiner, 2015a), further understanding of rates, patterns, and correlates of mental health services use among first responders is needed. In sum, although the present systematic review revealed 63 studies examining suicide across first responder populations, additional research utilizing methodological approaches with greater rigor are sorely needed to elevate the science.

6. Strengths and limitations of the present review

Notwithstanding the strengths of this review, including a systematic approach to reviewing the empirical literature on suicidality among multiple related first responder groups, there are a few noteworthy limitations. First, as with any review, there is a risk of publication biases; however, our concerns regarding this limitation are attenuated by the variegated findings across studies (e.g., studies were published reporting higher, lower, and comparable suicide rates across groups). Second, it is possible that our search terms, though broad, were not fully inclusive of the relevant literature. Third, although cross-national findings were reviewed, only studies published in English were included.

7. Conclusions

Findings from this systematic review revealed that police officers, firefighters, EMTs, and paramedics may be at elevated risk for suicidal thoughts and behaviors. In instances where risk relative to general population samples did not appear higher (or, indeed, were lower), it is emphasized that this could be an artifact of the “healthy worker” effect (Li & Sung, 1999; Pearce et al., 2007): First responders undergo pre-enlistment screening and are generally considered a higher functioning group of individuals; thus, one would expect rates of suicidality to be markedly lower among these populations.

Ultimately, it is our hope that this systematic review will yield further rigorous scientific inquiry into suicide among first responders, and that findings will translate to a greater understanding of mental health among first responders, increased compassion, reduced stigma, and scientifically informed prevention and treatment efforts to inoculate against preventable morbidity and mortality (e.g., suicide). When we call 911 with an emergency (in the U.S.), we expect swift and life-saving reactions from our first responders. The literature reviewed above sounds a similar alarm—one for which we, as clinicians and researchers, are duty-bound to respond.

Acknowledgments

This work was supported in part by the National Fallen Firefighters Foundation and the Military Suicide Research Consortium (MSRC), an effort supported by the Office of the Assistant Secretary of Defense for Health Affairs under Award No. (W81XWH-10-2-0181). Opinions, interpretations, conclusions and recommendations are those of the authors and are not necessarily endorsed by the MSRC or the Department of Defense. The funders had no role in the study design; in the collection, analysis, and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication.

References

- Arias, E. A., Schlesinger, L. B., Pinizzotto, A. J., Davis, E. F., Fava, J. L., & Dewey, L. M. (2008). Police officers who commit suicide by cop: A clinical study with analysis. *Journal of Forensic Sciences*, 53(6), 1455–1457. <http://dx.doi.org/10.1111/j.1556-4029.2008.00861.x>.
- Baris, D., Garrity, T. J., Telles, J. L., Heineman, E. F., Olshan, A., & Zahm, S. H. (2001). Cohort mortality study of Philadelphia firefighters. *American Journal of Industrial Medicine*, 39(5), 463–476. <http://dx.doi.org/10.1002/ajim.1040>.
- Barron, S. (2010). Police officer suicide within the New South Wales police force from 1999 to 2008. *Police Practice and Research*, 11(4), 371–382. <http://dx.doi.org/10.1080/15614263.2010.496568>.
- de Barros, V. V., Martins, L., Saitz, R., Bastos, R. R., & Ronzani, T. M. (2012). Mental health conditions, individual and job characteristics and sleep disturbances among firefighters. *Journal of Health Psychology*, 18(3), 350–358. <http://dx.doi.org/10.1177/1359105312443402>.
- Beck, A. T., Kovacs, M., & Weissman, A. (1979). Assessment of suicidal intention: The scale for suicide ideation. *Journal of Consulting and Clinical Psychology*, 47(2), 343–352.
- Beehr, T. A., Johnson, L. B., & Nieva, R. (1995). Occupational stress: Coping of police and their spouses. *Journal of Organizational Behavior*, 16(1), 3–25. <http://dx.doi.org/10.1002/job.4030160104>.
- Ben-Ya'acov, Y., & Amir, M. (2004). Posttraumatic symptoms and suicide risk. *Personality and Individual Differences*, 36(6), 1257–1264. [http://dx.doi.org/10.1016/S0191-8869\(03\)00003-5](http://dx.doi.org/10.1016/S0191-8869(03)00003-5).
