SELF-COMPASSION, OCCUPATIONAL STRESS, PERCEIVED STRESS AND BURNOUT

IN STRUCTURE FIREFIGHTERS: A MODERATED MEDIATION MODEL

By

ELI MALACHY DUNN DAPOLONIA, M.A., M.S.

A dissertation submitted in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY IN CLINICAL PSYCHOLOGY

PACIFIC UNIVERSITY

School of Graduate Psychology

AUGUST 2021

Abstract

The primary objective of this study was to determine if job stressors predict burnout symptoms in United States (U.S.) structure firefighters, and if perceived stress mediates the relationship between job stressors and burnout. In addition, this study sought to determine if self-compassion would moderate the relationship between job stressors and perceived stress, as well as between perceived stress and burnout in U.S. structure firefighters. Participants ($n = 147$) were recruited from fire departments across the continental U.S. Data were collected using an online Qualtrics survey. Results indicated that both job stressors and perceived stress positively predict burnout in firefighters, and that perceived stress mediates the relationship between job stressors and burnout. This suggests that how much perceived stress firefighters experience impacts how much job stressors will predict symptoms of burnout. Surprisingly, firefighters' level of self-compassion did not appear to affect the relationship between job stressors and perceived stress, or between perceived stress and burnout. This was inconsistent with prior studies of first responders, and may indicate a unique characteristic of how firefighters interact with stress.

Keywords: self-compassion, occupational stress, perceived stress, burnout, firefighter

Self-compassion, Occupational Stress, Perceived Stress and Burnout in Structure

Firefighters: A Moderated Mediation Model

Working as a structure firefighter is one of the most stressful jobs in the United States

(U.S.; Kahn, Woods, & Rae, 2014; Ludwig, 2010). This stress contributes to a number of serious

negative physiological and psychological outcomes for firefighters including, elevated perceived

stress and burnout. Burnout is one of the most common outcomes of stress among firefighters. In

a study of the interaction effects of burnout and job support on physical illnesses in firefighters

($n = 9328$) researchers found high levels of burnout symptoms affecting one out of every four on

the job, or 24.2% (Lin, Wang, Shih, Kuo, & Liang, 2019). It is also one of the more costly

outcomes in terms of damage to the individual, their performance on the job, potential risks to

public safety, and ultimately in financial losses to municipalities (Murphy, Beaton, Pike, & Cain,

1994).

Burnout

The most commonly studied factors of burnout are exhaustion, depersonalization, and

reduced personal accomplishment; while disengagement and deterioration in physical health

have only been researched more recently (Awa, Plaumann, & Walter, 2010; Bakker & Heuven,

2006; Basinska, Wiciak, & Dåderman, 2014; Queiros, Kaiseler, & da Silva, 2013; Schaible &

Six, 2016; Tett & Meyer, 1993). Factors that can contribute to burnout include being exposed to

persistent stress related to work combined with intense involvement with people, which creates a

constant and repetitive emotional pressure over time (Ascari et al., 2016). Similarly, acute stress,

chronic stress, organizational stress, overall perceived stress and an imbalance between job

reality, resources, and expectations combined with persistent work stress are key predictors of

burnout (Ascari et al., 2016; Awa et al., 2010, Bakker & Demerouti, 2007). Another significant

predictor is the role requirement to display or not display particular emotions; for example, the need to appear calm in a situation that would normally provoke a strong emotional reaction. Burnout often happens in work where there is an asymmetrical relationship between the worker or helper, and the receiver of help, and as a result, many professional roles have high rates of burnout. For example, one study found that 20% of German physicians, 27% of physicians in the United Kingdom, 22% of physicians in the U.S., and 40% of teachers in the U.S. experience burnout (Awa et al., 2010).

