SUICIDALITY IN FIREFIGHTERS: EXPLORING OCCUPATIONAL, PSYCHOLOGICAL, AND CULTURAL DETERMINANTS

by

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Abstract

Background: Suicidality is more prevalent among firefighters in comparison to the general population. Research suggests that trauma exposure while on duty may be associated with the increased prevalence of suicidality in firefighters. Duty-related trauma exposure has been previously associated with depression in firefighters and the well-established link between depression and suicidality suggests that depression may explain the relationship between duty-related trauma exposure and suicidality for this population. Additionally, expectations of masculine norm adherence are inherent to fire culture and may negatively impact the relationship between depression and suicidality. However, these relationships haven't been comprehensively explored. **Purpose:** The present study aimed to examine the mediating role of depression in the relationship between duty-related trauma exposure and suicidality in a large firefighter sample. Furthermore, this study aimed to examine the moderating role of gender role conflict in the relationship between depression and suicidality in the context of the proposed mediation model. It was hypothesized that 1) duty-related trauma exposure, depression, gender role conflict and suicidality would all share positive associations; 2) duty-related trauma exposure would have an indirect effect (i.e. mediation) on suicidality through depression and; 3) the relationship between depression and suicidality within the proposed mediation model would be conditioned upon levels of GRC (i.e. moderated mediation), with the effect being stronger for men high in GRC in comparison to men low in GRC. **Methods:** The current study was conducted through the analysis of data collected by an urban fire department in 2015. Participants were 984 male firefighters (*Mage* = 39.63; *SD* = 16.26), employed full-

time performing EMS or suppression duties, who also completed the target measures assessing duty-related trauma exposure, depression, gender role conflict, suicidality and the theoretically relevant covariates. **Results:** Correlational analyses were conducted to examine the bivariate correlations between all variables included in the study The proposed hypothesis was supported such that significant positive relationships were found between all relevant constructs including DRTE and suicidality ($r = .12$, $p < .001$), DRTE and depression ($r = .21$, $p < .001$), depression and suicidality ($r = .42$, $p < .001$), GRC and depression ($r = .27$, $p < .001$), GRC and DRTE ($r = .16$, $p < .001$), and GRC and suicidality ($r = .15$, $p < .001$). Next, a series of regression analyses were conducted to determine if there was a significant indirect effect of DRTE on suicidality through depression and a significant conditional indirect effect of GRC at path b_1 Hypothesis two was supported such that depression fully mediated the relationship between DRTE and suicidality ($ab = .13$, $SE = .04$, 95% CI [.0674, .2057]) with depression accounting for 76% of the total effect. Additionally, hypothesis three was supported such that the relationship between depression and suicidality in the context of the full mediation model was significantly stronger for participants high in GRC ($b = .24$, $SE = .06$, 95%CI [.1271, .3582]) as opposed to those low in GRC ($b = .05$, $SE = .05$, 95%CI [-.0549, .1494]). **Conclusion:** Limitations, future directions and clinical implications are discussed.

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Chapter I

Introduction

Suicide is a serious public health problem and has consistently been named one of the leading causes of death in the United States (Center for Disease Control, 2015). Consequently, research has begun to focus on identifying factors that predict suicide ideation and attempt to better understand the mechanisms underlying suicidality (Han, Compton, Gfroerer, & McKeon, 2015; Martin, 2017). Suicidality has previously been defined as suicidal ideation, intent, plan, and/or self-injurious behaviors (Krysinska & Lester, 2010). The current review defines suicidality as suicidal ideation or attempt.

Previous research has indicated that certain occupational groups have an increased propensity for suicidality (Milner, Spittal, Pirkis, & LaMontagne, 2013; Stanley, Hom, Hangan, & Joiner, 2015). However, this research has primarily focused on occupations in medicine, military and law enforcement (see Milner et al., 2013, for a review). Thus, suicidality among firefighters remains an understudied topic in empirical research despite evidence that the risk of suicide is elevated for this group in comparison to the general population (Carpenter et al., 2015; Nock et al., 2008; Stanley et al., 2015).

Research has found that risk factors of suicidality are generally similar for firefighters and civilians (Carpenter et al., 2015; National Volunteer Fire Council, 2012). However, the occupational duties and cultural characteristics inherent to fire service may pose additional risks. Consequently, the current review will deviate from examining common predictors of suicidality and instead focus on unique predictors related to the occupational demands and cultural characteristics of fire service. For example, fire service demands that firefighters constantly expose themselves to risks of personal injury

or death and to the injury or death of others while responding to critical incidents. While the impact of this exposure may not immediately be seen, research suggests that routine experiences of this type are likely traumatic and predictive of depression and suicidality (Fullerton, Ursano, & Wang, 2004; Van Orden et al., 2010). Furthermore, the predominantly male demographic and consequent over-endorsement of traditional masculine gender norms represent some of the cultural characteristics of fire service that have been found to negatively impact help seeking behaviors and consequently increase suicidality in this population (U.S. Bureau of Labor Statistics, 2015; Stanley et al., 2016). Therefore, this review aims to investigate occupational and cultural influences on firefighter suicidality by examining how operational constructs of these influences impact psychological and suicidal outcomes.

Chapter II

Literature Review

Duty-Related Trauma Exposure and Suicidality

According to the *Diagnostic and Statistical Manual of Mental Disorders-V* [DSM-V] (American Psychiatric Association [APA], 2013), trauma is defined as "exposure to actual or threatened death, serious injury, or sexual violation" (p. 271). Furthermore, the DSM-V qualifies that the trauma must result from "direct experience of the traumatic incident; witnessing the traumatic incident; learning a traumatic incident happened to a loved one, or first-hand, repeated, exposure to aversive details of the traumatic incident" (APA, 2013, p. 271). Based on these criteria, firefighters are consistently exposed to trauma while completing their tour of duty. This traumatic exposure may be fire related but more often involves initial response to medical emergencies, psychological emergencies, homicides or suicides prior to request for police presence. There is an increasing amount of evidence that suggests continuous exposure to such incidents takes a cumulative toll on firefighters' mental health (Beaton & Murphy, 1995; Boxer & Wild, 1993; Stanley et al., 2015; Stanley et al., 2016). For example, research on trauma exposure in first responder populations has found that firefighters and paramedics are at risk of experiencing traumatic stress as a result of consistent duty-related trauma exposure (DRTE; e.g. Regehr, Goldberg, & Hughes, 2002). Furthermore, research suggests that firefighters are at an increased risk for developing posttraumatic stress disorder [PTSD] and/or depression after exposure to just one traumatic incident, with the odds of development increasing with continued exposure (Fullerton et al., 2004).

Crucial to the scope of this review, theoretical models of suicidality suggest that frequent DRTE may diminish firefighters' fears of mortality while simultaneously amplifying their physical pain tolerance, consequently creating conditions under which suicidal behaviors may emerge (Joiner, 2005; Van Orden et al., 2010). These conditions are especially likely when firefighters consistently respond to suicide related incidents (Stanley et al., 2015). Stanley et al. (2015) found that career prevalence rates of suicidal ideation and attempt among firefighters were approximately 46.8% and 15.5%, respectively. This is significantly greater than the lifetime prevalence rates for suicidal ideation and attempt in the general population, which are approximately 9.2% and 2.7%, respectively (Nock et al., 2008).

While the relationship between DRTE and suicidality for firefighters may seem evident, several studies suggest that the relationship between these two constructs may be explained by the emotional turmoil that results from unresolved traumatic stress (Fullerton et al., 2004; Martin, 2017; Violanti et al., 2006). Traumatic stress is considered a precipitating risk factor for psychological disorders such as PTSD and depression. Additionally, research has determined that PTSD and depression both predict suicidality. Comprehensive consideration of these relationships suggests that these disorders may explain the relationship between DRTE and suicidality (Nock, Hwang, Sampson, & Kessler, 2010; Martin, Tran, & Buser, 2017; Stanley et al., 2016). However, research in this realm has overwhelmingly focused on PTSD as a mediator for the relationship between DRTE and suicidality (e.g. Beaton, Murphy, Johnson, Pike, & Corneil, 1999; Marmar et al., 2006) despite evidence that first responder populations have similar prevalence rates of depression (Fullerton et al., 2004; Sakuma, Takahashi, Ueda, Sato,

Katsura, & Abe, 2015). Thus, it would be beneficial to thoroughly explore the role that depression plays in the relationship between DRTE and suicidality to comprehensively inform efforts of intervention for suicidality in firefighter populations.