- Berg, A. M., Hem, E., Lau, B., & Ekeberg, O. (2006). Help-seeking in the Norwegian police service. *Journal of Occupational Health*, 48(3), 145–153. <http://dx.doi.org/10.1539/joh.48.145>.
- Berg, A. M., Hem, E., Lau, B., Loeb, M., & Ekeberg, O. (2003). Suicidal ideation and attempts in Norwegian police. *Suicide & Life-Threatening Behavior*, 33(3), 302–312. <http://dx.doi.org/10.1521/suli.33.3.302.23215>.
- Berger, W., Coutinho, E. S. F., Figueira, I., Marques-Portella, C., Luz, M. P., Neylan, T. C., ... Mendlowicz, M. V. (2012e). Rescuers at risk: A systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers. *Social Psychiatry and Psychiatric Epidemiology*, 47(6), 1001–1011. <http://dx.doi.org/10.1007/s00127-011-0408-2>.
- Bernert, R. A., Kim, J. S., Iwata, N. G., & Perlis, M. L. (2015). Sleep disturbances as an evidence-based suicide risk factor. *Current Psychiatry Reports*, 17(3), 554. <http://dx.doi.org/10.1007/s11920-015-0554-4>.
- Boxer, P. A., Burnett, C., & Swanson, N. (1995). Suicide and occupation: A review of the literature. *Journal of Occupational and Environmental Medicine*, 37(4), 442–452. <http://dx.doi.org/10.1097/00043764-199504000-00016>.
- Bruffaerts, R., Demyttenaere, K., Hwang, I., Chiu, W. -T., Sampson, N., Kessler, R. C., ... Nock, M. K. (2011). Treatment of suicidal people around the world. *The British Journal of Psychiatry*, 199(1), 64–70. <http://dx.doi.org/10.1192/bjp.bp.110.084129>.
- Bryan, C. J., Griffith, J. E., Pace, B. T., Hinkson, K., Bryan, A. O., Clemans, T. A., & Imel, Z. E. (2015). Combat exposure and risk for suicidal thoughts and behaviors among military personnel and veterans: A systematic review and meta-analysis. *Suicide & Life-Threatening Behavior*, 45(5), 633–649. <http://dx.doi.org/10.1111/sltb.12163>.
- Buckman, J. E., Sundin, J., Greene, T., Fear, N. T., Dandeker, C., Greenberg, N., & Wessely, S. (2011). The impact of deployment length on the health and well-being of military personnel: A systematic review of the literature. *Occupational and Environmental Medicine*, 68(1), 69–76. <http://dx.doi.org/10.1136/oem.2009.054692>.
- Cantor, C. H., Tyman, R., & Slater, P. J. (1995). A historical survey of police suicide in Queensland, Australia, 1843–1992. *Suicide & Life-Threatening Behavior*, 25(4), 499–507.
- Carpenter, G. S. J., Carpenter, T. P., Kimbrel, N. A., Flynn, E. J., Pennington, M. L., Cammarata, C., ... Gulliver, S. B. (2015a). Social support, stress, and suicidal ideation in professional firefighters. *American Journal of Health Behavior*, 39(2), 191–196. <http://dx.doi.org/10.5993/AJHB.39.2.5>.
- Cavanagh, J. T., Carson, A. J., Sharpe, M., & Lawrie, S. M. (2003). Psychological autopsy studies of suicide: A systematic review. *Psychological Medicine*, 33(3), 395–405. <http://dx.doi.org/10.1017/S0033291702006943>.
- Centers for Disease Control and Prevention [CDC] (2015). WISQARS: Web-based injury statistics query and reporting System. Retrieved from <http://www.cdc.gov/injury/wisqars/index.html>
- Chopko, B. A., Palmieri, P. A., & Facemire, V. C. (2014). Prevalence and predictors of suicidal ideation among U.S. law enforcement officers. *Journal of Police and Criminal Psychology*, 29(1), 1–9. <http://dx.doi.org/10.1007/s11896-013-9116-z>.
- Chu, C., Buchman-Schmitt, J. M., Hom, M. A., Stanley, I. H., & Joiner, T. E. (2015). *A test of the interpersonal theory of suicide among a large sample of current firefighters.* (under review).
- Cougle, J. R., Keough, M. E., Riccardi, C. J., & Sachs-Ericsson, N. (2009a). Anxiety disorders and suicidality in the National Comorbidity Survey-Replication. *Journal of Psychiatric Research*, 43(9), 825–829. <http://dx.doi.org/10.1016/j.jpsychires.2008.12.004>.