Exposure to emotionally demanding interpersonal interactions is also a key predictor of burnout (Huynh, Xanthopoulou, & Winefield, 2013; Smith et al., 2018). Examples may include frequent exposure to people involved in accidents, violence, and death and illness, or victims of crime. This makes members of health professions and first responders like police officers, paramedics and firefighters at particularly high risk (Bakker & Heuven, 2006). Burnout is not limited to service professionals, but is also common among human service providers (Bakker & Heuven, 2006). In a study of police officers, researchers found that the combination of physical and psychological fatigue strongly predicted burnout, and that other factors, such as acute stress from witnessing violence, injury, and death contributed as well (Russell, Cole, & Jones, 2014; Smoktunowicz et al., 2015). They also found that organizational stress, such as navigating bureaucracy, working additional hours due to staff shortages, and perceived unfair oversight or evaluation predicted burnout. These stressors often lead to negative job-related emotions such as anger, hopelessness, or disgust, and these acute negative emotions when combined with exhaustion predict burnout (Bakker & Heuven, 2006; Basinka et al., 2014).

Burnout is associated with a number of negative physical health, psychological health, and job performance outcomes. Negative physical health outcomes correlated with burnout

include increased risk of sleep disorders, increased risk of workplace injury, metabolic syndrome, high blood pressure, increased risk of suicide, increased risk of cardiovascular disease, skin rashes, increased physical fatigue, elevated blood pressure, migraine headaches, poor appetite, loss of sexual drive, and increased frequency of colds, with increased symptoms severity correlated with increased level of burnout (Honkonen et al., 2006; Kim, Ji, & Kao, 2011; Murphy, Beaton, Pike, & Cain, 1994; Peterson et al., 2008; Vaulerin, D'Arripe-Longueville, Emile, & Colson, 2016a). Negative psychological health outcomes correlated with burnout include emotional fatigue, depression, increased alcohol use, use of non-prescription drugs, apathy, irritability, relationship problems, crying spells, anxiety, rigid thinking, social withdrawal, and feelings of hopelessness, helplessness, guilt, inadequacy, failure, incompetence, cynicism, disillusionment, suspicion, resignation, indifference, depersonalization, cognitive exhaustion, and increased aggression (Jayaratne & Chess, 2013; Murphy et al., 1994; Queirós et al., 2013). Negative job performance outcomes associated with burnout include reduced job satisfaction, reduced job performance, disengagement, reduced personal accomplishment, increased work error rate, increased likelihood of engaging in counterproductive work behaviors, increased intent to leave job, and turnover (Dewa, Loong, Bonato, Thanh, & Jacobs, 2014; Russell, Cole, & Jones, 2014; Smoktunowicz et al., 2015).

Firefighting is a profession that is heavily impacted by burnout. For example, in a study of 3,289 full-time professional structure firefighters in Greece, researchers found that 20% met criteria for burnout (Katsavouni, Bebetsos, Malliou, & Beneka, 2015). Vinnikov et al. (2019) found that in a study of 604 firefighters, factors like time on the job were not predictive of burnout, but stressors like management role and uniform discomfort were significantly correlated with higher rates of firefighter burnout. Other researchers found that increased burnout

symptoms were a significant risk factor for increased risk of physical injury such as sprains, tendinitis, and muscle tears on the job (Katsavouni et al., 2016). The results suggest that the cognitive fatigue associated with burnout may make firefighters more prone to mistakes resulting in injuries (Vaulerin et al., 2016a).

Burnout as a contributor to injury among firefighters is a significant concern for a profession that already has very high injury rates. In 2010, the National Fire Protection Association indicated that 71,875 U.S. firefighters were injured in the line of duty, and that 45.4% of these injuries occurred during fireground operations, with a rate of injury by department as high as 23.5 injuries per 100 firefighters (Burgess et al., 2013). There are 30,000 fire truck crashes in the U.S. each year, and these crashes are responsible for between 20% and 25% of yearly firefighter fatalities. This makes truck crashes the second leading cause of death for firefighters following sudden cardiac death (SCD; Donoughe, Witestone, & Gabler, 2012).