The Role of Depression in the Relationship between DRTE and Suicidality

DRTE and depression. Depression is defined as a serious medical condition that causes feelings of sadness and/or a loss of interest in pleasurable activities (APA, 2017). Symptoms include: depressed mood, anhedonia, significant weight loss/gain, insomnia/hypersomnia, psychomotor agitation/retardation, fatigue, feelings of worthlessness, difficulty concentrating, and recurrent thoughts of death or suicidal ideation/attempt. An individual must present with at least five of these symptoms for the duration of two weeks to receive a clinical diagnosis of depression (APA, 2017). The most frequent trauma related disorders are depression, PTSD, and alcohol use disorder [AUD] (e.g. Benedek, Fullerton, & Ursano, 2007; Fullerton et al., 2004; Kleim & Westphal, 2011). Thus, routine exposure to traumatic incidents places firefighters at a higher risk for developing at least one of these disorders. Research indicates that the prevalence of PTSD and AUD is virtually equivalent within the firefighter population, with the prevalence of PTSD ranging from 11%-32% (McFarlane, 1988; Fullerton et al., 2004) and the prevalence of AUD ranging from 5%-30% (Boxer & Wild, 1993; Hoffmann, Brittingham, & Larson, 1996; Beaton et al., 1999). However, the prevalence of depression historically varies by symptom severity. For example, one study found that 3% of firefighters in their sample exhibited severe depression while roughly 19% exhibited moderate depression (Regehr, Hill, & Glancy, 2000). More recently a study found that 21% of firefighters involved in disaster work met criteria for a clinical

diagnosis of depression (Saijo, Ueno, & Hashimoto, 2008). Comparatively, the prevalence of depression in the general population is approximately 6.7% (National Institute of Mental Health, 2016). Consequently, this evidence of the increased prevalence of depression in firefighters emphasizes the importance of exploring the role that occupational factors such as DRTE play in the manifestation of the disorder.

Between-group comparisons of DRTE outcomes suggest that a positive relationship exists between DRTE and depression for firefighters. For example, research suggests that depression is highest for firefighters who report more exposure to traumatic incidents, particularly those incidents involving the injury/death of a child, a line of duty death, or a natural disaster (e.g. Regehr et al., 2002; Boxer & Wild, 1993). One study found that firefighters with high DRTE were more likely to develop depression than firefighters with low DRTE (Fullerton et al., 2004). Regehr, Hill, Knott, and Sault (2003) found that depression was significantly higher for senior firefighters in comparison to new recruits. This finding could be attributed to higher rates of DRTE for senior firefighters due to a longer time in the department. Previous research has also eluded to the directionality of the relationship between DRTE and depression. Findings suggest that DRTE precedes the onset of depression in firefighters with one study on rescue efforts following Hurricane Katrina indicating that 25% of firefighters involved met criteria for depression in the following months despite no prior history of the disorder (Tak, Driscoll, Bernard, & West, 2007).

Depression and suicidality. Additionally, support for the relationship between depression and suicidality has been previously established in trauma exposed populations. In firefighter samples, depression is a significant predictor of suicidality and

has been found to account for a significant proportion of the variance in lifetime suicidal ideation and attempt beyond variables such as race, relationship satisfaction, years of service, and alcohol dependence (Martin, Tran, & Buser, 2017; Nock et al., 2010; Sterud, Hem, Lau, & Ekeberg, 2008; Violanti et al., 2009). Furthermore, mental states associated with depression (e.g., emotional distress, worthlessness, hopelessness) have previously been cited as explanations for suicidality in firefighters (Joiner, 2005). Specifically, research posits that a combination of work-life balance difficulties, consequent decreases in social support, and depressive symptoms (i.e. worthlessness, hopelessness, and loneliness) may lead a firefighter to engage in suicidal behaviors to cope. Joiner's (2005) Interpersonal Theory of Suicide validates this assumption by positing that feelings of perceived burdensomeness ─ manifested as firefighters' beliefs that their lives are worth less than their deaths, and thwarted belonging ─ manifested as the loneliness that results from long shift schedules, both interact to produce suicidal ideation in firefighters. The theory further posits that perceived burdensomeness and thwarted belonging alone are not enough to produce suicidal behaviors. Thus, suicidal behaviors are said to result from an increased capability for self-injury that stems from a genetic predisposition or frequent DRTE (Bender, Gordon, Bresin, & Joiner, 2011; Franklin, Hessel, & Prinstein, 2011).

Notably, research testing the Interpersonal Theory of Suicide in firefighter samples has demonstrated mixed findings. For example, previous research testing predictors of career suicide attempts has found that the interaction effect between perceived burdensomeness, thwarted belongingness and fearlessness about death becomes non-significant after controlling for sex, age and years in the department (Chu, Buchman-Schmitt, Hom, Stanley & Joiner, 2016). Considering the positive association

that exists between years in the department, and DRTE (Corneil et al., 1999), these findings not only provide support for a strong association between DRTE and suicidality but also prompt for the examination of potential mediators and moderators of the relationship between these two constructs (Chu et al., 2016). Similarities that exist between depressive symptoms (i.e. feelings of worthlessness, loneliness, and suicidal ideation/attempt) and Joiner's risk factors for suicide (i.e. perceived burdensomeness, thwarted belonging and capacity for self-injury) suggest that depression may mediate the relationship between DRTE and suicidality. However, this hypothesis has not yet been empirically tested.

Examining the role of gender role conflict. Historically, subscription to traditional male gender roles was thought to explain lower rates of depression in men (Addis & Mahalik, 2003). However, recent research suggests that gender discrepancies in depression may be better explained by men's reluctance to seek psychological treatment (Addis, 2008; Lavant, Wimer, & Williams, 2011; Seidler, Dawes, Rice, Oliffe, & Dhillon, 2016). Research on gender and depression has found that men are more likely to mask their symptoms of depression than women and less likely to seek professional help for psychological distress (Galdas, Cheater, & Marshall, 2005). However, men who strictly adhere to traditional masculine norms are at greater risk of exhibiting these behaviors (Real, 1997; Magovcevic & Addis, 2008).

Notable differences in depression have been found between men who strictly adhere to masculine norms and those who don't. Studies indicate that men with strict adherence experience greater rates of depression but suffer silently because depressive affect directly conflicts with their traditional masculine ideology (Addis & Cohane, 2005;

Shepard, 2003). This phenomenon has previously been defined as gender role conflict (GRC; O'Neil, 1981) and it is said to explain why depression often goes undiagnosed and untreated in men (Borowsky et al., 2000). Gender role conflict is thought to impact both the presentation of depression and the likelihood of treatment. This is because men experiencing GRC are more likely to experience atypical symptoms of depression (e.g. aggression, substance use, and somatic complaints) that are less likely to improve because principal attributes of the male gender role promote the inhibition of emotion and fears of seeking help (Galdas et al., 2005; Hayes & Mahalik, 2000; Houle, Mishara, & Chagnog, 2008; Magovcevic & Addis, 2008).

Unfortunately, the GRC that stems from strict masculine norm adherence has detrimental effects on the prognosis of depression because it deprives men of protective factors such as social support and psychotherapy. Furthermore, men's unwillingness to seek help for depression may consequently exacerbate suicidality. Research examining the effect of GRC on suicidality supports this idea indicating that the likelihood of suicidality is higher among men high in GRC in comparison to men low in GRC. Additionally, the relationship between GRC and suicidality is moderated by protective factors such as social support and help seeking (Houle et al., 2008). However, research has only examined the effect of GRC on depression and suicidality separately despite evidence that it may also impact the relationship between these two variables. Furthermore, no research to date has examined how GRC may impact suicidality in the context of fire culture, which is known for its inherent endorsement of traditional masculine norms.