- Cougle, J. R., Resnick, H., & Kilpatrick, D. G. (2009b). PTSD, depression, and their comorbidity in relation to suicidality: Cross-sectional and prospective analyses of a national probability sample of women. *Depression and Anxiety*, 26(12), 1151–1157. <http://dx.doi.org/10.1002/da.20621>.
- Cowper, D. C., Kubal, J. D., Maynard, C., & Hynes, D. M. (2002). A primer and comparative review of major U.S. mortality databases. *Annals of Epidemiology*, 12(7), 462–468. [http://dx.doi.org/10.1016/S1047-2797\(01\)00285-X](http://dx.doi.org/10.1016/S1047-2797(01)00285-X).
- Crosby, A. E., Han, B., Ortega, L. A. G., Parks, S. E., & Gfroerer, J. (2011). Suicidal thoughts and behaviors among adults aged ≥ 18 years—United States, 2008–2009. *Morbidity and Mortality Weekly Report. Surveillance Summaries*, 60(13), 1–22.
- Curran, P. S., Finlay, R. J., & McGarry, P. J. (1988). Trends in suicide: N. Ireland 1960–86. *Irish Journal of Psychological Medicine*, 5, 98–102.
- Daniels, R. D., Kubale, T. L., Yiin, J. H., Dahm, M. M., Hales, T. R., Baris, D., ... Pinkerton, L. E. (2013). Mortality and cancer incidence in a pooled cohort of US firefighters from San Francisco, Chicago and Philadelphia (1950–2009). *Occupational and Environmental Medicine*, 71, 388–397. <http://dx.doi.org/10.1136/oemed-2013-101662>.
- Dash, J., & Reiser, M. (1978). Suicide among police in urban law enforcement agencies. *Journal of Police Science and Administration*, 6(1), 18–21.
- Davis, M. T., Witte, T. K., Weathers, F. W., & Blevins, C. A. (2014). The role of posttraumatic stress disorder symptom clusters in the prediction of passive suicidal ideation. *Psychological Trauma: Theory, Research, Practice, and Policy*, 6, 582–591. <http://dx.doi.org/10.1037/a0035966>.
- Faust, K. L., & Ven, T. V. (2014). Policing disaster: An analytical review of the literature on policing, disaster, and post-traumatic stress disorder. *Sociology Compass*, 8(6), 614–626. <http://dx.doi.org/10.1111/soc4.12160>.
- Feuer, E., & Rosenman, K. (1986). Mortality in police and firefighters in New Jersey. *American Journal of Industrial Medicine*, 9(6), 517–527. <http://dx.doi.org/10.1002/ajim.4700090603>.
- Finney, E. J., Buser, S. J., Schwartz, J., Archibald, L., & Swanson, R. (2015). Suicide prevention in fire service: The Houston fire department (HFD) model. *Aggression and Violent Behavior*, 21, 1–4. <http://dx.doi.org/10.1016/j.avb.2014.12.012>.
- Gist, R., Taylor, V. H., & Raak, S. (2011). Suicide surveillance, prevention, and intervention measures for the US fire service: Findings and recommendations for the suicide and depression summit. Retrieved from http://www.everyonegoeshome.com/wp-content/uploads/2014/04/suicide_whitepaper.pdf
- Gradus, J. L., Qin, P., Lincoln, A. K., Miller, M., Lawler, E., Sorensen, H. T., & Lash, T. L. (2010). Posttraumatic stress disorder and completed suicide. *American Journal of Epidemiology*, 171(6), 721–727. <http://dx.doi.org/10.1093/aje/kwp456>.
- Gradus, J. L., Suvak, M. K., Wisco, B. E., Marx, B. P., & Resick, P. A. (2013). Treatment of posttraumatic stress disorder reduces suicidal ideation. *Depression and Anxiety*, 30(10), 1046–1053. <http://dx.doi.org/10.1002/da.22117>.
- Han, B., Compton, W. M., Gfroerer, J., & McKeon, R. (2015). Prevalence and correlates of past 12-month suicide attempt among adults with past-year suicidal ideation in the United States. *The Journal of Clinical Psychiatry*, 76(3), 295–302. <http://dx.doi.org/10.4088/JCP.14m09287>.