Perceived Stress and Burnout

A number of studies have demonstrated the link between perceived stress and burnout. In a study of 126 volunteer caregivers serving in AIDS care in South Africa, high levels of perceived occupational stress, specifically role overload and lack of support, predicted higher levels of burnout (Akintola, Hlengwa, & Dageid, 2013). In a sample ($n = 314$) of dental students in Spain, researchers found that specific dimensions of perceived stress were correlated with specific dimensions of burnout. For example, the burnout factor 'overload' was positively associated with both 'tenseness' (0.45), and 'frustration' (0.38) perceived stress dimensions; and the burnout factor 'lack of development' was positively associated with the perceived stress dimension 'frustration' (0.72; Montero-Marín et al., 2014). Popa-Vela (2014) found in a study of physicians ($n = 79$) attending to end of life patients that perceived stress was positively

correlated with the burnout factor of emotional exhaustion. And in a study of 489 Spanish

teachers, researchers found that emotional competence mediated the relationship between

perceived stress and burnout (Rey, Extremera, & Pena, 2016). Together these studies support the

idea that perceived stress may predict burnout in some populations. But does this hold true in

firefighters? We know that burnout in firefighters is intimately linked with perceived stress, and

when interventions designed to address that stress are introduced, the risk of burnout is reduced

(Lee et al., 2018). But to date few studies have looked at how perceived stress predicts burnout in

firefighters.

Some research has shown that personality traits such as self-efficacy can moderate the

relationship between perceived stress and burnout in firefighters. In a study of 580 Polish

firefighters, researchers found that higher levels of trait self-efficacy moderated the relationship

between stress and burnout such that when stress was high, in firefighters with high self-efficacy,

that stress was less likely to result in increased burnout compared to firefighters with low self-

efficacy. These relationships were most significant when it came to disillusion and sense of

professional inefficacy and perceived stress and psychophysical exhaustion (Makara-Studzińska,

Golonka, & Izydorczyk, 2019). Another study supported the relationship between perceived

stress and burnout in 464 Korean male firefighters, and found that gratitude may reduce the risk

of both (Lee et al., 2018).

Occupational Stressors

Firefighters are commonly exposed to critical incident and other occupational stressors

that may include risk of death or injury to themselves, their coworkers, and members of the

public. These may include natural disasters, exposure to dangerous chemicals, exposure to fire,

smoke, and motor vehicle accidents (Hokanson & Wirth, 2000; Kulbarsh, 2007; Lesperance,

2017). Firefighter exposure to continuous stressors has been linked to negative health outcomes, problematic drinking, depression, and the development of PTSD at rates as high as 22% (Lambert, Benight, Harrison, & Cieslak, 2012). In addition to psychological stressors, firefighters are subjected to lack of sleep, intermittent, intense physical labor, and work in smoky hot conditions while exposed to dust, toxic chemicals and dangerous noise levels. Shift work also contributes to firefighter physical and psychological stress (Main et al., 2012). Firefighters are also exposed to acute occupational stressors including exposure to trauma, risk of injury or death, and witnessing injury or death of others (Arbona et al., 2017; Bryant, et al., 2017). Lastly, additional occupational stressors common to firefighters include age, gender or ethnicity discrimination, sleep disruption, isolation from family, financial strain due to inadequate pay, observing negative effects of stress on co-workers, and thoughts about past shifts that were particularly upsetting (Kimbrel et al., 2011; Kimbrel et al., 2015).

   Stress in firefighters is not only a product of the work environment, but also the social environment. In a study of 774 Finnish firefighters, alcohol use and disturbances in their social lives were found to be the strongest predictors of perceived stress (Lusa, Häkkänen, Luukkonen, & Viikari-Juntura, 2002). Similarly, a study of 1,036 Black and Latinx firefighters found that higher perceived stress was associated with higher alcohol use in 24% of black and 33% of Latinx firefighters (Arbona et al., 2017). In a study of 7,151 firefighters, researchers found that level of perceived job stress and resilience can mediate the development of depression or alcohol use disorders (AUDs) following trauma exposure in firefighters, with lower perceived stress reducing the risk of developing an AUD or depression after exposure to traumatic events (Kim, Park, & Kim, 2018).

Perceived stress in firefighters is also directly linked to factors of burnout. For example, firefighter autonomy, which is associated with the burnout factors of reduced personal accomplishment and disengagement, was directly correlated with perceived stress, such that as firefighter perceived autonomy goes down, perceived stress goes up (Chiang, Baley, Ponder, & Padilla, 2016). The studies described above offer strong evidence for a relationship between perceived stress and burnout, but are there inherent traits that might moderate that relationship? Self-compassion may offer one possibility.