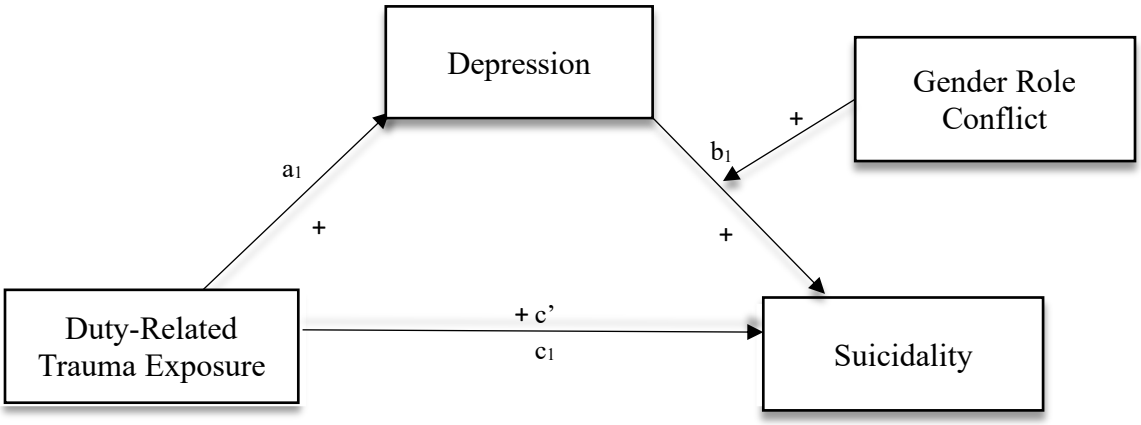
Limitations in Current Research

Research examining the relationship between DRTE and suicidality is in its infancy (e.g. Corneil et al., 1999; Stanley et al., 2016) and the mechanisms that explain the relationship are not comprehensively understood. Furthermore, research on suicidality in firefighters is limited by its extensive examination of PTSD despite elevated rates of other suicide related disorders within the population. Finally, research has yet to examine how cultural factors inherent to fire service (i.e. masculine gender norms) may serve to exacerbate suicidality when firefighters are experiencing depressive symptoms. Consequently, the present study examined the mediating role of depression in the relationship between DRTE and suicidality in a large firefighter sample. Furthermore, this study examined the moderating role of GRC within the context of the proposed mediation model.

Hypotheses

First, it was hypothesized that DRTE, depression, GRC, and suicidality would all share positive associations. Second, it was hypothesized that depression would mediate the relationship between DRTE and suicidality when controlling for theoretically relevant covariates. Third, it was hypothesized that the mediating effect would be moderated by GRC at path b_1 of the proposed model when controlling for theoretically relevant covariates. Specifically, it was expected that 1) all various combinations of each construct would yield positive correlations; 2) DRTE would have an indirect effect (i.e. mediation) on suicidality through depression; and 3) the relationship between depression and suicidality in the context of the proposed model would be conditioned upon levels of GRC (i.e. moderated mediation) with the effect being stronger for men high in GRC in comparison to men low in GRC. Further, it was expected that the proposed effects would

exist while controlling for the theoretically relevant effects of age, years in the department and social support. See Figure 1 for a graphical representation of the model.



1. Duty-related trauma exposure (Measure of Duty Related Incident Stressors Total Score)
2. Depression (Patient Health Questionnaire-9 Total Score)
3. Gender role conflict (Gender Role Conflict Scale Total Score)
4. Suicidality (Suicide Ideation Scale Total Score)

Figure 1. Theoretical Model. Hypothesized mediating effect of depression and moderating effect of gender role conflict on the relationship between DRTE and suicidality

Chapter III

Method

Participants

The present study was conducted through the analysis of data collected by a large urban fire department in 2015. Descriptive statistics were run prior to the substantive analyses to determine sample size and participant demographics. Approximately 1,114 of the department's firefighters completed the survey. All firefighters were full-time, paid employees who performed EMS and fire suppression duties. To be included in the study, participants had to be at least 18 years of age and had to have completed the target measures of the four key constructs and the covariates. Participants who did not complete the target measures were excluded from further analyses. Furthermore, it is well understood that women may also possess views consistent with traditional masculine ideology and may also experience GRC. However, women were not surveyed using the target measure of GRC in the present study. Thus, they were excluded from further analyses. This resulted in a final sample of 998 participants.

Participants were all male firefighters (*Mage* = 39.63; *SD* = 16.26) currently employed by the surveyed fire department. Most participants identified as White (64.6%), married (71.9%), with some college education (50.2%). The majority reported serving in the department for at least 12 years (*M* = 13.3, *SD* = 9.04) and a current rank of firefighter (37.9%). See Table 1 for detailed participant characteristics.

Table 1.
Participant Characteristics

Characteristic	Total % or M/SD
Race/Ethnicity	
White/Caucasian	64.6%
Black or African American	8.9%
Asian	1.3%
Indian (American)	.5%
Hispanic	21.3%
Other	3.4%
Age (20-61)	39.63/16.26
Years in the Department (>1 mo-40 yrs.)	13.3/9.04
Marital Status	
Single	12.3%
Married	71.9%
Living with Partner/Not Married	8.3%
In a Rel./Not Living with Partner	7.4%
Education	
GED or equivalent	.6%
High school/GED	3.6%
Some college	50.2%
Associate Degree	20.5%
Bachelor's Degree	22.8%
Master's Degree or Higher	2.3%
Rank	
Cadet	.1%
Rookie (probationary)	6.3%
Rookie (non-probationary)	1.8%
Firefighter	37.9%
Engineer Operator	27.0%
Captain	16.5%
Senior Captain	6.1%
District Chief	4.3%

Table 2.
Duty Related Trauma Exposure by Event

Traumatic Event	Percent
Death of a patient	84.8%
Aid to injured child	79.3%
Adult DOA-multiple injuries	78.7%
Completed suicide-gunshot	70.9%*
Attempted domestic homicide	61.3%
Aid to attempted homicide victim	52.8%
Co-worker fatality (not witnessed)	52.8%
Aid to stab victim	77.4%
Completed suicide-hanging	60.2%*
Multiple casualty MVA	79%
Fire w/ multiple burn victims	56.6%
Co-worker fatality (witnessed)	21.9%
Aid to attempted suicide	74.6%*
Gunshot victim	68%
Serious injury (co-worker)	41.9%
Third-degree burn (self)	14.5%
Sudden infant death	61.3%

Note. Asterixis indicate percentages of firefighters involved in suicide related incidents

Procedures

Data collection was conducted by the fire department's psychological division. Participants were given the opportunity to participate in an anonymous, online survey, via SurveyMonkey, that included the target measures (*see below*) in exchange for continuing education credits. Participants were told that they would obtain continuing education credits regardless of survey completion and were given alternative options should they be unwilling to participate in the survey. Upon completion of the survey, participants were given the opportunity to submit their email address to be entered into a drawing for various prizes. The data was then obtained by an affiliate of a large university located in the southern United States for further analysis. The affiliate received approval to conduct research projects using the archival data from the University's Institutional Review Board of Human Subjects.

Measures

Demographic sheet. This instrument included 16 items that inquired about participant demographics including age, gender, race, rank, job title, years in the department [YID], prior military and combat service and education level. In the present study, measurement of participants' age and years in the department were extracted from the collective items to assess their relevance as covariates based on their associations with the outcome of suicidality in previous research.

Measure of Duty-Related Incident Stressors (MDRIS; Beaton & Murphy, 1993). The MDRIS is a 25-item instrument used to determine the number and type of traumatic incidents experienced by first responders while on duty. Participants were asked to consider a list of duty-related incidents that they may have experienced and respond 0 if the situation had not happened to them or report the level of stress they experienced as a result of witnessing the incident on a 1 *"Not at all stressful"* to 5 "*Extremely stressful"* Likert scale. Example incidents included "completed suicide-gunshot," "sudden death of an infant" and "death of a patient." Only responses to events previously defined as "traumatic incidents" by Corneil (1995) were included in the measure for this study. These incidents included suicides, crime-victim incidents (i.e. gunshot wounds and stabbings), fire incident fatalities (either civilian or fire service personnel), dead on arrival incidents devoid of natural causes, serious injury accidents (excluding nonfatal injury motor vehicle accidents), and incidents that involved rendering medical aid to children or infants. Consequently, the final measure consisted of 17 of the original 25 items. Participants reported witnessing a variety of duty-related traumatic incidents. The majority reported experiencing the death of a patient (84.8%). See Table 2

for percentages by event. Furthermore, 82% reported witnessing a suicide related event (i.e. completed suicide-gunshot, completed suicide-hanging, aid to attempted suicide).

It was expected that DRTE would be influenced by both the number of incidents experienced and the relative level of stress attributed to each event. Consequently, a composite score reflecting both factors was calculated for each participant. Calculations were based on methods posited by Lee, Lee, Kim, Jeon, and Sim (2017). The final score was computed by multiplying the mean stress level score by its weighted value, which was the ratio of the number of incidents experienced by the respondent to the total number of incidents on the MDRIS. The formula was average stress score x number of incidents experienced/17. This composite was then transformed into a z score with higher scores indicating higher levels of DRTE. Psychometric properties for the measure had not been previously established. However, the measure was found to have high face validity among firefighter samples in previous research (Smith et al., 2011) and demonstrated high internal consistency in the present study ($\alpha = .92$).