- Haugen, P. T., Evces, M., & Weiss, D. S. (2012). Treating posttraumatic stress disorder in first responders: A systematic review. *Clinical Psychology Review*, 32(5), 370–380. <http://dx.doi.org/10.1016/j.cpr.2012.04.001>.
- Haugen, P. T., Splaun, A. K., Evces, M. R., & Weiss, D. S. (2013). Integrative approach for the treatment of posttraumatic stress disorder in 9/11 first responders: Three core techniques. *Psychotherapy*, 50(3), 336–340. <http://dx.doi.org/10.1037/a0032526>.
- Heiman, M. F. (1975). The police suicide. *Journal of Police Science and Administration*, 3(3), 267–273.
- Heiman, M. F. (1977). Suicide among police. *American Journal of Psychiatry*, 134(11), 1286–1290.
- Hem, E., Berg, M., & Ekeberg, O. (2001). Suicide in police—A critical review. *Suicide & Life-Threatening Behavior*, 31(2), 224–233. <http://dx.doi.org/10.1521/suli.31.2.224.21513>.
- Hem, E., Haldorsen, T., Aasland, O. G., Tyssen, R., Vaglum, P., & Ekeberg, O. (2005). Suicide rates according to education with a particular focus on physicians in Norway 1960–2000. *Psychological Medicine*, 35(6), 873–880. <http://dx.doi.org/10.1017/S0033291704003344>.
- Hill, K. Q., & Clawson, M. (1988). The health hazards of “street level” bureaucracy: Mortality among the police. *Journal of Police Science and Administration*, 16(4), 243–248.
- Hom, M. A., Stanley, I. H., & Joiner, T. E. (2015a). Evaluating factors and interventions that influence help-seeking and mental health service utilization among suicidal individuals: A review of the literature. *Clinical Psychology Review*, 40, 28–39. <http://dx.doi.org/10.1016/j.cpr.2015.05.006>.
- Hom, M. A., Stanley, I. H., Moberg, F., & Joiner, T. E. Mental health service use among firefighters with suicidal thoughts and behaviors. *Psychiatric Services*. (in press)
- Hom, M. A., Stanley, I. H., Rogers, M. L., Tzoneva, M., Bernert, R. A., & Joiner, T. E. (2015b). The association between sleep disturbances and depression among firefighters: Emotion dysregulation as an explanatory factor. *Journal of Clinical Sleep Medicine*.
- Ide, C. W. (1998). Failing firefighters: A survey of causes of death and ill-health retirement in serving firefighters in Strathclyde, Scotland from 1985–94. *Occupational Medicine*, 48(6), 381–388. <http://dx.doi.org/10.1093/occmed/48.6.381>.
- Janik, J., & Kravitz, H. M. (1994). Linking work and domestic problems with police suicide. *Suicide & Life-Threatening Behavior*, 24(3), 267–274.
- Joe, S., Stein, D. J., Seedat, S., Herman, A., & Williams, D. R. (2008). Non-fatal suicidal behavior among South Africans: Results from the South Africa stress and health

- study. *Social Psychiatry and Psychiatric Epidemiology*, 43(6), 454–461. <http://dx.doi.org/10.1007/s00127-008-0348-7>.
- Joiner, T. E. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.
- Joiner, T. E., & Stanley, I. H. (2015). *Can the phenomenology of a suicidal crisis be usefully understood as a suite of antipredator defensive reactions?* (under review).
- Joiner, T. E., Hom, M. A., Hagan, C. R., & Silva, C. Suicide as a derangement of the self-sacrificial aspect of eusociality. *Psychological Bulletin*. <http://dx.doi.org/10.1037/rev0000020> (in press)
- Joiner, T. E., Pfaff, J. J., & Acres, J. G. (2002). A brief screening tool for suicidal symptoms in adolescents and young adults in general health settings: Reliability and validity data from the Australian national general practice youth suicide prevention project. *Behaviour Research and Therapy*, 40(4), 471–481. [http://dx.doi.org/10.1016/S0005-7967\(01\)00017-1](http://dx.doi.org/10.1016/S0005-7967(01)00017-1).
- Josephson, R. L., & Reiser, M. (1990). Officer suicide in the Los Angeles police department: A twelve-year follow-up. *Journal of Police Science and Administration*, 17(3), 227–229.