Self-Compassion

Kristin Neff, the creator of the self-compassion scale (SCS) defines self-compassion as being touched by and open to one's own suffering, not avoiding or disconnecting from it, generating the desire to alleviate one's suffering and to heal oneself with kindness. Self-compassion also involves offering nonjudgmental understanding to one's pain, inadequacies and failures, so that one's experience is seen as part of the larger human experience (Neff, 2003b, p.87).

Researchers have found that burnout is negatively correlated with self-compassion, and that individuals who are high in self-compassion reported less burnout than those who have low self-compassion scores (Beaumont, Durkin, Martin, & Carson, 2015). Another study that looked at a variety of different variables and their relationship to burnout in employees at the Department of Veterans Affairs and found that self-compassion was consistently the strongest predictor of burnout; staff with the highest self-compassion scores had the lowest risk of burnout (Atkinson, Rodman, Thuras, Shiroma, & Lim, 2017). Other authors have found that self-compassion interventions may reduce risk of burnout in first responders (Beaumont, et al., 2015; Dapolonia, 2018; Richardson et al., 2016).

There are only a few research studies looking at self-compassion and firefighters. In one German study (*n* = 123), researchers looked at how self-compassion moderates the relationship between self-criticism and depression, and they found significant protective effects of self-compassion (Kaurin, Schonfelder, & Wessa, 2018). In another study (*n* = 289), self-compassion was a significant predictor for perceived supervisor leadership in wildland firefighters (Lewis, 2013).

Self-Compassion as a Protective Trait

There are a number of studies that look at the power of self-compassion to moderate the effects of stress and other factors on negative outcomes. For example, self-compassion moderated the relationship between physical health and subjective well-being in older adults, to the extent that among adults with poorer physical health, self-compassion was associated with better subjective well-being (Allen, Goldwasser, & Leary, 2012). This finding was further supported by a meta-analysis looking at the relationship between self-compassion and well-being across 79 studies (*n* = 16,416) where authors found the magnitude of the relationship between self-compassion and well-being was *r* = .47 (Zessin, Dickhäuser, & Garbade, 2015). Similarly, self-compassion moderated the relationship between academic burnout and psychological health in Korean university students (*n* = 350), such that those with higher self-compassion had a weaker relationship between burnout and depression (Kyeong, 2013). In a study of 799 nurses in New Zealand, researchers found that self-compassion moderated the relationship between burnout and burnout-related barriers to compassion, such that higher self-compassion predicted lower burnout-related barriers to self-compassion, even when accounting for higher burnout (Dev, Fernando, Lim, & Consedine, 2018). In a study of hospital staff (*n* = 281) self-compassion moderated the relationship between stress and sleep quality, depression, mental well-being, and

anxiety, such that those higher in self-compassion had a weaker association between stress and depression.

Another way that self-compassion may be a protective trait is in how it impacts perceived stress. In a small study of 44 adolescents, researchers found that self-compassion co-varied with perceived stress and depressive symptoms, and that adolescents with higher self-compassion tended to have lower depression and perceived stress (Bluth & Eisenlohr-Moul, 2018). Similarly, self-compassion predicts emotional wellbeing in healthy (but stressed) adolescents ($n = 132$) and increases in self-compassion predicted decreases in negative affect, perceived stress, depressive symptoms, and rumination (Galla, 2016). Ewert, Gaube, Caroline, and Geisler (2018) found that those with higher self-compassion experienced lower perceived stress following an event that evoked embarrassment or shame. Similarly, self-compassion mediated the relationship between perceived stress and physical health, and those higher in self-compassion were likely to be lower in perceived stress and therefore more likely to engage in positive health behaviors (Homan & Sirois, 2017). Self-compassion also moderates the relationship between rumination and stress, which are direct contributors to burnout (Samaie & Farahani, 2011).

Although self-compassion is inversely related to perceived stress and burnout, few studies have assessed trait self-compassion as a predictor of burnout, particularly in a first responder sample (Dapolonia, 2018). Therefore, the primary aim of this dissertation is to assess if perceived stress mediates the relationship between occupational stressors and burnout in structure firefighters, and to evaluate if the relationships between occupational stressors and perceived stress, and perceived stress and burnout are moderated by self-compassion.

Hypotheses

Among a sample of structure firefighters:

Hypothesis 1: Occupational stressors will positively predict burnout.