Patient Health Questionnaire-9 (PHQ-9; Spitzer et al., 1999). The PHQ-9 was used to determine participants' self-reported depressive symptoms. The PHQ-9 is a 9-item depression module adapted from the PRIME-MD diagnostic instrument for common mental disorders. The self-report measure lists each of the nine DSM-5 criteria for depression. Respondents reported their experience with each symptom over the past two weeks. Participants responded to the items using a 0 "*Not at all*" to 3 "*Nearly every day*" Likert scale. Example items included "feeling down, depressed or hopeless" and "had trouble concentrating on things such as reading the newspaper or watching television." Total scores on the measure range from 0-27 with scores of 5, 10, 15, or 20 indicating

mild, moderate, moderately severe or severe depression, respectively. Twenty-three percent of participants (n = 226) scored above the cutoff for mild severity of depression (score ≥ 5) as measured by the Patient Health Questionnaire-9 (Spitzer, Kroenke, & Williams, 1999) (M = 2.83; SD = 3.33). Seventeen percent (n = 176) met criteria for mild depression, 4% (n = 40) met criteria for moderate depression, 1% (n = 10) met criteria for moderately severe depression and none of the participants met criteria for severe depression. The instrument previously demonstrated a sensitivity of 88% and a specificity of 88% for major depression (Kroenke, Spitzer, & Williams, 2001). The measure also previously demonstrated strong internal consistency (α = .89), strong test-retest reliability (r = .84), and high convergent validity with the Beck Depression Inventory-II (r = .87) (Kroenke et al., 2001). In the present study, the collective items demonstrated high internal consistency (α =.81).

Gender Role Conflict Scale (GRCS; O'Neil, Helms, Gable, David, & Wrightsman, 1986). The GCRS was used to assess the GRC that resulted from participants' adherence to traditional masculine norms. The GRCS is a 37-item self-report instrument that evaluates the importance a respondent places on complying with principals of the traditional masculine gender role and the stress they experience when these roles are breached. Respondents reported their level of agreement with each statement on a 1 *"strongly disagree"* to 4 *"strongly agree"* Likert scale. Example items included "strong emotions are difficult for me to understand" and "being personal with other men makes me feel uncomfortable."

The original factor analysis of the GRCS yielded four factors: (a) Success, Power, and Competition (SPC; 13 items); (b) Restrictive Emotionality (RE; 10 items); (c)

Restrictive Affectionate Behavior between Men (RABBM; 8 items); and (d) Conflicts between Work and Family Relations (CBWFS; 6 items). However, only the RE and RABBM were included as measures in the original data collection. Consequently, the instrument in the present study only contained 18 of the original 37 items. However, previous research has found that the RE subscale is strongly correlated with depression (Birthistle, 1999) and suicidality (Naranjo, 2001). Additionally, both the RE and RABBM subscales are strongly correlated with problematic coping (Davenport, Hetzel, & Brooks, 1999) and emotional inhibition (Stanzione, 2005). A total GRC score was computed for the measure by summing all of the items. Scores ranged from 18 to 72 (M = 39.87; SD = 11.04) with higher scores indicating higher GRC and greater fear of femininity. Previous reliability estimates indicated that both factors were internally consistent and reliable over a four-week period (RE: α = .82, r = .76 and RABBM: α = .83, r = .86) (Sharpe & Hepner, 1991). In the present study, the collective items demonstrated high internal consistency (GRCSα = .96; REα = .94; RABBMα = .91).

Suicidal Ideation Scale (SIS; Rudd, 1989). The SIS was used to assess participants' suicidality as it related to suicide ideation or attempt. The SIS is a 10-item measure that was designed to be a brief measure of suicidality for use in clinical and non-clinical populations. The items are conceptualized as a representation of a continuum of suicidal ideation ranging from covert suicidal ideation to more overt ideation, and attempts. Factor analysis for the instrument in a military sample yielded two factors: Suicidal Desire and Resolved Plans/Preparation (Luxton, Rudd, Reger, & Gahm, 2011). Respondents reported their experience with each item over the last week on a 1 *"never"* to 5 *"always"* Likert scale. Example items included: "I have made attempts to kill

myself" and "I just wish my life would end." A total score was computed for the measure but unfortunately, due to a mistake in preparation of the survey the last item on the measure, "*I have come close to taking my own life*," was not included in the present study. Consequently, a prorated score was calculated by summing the scores of the items answered to get a partial raw score, multiplying the partial raw score by the total number of items on the SIS (i.e. 10) and then dividing by the number of items answered (i.e. 9). Scores above 15 are said to suggest serious suicidal ideation (Rudd, 1989). In the present study, 2% (n = 22) of participants scored above the cutoff for serious suicidal ideation (M = 10.29; SD = 1.48).

Previous research has found the SIS has high internal consistency (α = .86-.91) as well as strong construct validity in association with the Behavior and Symptom Identification Scale-24 Self-Harm subscale (r = .83) (Luxton et al., 2011; Rudd, 1989). While only nine of the original items could be assessed for internal consistency, the collective items still demonstrated internal consistency within the range of findings from previous research (α = .90).

Social Provisions Scale (SPS; Cutrona & Russell, 1987). The SPS is a 24-item measure that is used to assess the degree to which respondents' social relationships provide various dimensions of social support. For the purposes of the present study, the measure was included to assess social support as a potential covariate in the substantive model due to its theoretical association with depression and suicidality outcomes in the context of GRC both independently and interrelatedly (Houle et al., 2008; Regehr et al., 2003; Regehr, 2009; Roy & Steptoe, 1994).

Items on the SPS are conceptualized as a representation of the six social provisions identified by Weiss (1974). Consequently, the measure consists of six subscales: Attachment, Social Integration, Reassurance of Worth, Reliable Alliance, Guidance, and Opportunity for Nurturance. The original measure is 24 items. Each subscale contains four questions, two inquiring about the *presence* of a type of support and two inquiring about the *absence* of a type of support. Three subscales were included in the survey utilized in the present study, Reassurance of Worth, Social Integration, and Reliable Alliance. Participants in the present study were asked to respond to each of the items twice. Once based on their relationships with their peers and then again based on their relationships with their superior officers. However, only items from the peer-based responses were included in the analyses due to their pre-established association with suicidality outcomes (Carpenter et al., 2015; Stanley et al., 2015). Additionally, only items assessing the *presence* of a type of support were included in the analyses to reduce redundancy in the data. This resulted in a scale consisting of six of the original 24 items.

Responses were rated on a 1 "*strongly disagree"* to 4 "*strongly agree*" Likert scale. Example items included "there are people I can depend on to help me if I really need it" and "I feel part of a group of people who share my attitudes and beliefs." In the present study, scores on the measure ranged from 6 to 24. A total SPS score was calculated by summing all items, with higher scores indicating higher perceived peer-based social support (M = 19.48, SD = 4.43). The measure in its entirety previously demonstrated strong reliability (α = .88-.92) and the internal consistency of the subscales has been previously deemed adequate, ranging from .65 to .76 (Gottleib & Bergen, 2010). The six collective items demonstrated strong reliability in the present study (α = .96).

Data Analytic Plan

Preliminary analyses. First, power analyses were conducted using G*Power (Faul, Erfelder, Bucnhner, & Lang, 2014) to determine the sample size necessary for the analyses needed to assess the three hypotheses. Power analyses were based off the correlational and regression analyses needed for this study. All power analyses were executed using an alpha of .05, standard power level of .80 and quantities relative to a medium effect size based on Cohen (1992). Next, preliminary were conducted using the Statistical Package for the Social Sciences (SPSS; version 22). First, *Missing value analysis* (MVA) *7.5* was conducted to assess the distribution of missing data. MVA determines missingness type through the output of a chi-square statistic referred to as 'Little's MCAR test' (Hill, 1997). Following, Cook's and Mahalanobis' Distance were calculated by entering the total score for the SIS as a regression outcome and the total scores for the MDRIS, PHQ-9 and GRCS as predictors. Outcomes of these analyses were used to identify influential data points and check for outliers. Next, analyses assessing the skewness and kurtosis of the measures were conducted to test assumptions of normality for each scale. Finally, a Koenker test was conducted to assess regression assumptions of homoscedasticity.

Substantive analyses. The substantive analyses were also conducted using SPSS. First, Pearson product-moment correlation coefficients were computed using the total scores for the MDRIS, PHQ-9, GRCS and the SIS to assess for existing relationships between DRTE, depression, GRC and suicidality (*hypothesis 1)*. Additionally, correlations were computed between participants' responses to the demographic questions about age, YID, total scores on the SPS and total scores on the SIS to determine each potential covariate's significance to the outcome of suicidality.