- Kapusta, N. D., Voracek, M., Etzersdorfer, E., Niederkrotenthaler, T., Dervic, K., Plener, P. L., ... Sonneck, G. (2010). Characteristics of police officer suicides in the federal Austrian police corps. *Crisis*, 31(5), 265–271. <http://dx.doi.org/10.1027/0227-5910/a000033>.
- Kaylor, J. A. D., King, D. W., & King, L. A. (1987). Psychological effects of military service in Vietnam: A meta-analysis. *Psychological Bulletin*, 102(2), 257–271. <http://dx.doi.org/10.1037/0033-2909.102.2.257>.
- Kessler, R. C., Borges, G., & Walters, E. E. (1999). Prevalence of and risk factors for lifetime suicide attempts in the national comorbidity survey. *Archives of General Psychiatry*, 56(7), 617. <http://dx.doi.org/10.1001/archpsyc.56.7.617>.
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, 52(12), 1048–1060. <http://dx.doi.org/10.1001/archpsyc.1995.03950240066012>.
- Klonsky, E. D., & May, A. M. (2014). Differentiating suicide attempters from suicide ideators: A critical frontier for suicidology research. *Suicide & Life-Threatening Behavior*, 44(1), 1–5. <http://dx.doi.org/10.1111/sltb.12068>.
- Klonsky, E. D., & May, A. M. (2015). The three-step theory (3ST): A new theory of suicide rooted in the “ideation-to-action” framework. *International Journal of Cognitive Therapy*, 8(2), 114–129. <http://dx.doi.org/10.1521/ijct.2015.8.2.114>.
- Kposowa, A. J. (2000). Marital status and suicide in the national longitudinal mortality study. *Journal of Epidemiology and Community Health*, 54(4), 254–261. <http://dx.doi.org/10.1136/jech.54.4.254>.
- Kraemer, H. C., Kazdin, A. E., Offord, D. R., Kessler, R. C., Jensen, P. S., & Kupfer, D. J. (1997). Coming to terms with the terms of risk. *Archives of General Psychiatry*, 54(4), 337–343. <http://dx.doi.org/10.1001/archpsyc.1997.01830160065009>.
- Labovitz, S., & Hagedorn, R. (1971). An analysis of suicide rates among occupational categories. *Sociological Inquiry*, 41, 67–72.
- Lester, D. (1993). A study of police suicide in New York City, 1934–1939. *Psychological Reports*, 73, 1395–1398. <http://dx.doi.org/10.2466/pr0.1993.73.3f.1395>.
- Lester, D., & Pitts, J. (1990). Depression and locus of control in police officers. *Psychological Reports*, 67, 826.
- Li, C. -Y., & Sung, F. -C. (1999). A review of the healthy worker effect in occupational epidemiology. *Occupational Medicine*, 49(4), 225–229. <http://dx.doi.org/10.1093/occmed/49.4.225>.
- Lindsay, M. S., & Lester, D. (2001). Suicide in a northeastern police department. *Psychological Reports*, 88, 226. <http://dx.doi.org/10.2466/pr0.2001.88.1.226>.
- Liu, B., Tarigan, L. H., Bromet, E. J., & Kim, H. (2014). World trade center disaster exposure-related probable posttraumatic stress disorder among responders and civilians: A meta-analysis. *PLoS One*, 9(7), e101491. <http://dx.doi.org/10.1371/journal.pone.0101491>.
- Loo, R. (1986). Suicide among police in a federal force. *Suicide & Life-Threatening Behavior*, 16(3), 379–388.
- Loo, R. (2003). A meta-analysis of police suicide rates: Findings and issues. *Suicide & Life-Threatening Behavior*, 33(3), 313–325. <http://dx.doi.org/10.1521/suli.33.3.313.23209>.
- Maia, D. B., Marmar, C. R., Metzler, T., Nóbrega, A., Berger, W., Mendlowicz, M. V., ... Figueira, I. (2007). Post-traumatic stress symptoms in an elite unit of Brazilian police officers: Prevalence and impact on psychosocial functioning and on physical and mental health. *Journal of Affective Disorders*, 97(1–3), 241–245.
- Marzuk, P. M., Nock, M. K., Leon, A. C., Portera, L., & Tardiff, K. (2002). Suicide among New York city police officers, 1977–1996. *American Journal of Psychiatry*, 159(12), 2069–2071. <http://dx.doi.org/10.1176/appi.ajp.159.12.2069>.