Hypothesis 2: Perceived stress will positively predict burnout.

Hypothesis 3: (a) The relationship between occupational stressors and burnout will be mediated by perceived stress, and (b) the relationships between occupational stressors and perceived stress, and perceived stress and burnout with be moderated by self-compassion, such that at higher levels of self-compassion (+1SD), the relationships between occupational stressors and perceived stress and perceived stress and burnout will not be statistically significant, whereas at lower levels (-1SD) they will be statistically significant.

Method

Participants and Procedures

Based on the use of a linear multiple regression with three tested predictors, occupational stress, perceived stress and burnout, a medium anticipated effect size $f^2 = 0.15$, an alpha of 0.05, and power (1-$\boldsymbol{\beta}$ error probability) of 0.95, a power analysis using G*Power indicated a sample size of at least 119 participants were required (Faul, Erdfelder, Buchner, & Lang, 2009). According to the Bureau of Labor Statistics (2019) there are 321,570 full-time paid firefighters working in the United States with an average age of 38.8, 4.5% were women, 9.2% identified as Black, with 9% identified as Latinx (BLS, 2019; NFPA, 2019).

Structure firefighters were recruited using direct mail solicitation to 348 individual fire stations, 12 local, regional and national fire departments across 8 states in the United States. Additional participants were obtained via snowball sampling and via word of mouth between participants. Participants were limited to structure firefighters, age 18 or older, English speaking, currently working full-time in the United States. Demographic variables collected included age, shift, position (rank), geographic region, gender, race, ethnicity, job type, and education level.

The sampling method focused on direct recruitment using email, fliers, and in-person presentations, with additional participants recruited using snowball sampling and social media. Because firefighters are a low diversity population in the United States, efforts were made in sampling to increase the diversity of the sample by targeting specific groups to recruit participants (Bureau of Labor Statistics, 2019; National Fire Protection Association, 2019). Targeted groups included high diversity departments such as the San Francisco Fire Department, the Saint Louis Fire department and the Albuquerque Fire Department; as well as diverse firefighter associations such as the International Association of Women in Fire & Emergency Service (Women in Fire), International Association of Black Professional Fire Fighters (IABPFF), National Association of Hispanic Firefighters (NAHFF), International EMS & Firefighters LGBTQ Pride Alliance, and the Asian Firefighters Association (AFA; Asian Firefighters Association, 2019); International Association of Black Professional Fire Fighters, 2019; International Association of Women in Fire & Emergency Services, 2019; International EMS & Firefighters LGBTQ Pride Alliance, 2019).

The study procedures reviewed below were granted exempt status by Pacific University's Institutional Review Board (IRB) on 5/26/2020. An informed consent was provided prior to the start of every survey and included an explanation of possible risks and benefits from taking the survey, assurance that survey takers could stop at any time, and contact information for the primary investigator, co-investigator, and supervisor of the project. Recruiting included mail solicitations to 348 individual fire stations across the continental United States. All participants had the option to receive a $10.00 gift card from a national online retail store as compensation for their participation. Gift cards were mailed to participants who completed all questions on the

survey and provided a mailing address in the United States within two weeks of survey

completion.

Measures

All measures were delivered via online survey using Qualtrics (Qualtrics, 2019).

The Occupational Stress-14 Scale (SOOS-14; Kimbrel et al., 2011; Kimbrel et al., 2015)

is a measure of occupational stressors developed for use with emergency responders such as

paramedics and firefighters. It was derived from Beaton & Murphy's 57-item Sources of

Occupational Stress (SOOS). Respondents are asked how bothered they felt about several sources

of on-the-job stress experienced during the last 10 shifts they worked using a 1 to 5 Likert-type

scale that ranges from 1 = *not at all bothered* to 5 = *extremely bothered.* Higher scores indicate

higher levels of job stressors. The test–retest reliability of the measure over three months indicate

that the SOOS-14 was moderately stable, $r = 0.51$, $p < 0.001$. Cronbach's alphas across several

studies ranged from adequate at, $\alpha = 0.78$, to good at $\alpha = 0.86$. The SOOS-14 demonstrates

similar validity and reliability and validity as the longer SOOS (Beaton & Murphy, 1993;

Kimbrel et al., 2011; Kimbrel et al., 2015).