Next, a series of regression analyses were conducted via Preacher and Hayes' (2007) *PROCESS* tool for SPSS to assess the indirect effect (i.e. mediation) of DRTE on suicidality through depression *(hypothesis 2)* and the conditional indirect effect (i.e. moderated mediation) of GRC on the relationship between depression and suicidality (path b_1) within the context of the proposed model *(hypothesis 3)*. *PROCESS* is an observed variable OLS and logistic regression path analysis modeling tool that generates bootstrap confidence intervals for indirect effects using 1,000+ bootstrap samples (Hayes, 2017).

Bootstrapping is a resampling strategy used for estimation and hypothesis testing that is increasingly recommended for assessing indirect effects (MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2004; Shrout & Bolger, 2002). "In bootstrapping, the sample is conceptualized as a pseudo-population that represents the broader population from which the sample was derived. The sampling distribution of any statistic can be generated by calculating the statistic of interest in multiple resamples of the data set. When using bootstrapping, no assumptions about the shape of the sampling distribution are necessary when conducting inferential tests" (Preacher, Rucker & Hayes, 2007, pg. 190). Consequently, bootstrapping is ideal when analyzing non-normal data. The sampling distribution of an indirect effect is estimated through bootstrapping by sampling N units with replacement from the original sample of N units. This process produces a bias-corrected confidence interval for the indirect effect that is asymmetric in accordance with the skewness of the sampling distribution (Preacher et al., 2007).

Five-thousand bootstrap samples were used to derive estimates of the indirect and conditional indirect effects proposed in the present study. To assess the indirect effect of

DRTE on suicidality through depression *(hypothesis 2*), total scores on the SIS were entered into SPSS as the dependent (Y) variable. Total scores on the MDRIS were entered as the independent (X) variable, total scores on the PHQ-9 were entered as the mediator (M) and the pre-determined covariate(s) were entered into the covariate box. Next, the conditional indirect effect of GRC at path b_1 of the model (*hypothesis 3*) was tested by re-entering the same Y, X, M and covariate variables into SPSS. Additionally, mean-centered total scores on the GRCS (i.e. 1*SD* below the mean, mean, and 1*SD* above the mean) were entered as the moderator (W) to test whether the effect of depression on suicidality within the substantive model significantly differed from zero at low, average and high levels of GRC.

Chapter IV

Results

Preliminary Analyses

Power analyses. Power analyses determined there was an 80.3% chance that the Pearson r value for the correlational model (*hypothesis 1*) would significantly differ from zero with 67 participants and the R-squared value for the conditional indirect effect (*hypothesis 2 & 3*) would significantly differ from zero with 115 participants. Consequently, the present study possessed adequate power to obtain a significant effect.

Missing data. MVA determined that 29.06% of cases contained missing data. Four percent of the values from the target sample were missing. Eighty-eight percent of the target variables contained missing data and the percent of missing data on each variable ranged from .1%-12.9%. Missing values are assumed to be 'missing completely at random' (MCAR) if the Little's test is not significant. Non-significant Little's tests suggest that the missingness type is 'missing completely at random' (MCAR) while a significant Little's test suggests that the missingness type is either 'missing at random' (MAR) or 'not missing at random' (NMAR). The Little's MCAR test obtained for the data in the present study rejected the null hypothesis of MCAR ($\chi^2 = 6348.63$, $p > .001$), indicating that the missing values were not considered missing completely at random.

Here, it is important to note that there is no clear method for refuting assumptions of MAR versus NMAR patterns with incomplete data (Breunig, 2019; Golden, Henley, White, & Kashner, 2019; Lall, 2016). However, in the case of a significant Little's result, the missing variables can be individually examined for monotonicity using MVA procedures to suggest the presence of MAR or NMAR patterns (Schafer & Graham, 2002). Analyses revealed that the missing values demonstrated some monotonicity, with

the majority of missingness clustering across items assessing gender role conflict and specifically those items assessing expression of emotion and intimate behaviors. Consequently, the results failed to reject the NMAR hypothesis. However, multiple imputation procedures have previously been found to be unbiased with NMAR data (Arel-Bundock & Pelc, 2018; Schafer & Graham, 2002). Consequently, multiple imputation was employed to address missingness in the data. Consistent with previous recommendations, the dataset was subject to 10 imputations to avoid loss of power in the final analyses (Bodner, 2008; Graham, Olchowski, & Gilreath, 2007; White, Royston, & Wood, 2011). Finally, the data was pooled into a single, compressed dataset which reflected the variation in outcomes from all 10 imputations by depicting the mean of all 10 scale variable imputations and the mode of all 10 ordinal/nominal variable imputations for each participant (Baranzini, 2018).

Outliers. Cook and Weisberg (1982) proposed an operational guideline of $D_i > 1$ when identifying influential data points. Alternatively, Mahalanobis D assesses outliers based on a chi-squared distribution for the degrees of freedom. Generally, a universal guideline of $p < .001$ is applied for larger datasets (Mahalanobis, 1936). No cases returned Cook's outcomes greater than one. However, Mahalanobis outcomes identified 14 potential outliers.

When determining how to handle outliers, several studies advise against deletion without an investigation of the outliers' influence on outcomes (see Aguinis, Gottfredson, & Joo, 2013 for a review). Outliers are considered influential if they impact the model fit (R^2) and/or the parameter estimates (slope and intercept). Aguinis et al. (2013) proposes a two-step process for identifying model fit outliers: 1) evaluate identified outliers for entry

error; and 2) evaluate whether removal of the outliers changes the statistical significance of the model fit index (Yuan & Bentler, 1998). Visual examination of the outliers revealed no obvious entry error. Consequently, a model regressing the unstandardized predicted values onto the measure of the dependent variable (SIS_Total) was run with and without outliers. The R^2 change was not significant ($R^2change$ = .000, F = .103, p = .749) indicating that removal of the outliers did not significantly influence the model. Additionally, regression plots with and without the outliers were created to examine influential changes to the parameter estimates (Figure 2). Investigation of these plots indicated that removal of the outliers did not significantly influence the parameter estimates of the model. Consequently, outliers were removed for the substantive analyses resulting in a final sample of n = 984 (998 - 14).

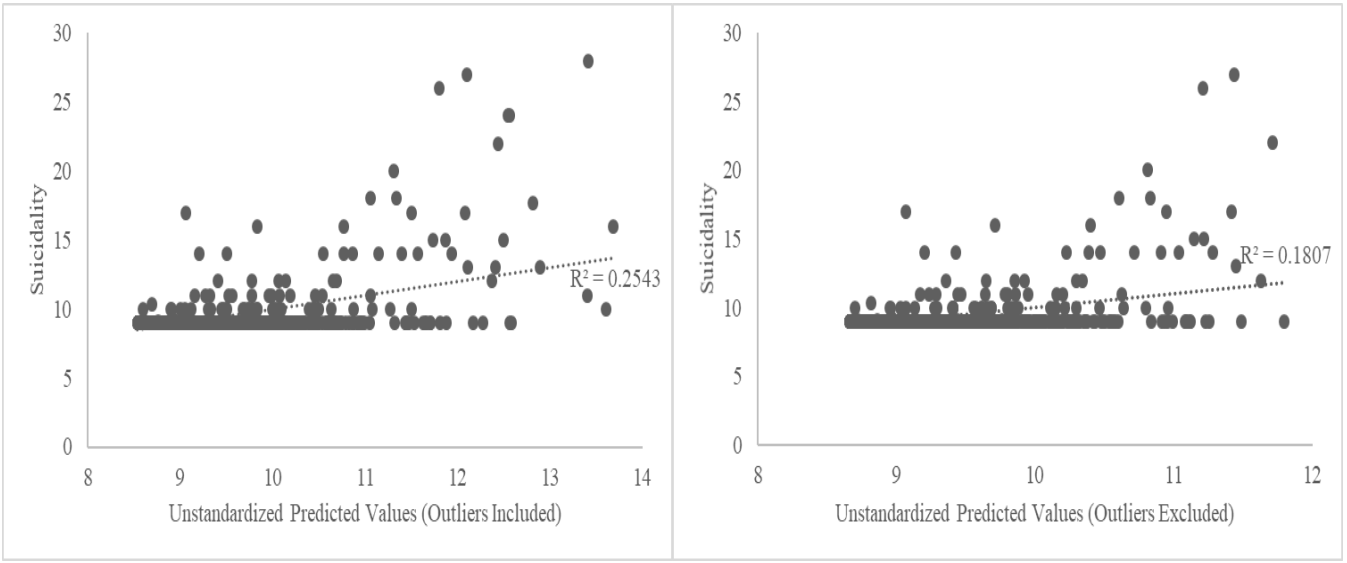


Figure 2. Regression Plots with and without Outliers

Regression assumptions. Preliminary assumption testing for the regression analyses revealed that the data violated assumptions of normality. Scores on the SIS were non-normally distributed, with skewness of 7.94 (*SE* = .08) and kurtosis of 77.98 (*SE* =

.16). Scores on the PHQ-9 were non-normally distributed, with skewness of 1.65 (*SE* = .08) and kurtosis of 2.78 (*SE* = .16). Scores on the MDRIS and SPS were non-normally distributed, with skewness of 2.44 (*SE* = .08) and -1.37 (*SE* = .078), respectively and a kurtosis of 7.94 (*SE* = .16) and 2.17 (*SE* = .16), respectively. However, scores on the GRCS were normally distributed with skewness of -.14 (*SE* = .08) and kurtosis of .26 (*SE* = .16). Nonetheless, bootstrapping was employed in the substantive analyses to account for the violations of normality and to reduce bias in the outcomes (Preacher et al., 2007).