- Milner, A., Spittal, M. J., Pirkis, J., & LaMontagne, A. D. (2013). Suicide by occupation: Systematic review and meta-analysis. *The British Journal of Psychiatry*, 203, 409–416. <http://dx.doi.org/10.1192/bjp.bp.113.128405>.
- Mishara, B. L., & Martin, N. (2012). Effects of a comprehensive police suicide prevention program. *Crisis*, 33(3), 162–168. <http://dx.doi.org/10.1027/0227-5910/a000125>.
- Mitchell, J. T. (1995). Medic suicide: What can be done? *Journal of Emergency Medical Services*, 20(11), 41–45.
- Musk, A. W., Monson, R. R., Peters, J. M., & Peters, R. K. (1978). Mortality among Boston firefighters, 1915–1975. *British Journal of Industrial Medicine*, 35(2), 104–108. <http://dx.doi.org/10.1136/oem.35.2.104>.
- Nelson, Z. P., & Smith, W. E. (1970). The law enforcement profession: An incident of high suicide. *OMEGA—Journal of Death and Dying*, 1(4), 293–299.
- Neria, Y., Nandi, A., & Galea, S. (2008). Post-traumatic stress disorder following disasters: A systematic review. *Psychological Medicine*, 38(04). <http://dx.doi.org/10.1017/S0033291707001353>.
- Nock, M. K., Deming, C. A., Fullerton, C. S., Gilman, S. E., Goldenberg, M., Kessler, R. C., ... Ursano, R. J. (2013). Suicide among soldiers: A review of psychosocial risk and protective factors. *Psychiatry: Interpersonal and Biological Processes*, 76(2), 97–125. <http://dx.doi.org/10.1521/psyc.2013.76.2.97>.
- Nock, M. K., Holmberg, E. B., Photos, V. I., & Michel, B. D. (2007). Self-injurious thoughts and behaviors interview: Development, reliability, and validity in an adolescent sample. *Psychological Assessment*, 19(3), 309–317. <http://dx.doi.org/10.1037/1040-3590.19.3.309>.
- O'Connor, R. C. (2011). The integrated motivational-volitional model of suicidal behavior. *Crisis*, 32(6), 295–298. <http://dx.doi.org/10.1027/0227-5910/a000120>.
- O'Hara, A. F., & Violanti, J. M. (2009). Police suicide—A web surveillance of national data. *International Journal of Emergency Mental Health*, 11(1), 17–24.
- O'Hara, A. F., Violanti, J. M., Levenson, R. L., & Clark, R. G. (2013). National police suicide estimates: Web surveillance study III. *International Journal of Emergency Mental Health and Human Resilience*, 15(1), 31–38.
- Panagioti, M., Gooding, P., & Tarrier, N. (2009). Post-traumatic stress disorder and suicidal behavior: A narrative review. *Clinical Psychology Review*, 29(6), 471–482. <http://dx.doi.org/10.1016/j.cpr.2009.05.001>.
- Pearce, N., Checkoway, H., & Kriebel, D. (2007). Bias in occupational epidemiology studies. *Occupational and Environmental Medicine*, 64(8), 562–568. <http://dx.doi.org/10.1136/oem.2006.026690>.
- Peñalba, V., McGuire, H., & Leite, J. R. (2008). Psychosocial interventions for prevention of psychological disorders in law enforcement officers. *Cochrane Database of Systematic Reviews*, 3. <http://dx.doi.org/10.1002/14651858.CD005601.pub2>.
- Pienaar, J., Rothmann, S., & van de Vijver, F. J. R. (2007). Occupational stress, personality traits, coping strategies, and suicide ideation in the South African police service. *Criminal Justice and Behavior*, 34(2), 246–258. <http://dx.doi.org/10.1177/0093854806288708>.
- Plani, F., Bowley, D. M., & Goosen, J. (2003). Death and injury on duty—A study of South African police officers. *South African Medical Journal*, 93(11), 851–853.
- Platt, B., Hawton, K., Simkin, S., Dean, R., & Mellanby, R. J. (2012). Suicidality in the veterinary profession. *Crisis*, 33(5), 280–289. <http://dx.doi.org/10.1027/0227-5910/a000143>.