The Perceived Stress Scale (PSS-10; Cohen et al., 1983) is a 10-item measure designed to

evaluate an individual's perception of stress. Items are constructed to examine how overloaded,

uncontrollable, and unpredictable respondents feel their lives are. The PSS-10 includes direct

questions about current perception of stress and is designed using community norms with at least

an eighth-grade education. The PSS-10 has shown adequate internal consistency ($\alpha = .70$),

convergent validity, and consistency across language groups (Lee, 2012). The PSS-10 asks

questions about thoughts and feelings that occurred over the last month. Respondents are asked

about their feelings and thoughts experienced during the last month using a 0 to 4 Likert-type

scale that ranges from 0 = *never* to 4 = *very often.* Higher scores indicate higher levels of

perceived stress. (Cohen et al., 1983; Perera et al., 2017).

The *Self-Compassion Scale-Short Form* (SCS-SF; Neff, 2003b; Raes, Pommier, Neff, &

Van Gucht, 2011) is a brief 12-item variant of the 26-item SCS (Neff, 2003a, Neff, 2003b). It

measures the ability to hold painful feelings and thoughts in mindful awareness, to have

understanding and kindness toward oneself in situations of failure or pain; and perception that

our own individual experiences are part of a larger human experience. Respondents are asked

about their feelings and thoughts experienced during the last month using a 1 to 5 Likert-type

scale that ranges from 1 = *almost never* to 5 = *almost always.* Higher scores indicate higher

levels of self-compassion. The SCS-SF has shown good factorial validity, internal consistency,

and correlations with other constructs as expected (Raes et al., 2011).

The *Oldenburg Burnout Inventory* (OLBI; Demerouti, Bakker, Vardakou, & Kantas,

2003) is a burnout scale consisting of 16 items, and was developed to address the psychometric

problems of previous measures of burnout, as well as to provide a measure that could be utilized

for a broader range of occupations than previous measures. The OLBI examines burnout across

two dimensions, disengagement and exhaustion. The measure uses a five-point, Likert scale with

anchors that range from 1 = *strongly disagree* to 5 = *strongly agree*. Higher scores indicate

higher levels of burnout symptoms. The OLBI has demonstrated acceptable internal consistency,

with Cronbach's alpha ranging from .74 to .87, and good test-retest reliability ($r = .51$, $p < .001$,

for exhaustion; and $r = .34$, $p < .01$, for disengagement). Examination of factorial, construct,

convergent and divergent validity also yielded acceptable psychometric properties (Demerouti,

Bakker, Vardakou, & Kantas, 2003; Demerouti, Mostert, & Bakker, 2010).

Data Plan

The primary aim was to examine how perceived stress mediates the relationship between occupational stressors and burnout, and may be moderated by self-compassion. Structural equation modeling (SEM) was used to model these relationships and identify if the strength of the indirect effect (i.e., path $a * b$ of Figure 1) varies across the proposed moderator, self-compassion (a.k.a., conditional indirect effect; Hayes, 2015; Kline, 2011). Two multiple linear regression (MLR) equations were specified within the structural equation model. For the first equation, perceived stress was regressed on occupational stress, self-compassion, and occupational stress X self-compassion interaction. For the second equation, burnout was regressed on occupational stress, perceived stress, self-compassion, and perceived stress X self-compassion interaction. These equations allowed the ability to derive and examine the conditional indirect and total effects.

$$Y_i \text{perceived\_stress} = \beta_0 + \beta_1 \text{occupational\_stress}_{1i} + \beta_2 \text{self-compassion}_{2i} + \beta_3 \quad (1)$$
$$\text{occupational\_stressXself-compassion}_{3i} + e_i$$

$$Y_i \text{burnout} = \beta_0 + \beta_1 \text{occupational\_stress}_{1i} + \beta_2 \text{perceived\_stress}_{2i} + \beta_3 \text{self-compassion}_{3i} + \quad (2)$$
$$\beta_4 \text{perceived\_stressXself-compassion}_{4i} + e_i$$

A model building approach was used to examine if the moderator self-compassion improved the model fit (Cohen, Cohen, West, & Aiken, 2003; Kline, 2011). Using this approach, two nested models were specified. The first model included all predictors (i.e., occupational stress, perceived stress, self-compassion) and a direct, indirect, and total effect. No interaction terms or conditional effects were specified. This allowed identification of how the indirect effect model fit the data even after controlling for self-compassion. The second model added the interaction terms, conditional indirect effects, and conditional total effects to examine how

perceived stress as a mediator between occupational stress and burnout may be moderated by self-compassion.