Additionally, assumption testing revealed that the data also violated assumptions of homoscedasticity ($\lambda = 99.16$, $p < .001$). Violations of homoscedasticity have been found to influence hypothesis tests and confidence intervals in OLS regression analyses (Hayes & Cai, 2007). Consequently, previous research has recommended heteroskedasticity-consistent estimators be applied to the substantive analyses to reduce bias in outcomes (Hayes & Cai, 2007; Long & Ervin, 2000). In response, the present study employed heteroskedasticity-consistent estimator-3 [HC-3] to account for influences of heteroskedasticity due to its ability to reduce bias in hypothesis testing regardless of the presence or absence of heteroskedasticity (Hayes & Cai, 2007; Long & Ervin, 2000; Cribari -Neto, Ferrari, & Oliveira, 2005).

Substantive Analyses

Correlational analyses. Correlations were produced in the hypothesized directions with results indicating significant positive relationships between DRTE and suicidality ($r = .12$, $p < .001$), DRTE and depression ($r = .21$, $p < .001$), depression and suicidality ($r = .42$, $p < .001$), GRC and depression ($r = .27$, $p < .001$), GRC and DRTE ($r = .16$, $p < .001$), and GRC and suicidality ($r = .15$, $p < .001$) (Table 3). Additionally, age,

YID and social support were included in the correlational analysis to assess their associations with suicidality to determine their appropriateness as covariates in the model. Inconsistent with previous research, age (r = .01, p = .66) and YID (r = .03, p = .31) were not significantly correlated with suicidality. Consequently, they were excluded as covariates in the substantive analyses. However, social support was significantly correlated with suicidality (r = -.12, p <.001) and was included as a covariate in the substantive analyses.

Table 3.
Correlations of Key Variables

Variable	1	2	3	4	5	6	7	M (SD)
1. Age[1]	1	.49***	-.07*	.14***	-.03*	.01	.01	39.63 (16.26)
2. YID[2]	-	1	-.15***	.23***	-.01	.04	.03	13.28 (9.04)
3.Social Support[3]	-	-	1	-.03	-.13***	-.11***	-.12***	19.48 (4.43)
4. DRTE[4]	-	-	-	1	.21***	.16***	.12***	-
5. Depression[5]	-	-	-	-	1	.27***	.42***	2.83 (3.33)
6. GRC[6]	-	-	-	-	-	1	.15***	39.87 (11.04)
7. Suicidality[7]	-	-	-	-	-	-	1	10.29 (1.48)

Note. * p < .05. ** p < .01. *** p < .001
[1] Age
[2] Years in the Dept.
[3]Social Provisions Scale Total Score
[4]Measure of Duty-Related Incident Stressors Composite Score
[5]Patient Health Questionnaire-9 Total Score
[6]Gender Role Conflict Scale Total Score
[7]Suicide Ideation Scale Total Score

Indirect effect. Interpretation of the indirect effect *(hypothesis 2)* was based on assumptions outlined by Preacher and Hayes (2004). Accordingly, an indirect effect is confirmed if significant relationships are established between the independent variable

and the dependent variable (path c_1), the independent variable and the mediator (path a_1), and the mediator and the dependent variable (path b_1). Additionally, the relationship between the independent variable and the dependent variable must become non-significant (i.e. full mediation), or significantly decrease (i.e. partial mediation), when controlling for the mediator (path c'). Finally, the 95% confidence interval generated for the indirect effect must not contain zero, indicating that the indirect effect (c-c' or a*b) is significantly different from zero. Testing each of these assumptions significantly decreases the possibility of committing Type I and Type II errors, which has been found to occur when using the Barron and Kenny (1986) method in large samples and in samples with non-normative distributions (Preacher & Hayes, 2004, Preacher et al., 2007).

The conditions specified by Preacher & Hayes (2004) were all met in the present study. First, path c_1 was significant indicating that DRTE was positively associated with suicidality (b = .17, t (981) = 2.04, p = .04). Path a_1 was also significant indicating that DRTE was positively associated with depression (b = .70, t (981) = 6.17, p <.001). Path b_1 was significant indicating that depression was positively associated with suicidality (b = .18, t (980) = 4.94, p < .001). Notably, path c' became nonsignificant (b = .04, t (980) = .67, p = .50) suggesting the presence of a fully mediated effect. Examination of the 95% confidence interval for the indirect effect confirmed full mediation (ab = .13, SE = .04, 95% CI [.0674, .2057]). Consequently, hypothesis two was supported such that depression fully mediated the relationship between DRTE and suicidality. Furthermore, the mediator accounted for approximately 76% of the total effect P_M = .76. Table 4 displays the results.

Conditional indirect effect. Interpretation of the conditional indirect effect (*hypothesis 3)* was based on assumptions outlined by Hayes and Preacher (2013). A conditional indirect effect is said to occur when mediation relations are contingent upon the level of a moderator (James & Brett, 1984; Hayes & Preacher, 2013; Preacher et al., 2007). In the context of Preacher and Hayes' (2013) *PROCESS* model, a conditional indirect effect is present when the indirect effect (c-c') is confirmed, the interaction effect between the mediator and the moderator (M*W) is significant, and the 95% confidence interval generated for the Index of Moderated Mediation does not include zero.

All conditions for the conditional indirect effect were met in the present study. See above (*hypothesis 2*) for interpretation and confirmation of the indirect effect (i.e. mediation) initially required for confirmation of the conditional indirect effect. Additionally, the interaction effect between depression and GRC (M*W) was significant (b = .01, t (978) = 2.03, p = .04) suggesting that the effect of path b1 differed at different levels of GRC. Analysis of the Index of Moderated Mediation confirmed the significance of these differences (b = .01, *SE* = .003, 95%CI [.0004, .0132]). Analysis of the conditional effect indicated that the relationship between depression and suicidality was not significant for participants low in GRC (1 *SD* below the mean), (b = .05, *SE* = .05, 95%CI [-.0549, .1494]). However, the relationship was significant for participants who were average (b = .14, *SE* = .03, 95%CI [.0901, .1998]) and high (1 *SD* above the mean) in GRC (b = .24, *SE* = .06, 95%CI [.1271, .3582]). Table 4 displays the results.

Simple slopes analysis further indicated that there were significant differences between the conditional effects for those who were low, average and high in GRC, such that the effect was significantly stronger for those high in GRC in comparison to those

who were average (*contrast* = .07, *SE* = .04, 95%CI [.0048, .1459]) and low (*contrast* = .14, *SE* = .07, 95%CI [.0097, .2918] in GRC. Thus, hypothesis three was supported such that the relationship between depression and suicidality in the context of the proposed model was conditioned upon levels of GRC with the effect being stronger for men high in GRC in comparison to men low in GRC. Additionally, results revealed there was a significant difference between the conditional effects for those average in GRC in comparison to those low in GRC, such that the effect was significantly stronger for those average in GRC (*contrast* = .07, *SE* = .04, 95%CI [.0048, .1459]). Figure 3 displays the results.