- Quinet, K. D., Bordua, D. J., & Lassiter, W. (1997). Line of duty police deaths: A paradoxical trend in felonious homicides in the United States. *Policing and Society*, 6(4), 283–296. <http://dx.doi.org/10.1080/10439463.1997.9964758>.
- Rouse, L. M., Frey, R. A., Lopez, M., Wohlers, H., Xiong, I., Llewellyn, K., ... Wester, S. R. (2015). Law enforcement suicide: Discerning etiology through psychological autopsy. *Police Quarterly*, 18(1), 79–108. <http://dx.doi.org/10.1177/1098611114563083>.
- Rudd, M. D., Bryan, C. J., Wertenberger, E. G., Peterson, A. L., Young-McCaughan, S., Mintz, J., ... Bruce, T. O. (2015z). Brief cognitive-behavioral therapy effects on post-treatment suicide attempts in a military sample: Results of a randomized clinical trial with 2-year follow-up. *American Journal of Psychiatry*, 172(5), 441–449. <http://dx.doi.org/10.1176/appi.ajp.2014.14070843>.
- Schmidtko, A., Fricke, S., & Lester, D. (1999). Suicide among German federal and state police officers. *Psychological Reports*, 84, 157–166. <http://dx.doi.org/10.2466/pr0.1999.84.1.157>.
- Selby, E. A., Joiner, T. E., & Ribeiro, J. D. (2014). Comprehensive theories of suicidal behaviors. In M. K. Nock (Ed.), *The Oxford handbook of suicide and self-injury*. New York, NY: Oxford University Press.
- Stanley, I. H., Hom, M. A., & Joiner, T. E. (2015a). Mental health services use among adults with suicide ideation, plans, or attempts: Results from a national survey. *Psychiatric Services*, 66(12), 1296–1302. <http://dx.doi.org/10.1176/appi.ps.201400593>.
- Stanley, I. H., Hom, M. A., Hagan, C. R., & Joiner, T. E. (2015b). Career prevalence and correlates of suicidal thoughts and behaviors among firefighters. *Journal of Affective Disorders*, 187, 163–171. <http://dx.doi.org/10.1016/j.jad.2015.08.007>.
- Stanley, I. H., Hom, M. A., Rogers, M. L., Hagan, C. R., & Joiner, T. E. (2015c). Understanding suicide among older adults: A review of psychological and sociological theories of suicide. *Aging & Mental Health*.
- Sterud, T., Hem, E., Lau, B., & Ekeberg, O. (2008). Suicidal ideation and suicide attempts in a nationwide sample of operational Norwegian ambulance personnel. *Journal of Occupational Health*, 50(5), 406–414. <http://dx.doi.org/10.1539/joh.L8025>.
- Steyn, R., Vawda, N., Wyatt, G. E., Williams, J. K., & Madu, S. N. (2013). Posttraumatic stress disorder diagnostic criteria and suicidal ideation in a South African police sample. *African Journal of Psychiatry*, 16(1), 19–22. <http://dx.doi.org/10.4314/ajps.v16i1.3>.
- Tiesman, H. M., Hendricks, S. A., Bell, J. L., & Amandus, H. A. (2010). Eleven years of occupational mortality in law enforcement: The census of fatal occupational injuries, 1992–2002. *American Journal of Industrial Medicine*, 53(9), 940–949. <http://dx.doi.org/10.1002/ajim.20863>.
- Tiesman, H. M., Konda, S., Hartley, D., Menéndez, C. C., Ridenour, M., & Hendricks, S. (2015). Suicide in U.S. workplaces, 2003–2010. *American Journal of Preventive Medicine*, 48(6), 674–682. <http://dx.doi.org/10.1016/j.amepre.2014.12.011>.
- Tyssen, R., Vaglum, P., Grønqvold, N. T., & Ekeberg, O. (2001). Suicidal ideation among medical students and young physicians: A nationwide and prospective study of prevalence and predictors. *Journal of Affective Disorders*, 64(1), 69–79.
- U.S. Bureau of Labor Statistics (2015). Occupational Employment Statistics. Retrieved August 1, 2015, from <http://www.bls.gov/oes/current/oes330000.htm>
- Vallières, A., Azaïef, A., Moreau, V., LeBlanc, M., & Morin, C. M. (2014). Insomnia in shift work. *Sleep Medicine*, 15(12), 1440–1448. <http://dx.doi.org/10.1016/j.sleep.2014.06.021>.
- Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, T. E. (2010). The interpersonal theory of suicide. *Psychological Review*, 117(2), 575–600. <http://dx.doi.org/10.1037/a0018697>.
- Vena, J. E., Violanti, J. M., Marshall, J., & Fiedler, R. C. (1986). Mortality of a municipal worker cohort: III. Police officers. *American Journal of Industrial Medicine*, 10(4), 383–397 Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/3788983>.
- Violanti, J. M. (1995). Trends in police suicide. *Psychological Reports*, 77(2), 688–690.
- Violanti, J. M. (2004). Predictors of police suicide ideation. *Suicide & Life-Threatening Behavior*, 34(3), 277–283. <http://dx.doi.org/10.1521/suli.34.3.277.42775>.

- Violanti, J. M. (2007). Homicide-suicide in police families: Aggression full circle. *International Journal of Emergency Mental Health*, 9(2), 97–104.
- Violanti, J. M. (2010a). Police suicide: A national comparison with firefighter and military personnel. *Policing: An International Journal of Police Strategies & Management*, 33(2), 270–286.
- Violanti, J. M. (2010b). Suicide or undetermined? A national assessment of police suicide death classification. *International Journal of Emergency Mental Health and Human Resilience*, 12(2), 89–94.
- Violanti, J. M., Vena, J. E., & Marshall, J. R. (1996a). Suicides, homicides, and accidental death: A comparative risk assessment of police officers and municipal workers. *American Journal of Industrial Medicine*, 30, 99–104. [http://dx.doi.org/10.1002/\(SICI\)1097-0274\(199607\)30:1<99::AID-AJIM17>3.3.CO;2-Z](http://dx.doi.org/10.1002/(SICI)1097-0274(199607)30:1<99::AID-AJIM17>3.3.CO;2-Z).
- Violanti, J. M., Vena, J. E., Marshall, J. R., & Petralia, S. (1996b). A comparative evaluation of police suicide rate validity. *Suicide & Life-Threatening Behavior*, 26(1), 79–85.
- Violanti, J. M., Vena, J. E., & Petralia, S. (1998). Mortality of a police cohort: 1950–1990. *American Journal of Industrial Medicine*, 33, 366–373. [http://dx.doi.org/10.1002/\(SICI\)1097-0274\(199804\)33:43.0.CO;2-S](http://dx.doi.org/10.1002/(SICI)1097-0274(199804)33:43.0.CO;2-S).
- Violanti, J. M., Castellano, C., Rourke, J. O., & Paton, D. (2006). Proximity to the 9/11 terrorist attack and suicide ideation in police officers. *Traumatology*, 12(3), 248–254. <http://dx.doi.org/10.1177/1534765606296533>.
- Violanti, J. M., Charles, L. E., Hartley, T. A., Mnatsakanova, A., Andrew, M. E., Fekedulegn, D., ... Burchfiel, C. M. (2008e). Shift-work and suicide ideation among police officers. *American Journal of Industrial Medicine*, 51(10), 758–768.
- Violanti, J. M., Fekedulegn, D., Charles, L. E., Andrew, M. E., Hartley, T. A., Mnatsakanova, A., & Burchfiel, C. M. (2009o). Suicide in police work: Exploring potential contributing influences. *American Journal of Criminal Justice*, 34(1–2), 41–53. <http://dx.doi.org/10.1007/s12103-008-9049-8>.
- Violanti, J. M., Gu, J. K., Charles, L. E., Fekedulegn, D., Andrew, M. E., & Burchfiel, C. M. (2011). Is suicide higher among separated/retired police officers? An epidemiological investigation. *International Journal of Emergency Mental Health*, 13(4), 221–228.
- Violanti, J. M., Mnatsakanova, A., Burchfiel, C. M., Hartley, T. A., & Andrew, M. E. (2012). Police suicide in small departments: a comparative analysis. *International Journal of Emergency Mental Health*, 14(3), 157–162.
- Violanti, J. M., Robinson, C. F., & Shen, R. (2013). Law enforcement suicide: A national analysis. *International Journal of Emergency Mental Health and Human Resilience*, 15(4), 289–298.
- Whealin, J. M., Ruzek, J. I., & Southwick, S. (2008). Cognitive-behavioral theory and preparation for professionals at risk for trauma exposure. *Trauma Violence Abuse*, 9(2), 100–113.