Table 4.
Regression Results for the Indirect and Conditional Indirect Effects

	Mediator Variable Model			
PHQ-9_Tot	*b*	*SE*	*t*	*P*
Constant	4.68	.53	8.79***	.001
MDRIS_Tot	.70	.11	6.17***	.001
SPS_Tot	-1.00	.03	-3.71***	.001
	Dependent Variable Model			
SIS_Tot	*b*	*SE*	*t*	*P*
Constant	10.61	.21	49.35***	.001
MDRIS_Tot	.05	.07	.82	.41
PHQ-9_Tot	.14	.03	5.18***	.001
GRCS_Tot	.00	.00	.99	.32
PHQ-9xGRCS_Tot	.01	.00	2.03*	.04
SPS_Tot	-.02	.01	-2.05*	.04
	Total Effect Model			
SIS_Tot	*b*	*SE*	*t*	*p*
Constant	11.06	.24	44.47***	.001
MDRIS_Tot	.17	.08	2.04*	.04
SPS_Tot	-.04	.01	-3.45***	.001
	Conditional Effect at GRC = mean and ± 1 *SD*			
GRCS_Tot (W)	$\hat{a}_1(\hat{b}_1 + \hat{b}_3 W)$	*SE*	*t*	*P*
-11.04	.05	.05	.91	.36
.00	.14	.03	5.18***	.001
11.04	.24	.06	4.12***	.001

Note. * $p < .05$. ** $p < .01$. *** $p < .001$

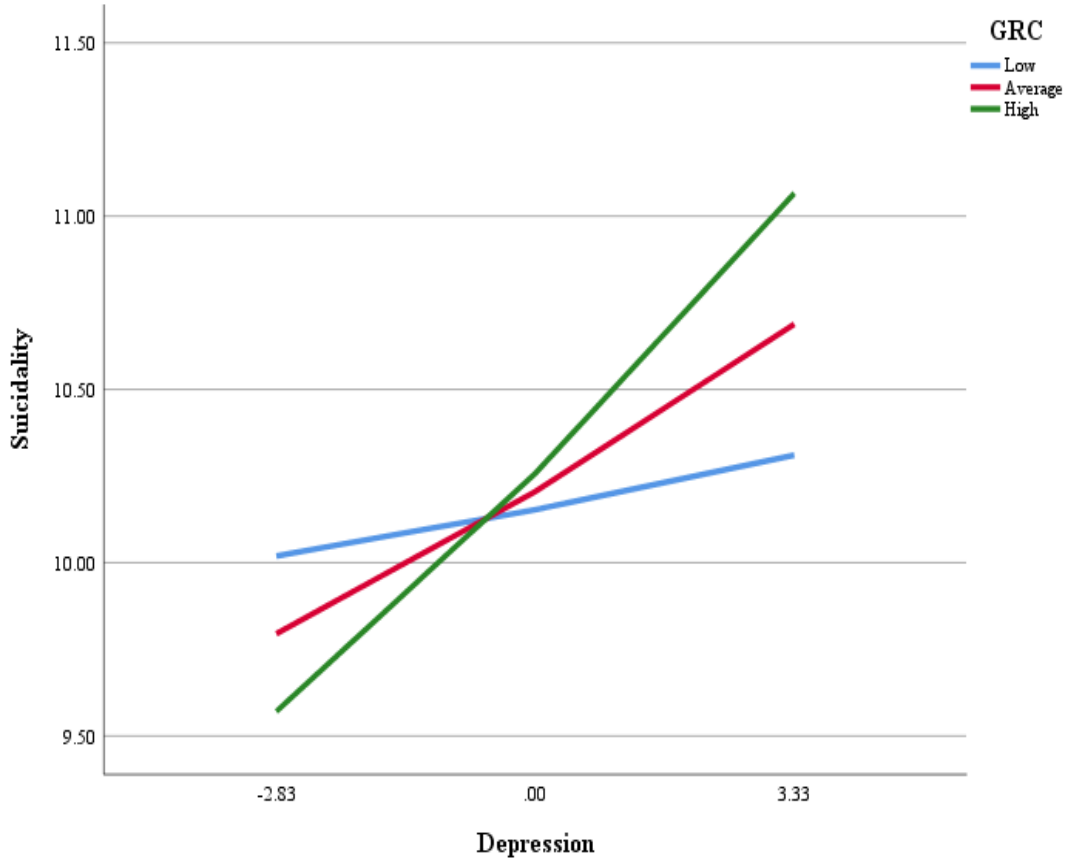


Figure 3. *Interactive Effects of Depression and GRC Predicting Suicidality*

Chapter V

Discussion

Study Overview

The present study addresses gaps in the existing literature on suicidality in firefighters. The study adds to the existent literature by examining unique predictors of suicidality that are imbedded in the occupation and culture of fire service, such as trauma exposure and culturally masculine norms that promote experiences of GRC. This study examined a) the relative associations between DRTE, depression, GRC and suicidality, b) the indirect effect of DRTE on suicidality through depression, and c) how this effect was conditioned upon levels of GRC. All proposed hypotheses were supported such that DRTE, depression, GRC and suicidality all shared positive associations between one another, depression fully mediated the relationship between DRTE and suicidality, and the mediating relationship was moderated by participants' experience of GRC. Notably, this study is of the first to comprehensively explore how interactions between trauma exposure, depression and GRC explain increased suicidal thoughts and behaviors in firefighters using constructs more objective than those specified in previous models of suicidality for this population (e.g. Joiner, 2005).

Associations Between DRTE, Depression, GRC and Suicidality

Consistent with the proposed hypothesis, significant positive relationships existed between DRTE, depression, GRC and suicidality. Specifically, as firefighters' exposure to traumatic incidents increased, their experiences of depression, GRC and suicidality also increased. Additionally, as firefighters' experiences of GRC increased, their experiences of depression and suicidality also increased. The former of these findings in part aligns with previous research on the association between trauma exposure,

depression and suicidality (Martin et al., 2017; Nock et al., 2010). Additionally, findings on the positive association between DRTE and GRC align with previous research which posits that among those in male-dominated occupations, there are intense pressures to conform to traditional masculine gender norms when exposed to trauma to avoid shaming by peers (Nolan, 2009; Pasciak & Kelley, 2013; Prokos & Padavic, 2002). However, this idea begets an important point when considering the impact of peer-based social support on depression and suicidality outcomes. Though it was not a main hypothesis in the present study, results indicated a negative association existed between peer-based social support, depression and suicidality. Conversely, GRC was positively associated with depression and suicidality in the present study. This suggests that although the GRC that results from subscription to traditional masculine gender norms may increase depression and suicidality, it may simultaneously help maintain peer-based social support, which was found to decrease depression and suicidality. Consequently, it may be important to examine whether the negative effects of GRC on depression and suicidality outweigh the positive effects of social support for this population specifically.

DRTE, Depression and Suicidality

The present study investigated beyond the associations present between DRTE, depression and suicidality by examining the predictive effects of trauma exposure and depression on suicidality. Additionally, these effects were examined in a population where exposure to traumatic incidents is a duty requirement. It was hypothesized that DRTE would have an indirect effect on suicidality through depression. This hypothesis was supported beyond the original expectation of an indirect effect when the fully mediating effect of depression was realized. To clarify, Preacher and Hayes (2004)

differentiate between a mediating effect and an indirect effect by stating that an indirect effect can be present even when the total effect is not significant but full mediation, otherwise known as *perfect mediation,* requires a significant total effect to be present. That is, confirmation of an indirect effect does not convey the presence of a fully mediating effect, but confirmation of a fully mediating effect does convey the presence of an indirect effect. Additionally, in a fully mediating effect c' must become non-significant in the presence of the mediator, suggesting that the mediator fully accounts for the relationship between the independent and dependent variable. This assumption is not required for an indirect effect. Consequently, the results of the present study indicate that depression fully mediates the relationship between DRTE and suicidality. Further, results indicated that depression mediated over ¾ of the total effect of DRTE on suicidality.

This finding is consistent with previous research that suggests psychological disorders can serve as conduits for the path from trauma exposure to suicidality (Fullerton et al., 2004; Martin, 2017; Violanti et al., 2006). This finding is also consistent with Joiner's (2005) first-responder based model of suicidality which suggests increased exposure to death and associated symptoms of depression couple to predict suicidal behaviors. Notably, Joiner's findings provided mixed support for his theory of suicide because the model became non-significant when controlling for age and YID. Age and YID were not included as covariates in the present study because they were not correlated with the outcome of suicidality. This is possibly due to the relatively low variability in scores on the measure of suicidality in this study. Additionally, the present study only utilized one measure of suicidality, which was missing an item, as opposed to Joiner's

two full measures. This may have also made it more difficult to find significant correlational relationships between age, YID and suicidality.

However, this study perhaps contributes to the existent literature on predictors of first-responder suicidality by better operationalizing some of Joiner's other constructs. For example, Joiner's concepts of perceived burdensomeness and thwarted belonging may have been better operationalized in the present study by firefighters' experiences with symptoms of depression as measured by the PHQ-9. Additionally, in Joiner's study, capability for suicide and fearlessness about death were measured using the 7-item Acquired Capability for Suicide-Fearlessness about Death subscale (Ribeiro et al., 2014), which demonstrated less than adequate internal consistency ($\alpha = .68$). Fearlessness about death may have been better operationalized in the present study by using 17 psychometrically sound items ($\alpha = .92$) to measure the product of the number of exposures to life-threatening/suicide incidents and the relative level of stress attributed to each incident.

Conditional Impact of GRC

Consistent with the proposed hypotheses, the relationship between depression and suicidality in the context of the proposed mediation model was conditioned upon levels of GRC with the effect being stronger for men high in GRC in comparison to men low in GRC. Notably, the effect was not significant for participants' low in GRC, which speaks to the exacerbating effects that strict adherence to masculine norms can have on the relationship between depression and suicidality. This finding is consistent with masculinity research that suggests GRC inhibits healthy coping and help seeking behaviors while subsequently increasing men's propensity for suicidal behaviors (Galdas et al., 2005; Houle et al., 2008).

Additionally, the effect of depression on suicidality was also stronger for men high in GRC in comparison to men average in GRC. This may suggest that the effects are somewhat less detrimental for men who loosely subscribe to traditional masculine norms as opposed to those who strictly subscribe to masculine norms. This would also be consistent with previous research that suggests men who exhibit a stronger subscription to masculine norms are more likely to engage in masking symptoms and denial of help (Real, 1997; Magovcevic & Addis, 2008). Overall, this finding suggests that firefighters' who strictly subscribe to masculine norms are at the greatest risk for suicidal behaviors when they are experiencing depression. Consequently, it may be helpful for clinicians to consider interventions that address depressive symptoms in the context of firefighters' experience of GRC when taking actions to decrease suicidality.

Limitations and Future Directions

The utilization of archival data presents a few key limitations in the present study. Most notable are the limitations in measurement of some of the key constructs. First, the missing item on the SIS (Rudd, 1989), "*I have come close to taking my own life*," somewhat limited the measurement of suicidality in the present study. However, the remining items still adequately captured the key constructs of suicide ideation and attempt and demonstrated strong reliability above universal cut-offs ($\alpha = .90$). Total scores on the SIS were also universally low ($M = 10.29$; $SD = 1.48$) and there was limited variability between item responses. This is likely because participants were asked to respond to the items based on their experience over the last week. This hindered the opportunity to adequately assess differences in participants who were low and high in suicidality. However, assessing symptomatology over the last week strengthened

specificity in the study by ensuring that the suicidality captured in the sample was reflective of those most at risk. Further, this demonstrates the SIS's clinical utility as a measure that can determine firefighters who are most at risk for suicidality in the present moment. Still, future research may benefit from the utilization of multiple measures that assess varying aspects of suicidality over a longer period of time. Measures of correlates of suicidality (e.g. suicidal ideation, suicide attempt, desire to die, suicide-based hospitalization history, self-injurious behaviors, impulsivity) that have occurred over a firefighter's lifetime may increase variability in outcomes for this population. Furthermore, the utilization of multiple measures of suicidality may also lend opportunities to answer questions related to the impact of DRTE and depression on suicidal ideation and suicide attempt separately.

Additionally, the missing item on the SIS constituted the need to compute a prorated score for each participant. Previous research has cautioned against the use of prorated scores, stating that it may bias scale outcomes (Mazza, Enders, & Ruehlman, 2016). Still, proration is said to be acceptable when items have similar means and strong correlations with other items on a scale (Mazza et al., 2019). Consequently, the low inter-item variability on the SIS in this study coupled with the strong reliability of the measure in the absence of the last item indicates that proration was acceptable in this case.

It is worth noting that while responses on the PHQ-9 were more variable in nature, only a few participants met criteria for symptoms beyond that of mild depression (n = 50). Additionally, multiple measures of depression must, and should, be used to make an accurate diagnosis of the disorder (Ng, How, & Ng, 2016). Additionally, the PHQ-9 may not have captured the complexities of depressive symptoms in men despite

its strong psychometric properties (Oliffe & Phillips, 2008). Theories of masculine depression posit that depressive symptoms are more likely to present in acceptable forms of masculine expression (i.e. alcohol abuse, somatic complaints, and stoicism) because traditional depressive affect has been stereotyped as too feminine (Magovcevic & Addis, 2008). Consequently, future research would benefit from the inclusion of measures of masculine depression such as the Masculine Depression Scale (Magovcevic & Addis, 2008) as well as traditional measures of depression like the PHQ-9 to increase internal validity.

There were also some limitations related to the relative properties of the data such as the inability to reject NMAR missingness and the violations of normality in relation to the skewness and kurtosis of the target measures. Multiple imputation (Arel-Bundock & Pelc, 2018; Lall, 2016; Schafer & Graham, 2002) and bootstrapping (Hayes, 2017; Preacher, Rucker & Hayes, 2007), respectively, have previously been posited as appropriate solutions that limit the bias created by these concerns. Consequently, both were employed as redress in the present study. However, there may still be some belief that SEM could outperform or produce significantly different results from basic statistical packages such as SPSS when dealing with data of this type. While SEM may be the preferred method of data analysis due to its robustness when trying to use misbehaved data to make statistical inferences, it is certainly not the only way to achieve this (e.g. Rochowicz, 2011). Furthermore, SEM techniques have not been found to produce significantly different results when compared to the *PROCESS* tool in SPSS, especially for observed variable models (Hayes, 2017; Hayes Montoya, & Rockwood, 2017).

However, SEM techniques and programs may be better suited for a more extensive analysis of the original research questions in the present study. For example, future research may benefit from examining the two subscales of the GRCS, REBBM and RE, separately in the proposed model to examine if greater differences in the effect between depression and suicidality exist for one subscale versus the other. It is plausible that restrictive emotionality could have a greater impact on the relationship between depression and suicidality than restrictive emotional behavior between men due to the relationship between emotional restriction, depression and suicidality in men (Birthistle, 1999; Naranjo, 2001; Jansz, 2000). Additionally, future research could benefit from the modeling of social support as a second moderator to the proposed model at path a_1 and b_1. Specifically, it is possible that social support could moderate the effect of GRC on the relationship between depression and suicidality (Houle et al., 2008) or moderate the relationship between DRTE and depression due to its protective effects. However, considering the previously discussed effect that subscription to masculine norms may have on firefighters' ability to receive social support, it would be preliminary to determine whether the negative effect of experiencing GRC outweighs the positive effect of peer-based social support on depression and suicidality. Despite the outcome, such research would be monumental for the development of interventions to counteract the effects found in the present study.

Clinical Implications

The findings of the present study have important clinical implications. First, results supported the mediating role of depression in the relationship between DRTE and suicidality. This suggests that DRTE has psychological implications that require

intervention to decrease suicidal outcomes for firefighters. These findings highlight the need for the development and implementation of brief, evidence-based interventions for firefighters following traumatic calls, as current practices have yielded mixed support (see Everly, Flannery, & Mitchell, 2000 for a review). Second, results supported the moderating role of GRC in the relationship between depression and suicidality. This suggests that the cultural characteristics of fire service thought to promote unity among peers may actually have a negative impact on firefighter's ability to cope with DRTE and may inadvertently be increasing firefighters' likelihood of suicidality. Consequently, these findings should inform new fire service education highlighting the effect that gender role conflict can have on depressive presentations in men and stressing the importance of seeking help.

Additionally, rates of depression and suicidality could be significantly diminished if mental health services were easily accessible and affordable for firefighters. Consequently, these findings highlight the need for departmentally embedded mental health professionals and resources that are readily available to assist firefighters in need. Notably, these findings also indirectly suggest that clinical outreach may be pertinent to improving the rates of mental illness and suicidality in firefighters. Thus, mental health professionals working in these settings may find the bulk of their work is focused on pursuing methods to actively identify members at risk as opposed to more conventional therapeutic frames. Additionally, education on the importance of mental health and on the differences in presentations of mental illnesses in this population will be pertinent.

Conclusion

Overall, this study determined that the relationship between DRTE and suicidality is mediated by depression and that the path to suicidality is further moderated by GRC. Additionally, these findings remained when controlling for social support. These findings reveal that occupational and cultural factors imbedded in fire service may unintentionally exacerbate psychological dysfunction and suicidality in this population. Consequently, this research can be used to inform new intervention efforts and evoke change in the functioning of fire departments.

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