Model parameters were estimated using a bootstrap method (Bollen & Stine, 1990). This method is recommended for estimating parameters in moderated mediation models as these parameters tend to not be normally distributed (Hayes, 2015). In this method, parameters are estimated with maximum likelihood estimation (MLE) for a number of bootstrap samples (i.e., 5,000 samples in this case). MLE is a technique that attempts to maximize the likelihood that the observed data and the relationship between variables (a.k.a., observed covariance matrix) can be described by the assumed statistical model (a.k.a., model-implied covariance matrix). Bootstrapping is a process of randomly resampling portions of the original dataset. The ML estimates derived from all resamples are then combined to create a sampling distribution where confidence intervals (CI) can be derived. Bias-corrected CIs were obtained. If zero was between the lower and upper CI bound, we retained the null hypothesis that there is no relationship.

Model parameters specific to conditional indirect effects were calculated. The direct effect was the relationship between occupational stressors and burnout while controlling for other predictors (i.e., c' path of Figure 1). The indirect effects were calculated by multiplying the a and b path coefficients. The total effect was calculated by adding the direct and indirect effects together. Conditional indirect effects were calculated by multiplying the interaction term estimates by +/- 1 SD and adding these to their respective a and b path estimates. These were then multiplied together (Hayes, 2015). For example, the indirect effect at -1 SD of the moderator equaled:

$$\text{indirect\_1sd\_below} = (w_1 * -1SD + a) * (w_2 * -1SD + b) \tag{3}$$

Conditional total effects were calculated by adding the direct effect to the respective conditional

indirect effect (e.g., total_1sd_below = direct + indirect_1sd_below). To compare conditional

effects, we subtracted each of the conditional effects and applied bootstrap estimation to

determine their significance (e.g., indirect_diff = indirect_1sd_below - indirect_1sd_above).

Significant difference values suggest moderated mediation is present (Hayes, 2015).

Various model fit indices were used to compare how well the two models fit the data.

Chi-square goodness of fit tests were performed but the significance values were de-emphasized.

In this test, a non-significant *p*-value typically suggests that there is no difference between the

model-implied covariance matrix and the observed covariance matrix, which suggests a

particular model fits some observed data. However, this test is known to be restrictive and

usually rejected with large sample sizes (Bollen, 1990). A chi-square difference test and model

fit indices were used to compare the two models. Although lower chi-square values suggest

greater model fit, a chi-square difference test was used to compare these two values. Root mean

square error of approximation (RMSEA) values less than or equal to .05 are indicative of good

model fit, while values above .08 are indicative of poor model fit (Finch & French, 2015).

Comparative fit index (CFI) values of .95 or greater are considered adequate fits of the data (Hu

& Bentler, 1999). Finally, standardized root mean square residual (SRMR) values less than or

equal to .08 are indicative of good model fit (Finch & French, 2015).

Assumptions of structural equation modeling were checked. Multivariate normality was

not assumed because estimates unique to moderated mediation models are generally not

normally distributed (Bollen & Stine, 1990; Hayes, 2015). The bootstrap estimation method

described earlier does not assume a normal distribution. Homoscedasticity was checked by (1)

examining a scatterplot of standardized residuals against predicted values and (2) performing a

Breusch-Pagan test for all regression equations. Independence among the covariates was checked

by (1) running Pearson correlations with relationships above .9 being suspect and (2) looking for

multicollinearity with a variance inflation factor 10 or above being suspect (Cohen et al., 2003;

Tabachnick & Fidell, 2007). All variables were mean centered before creating interaction terms

to limit the multicollinearity that is introduced when adding interaction terms to a model.

Independence of error assumption was checked by conducting a Pearson correlation between the

residuals derived from each equation and their respective predicted values. Participants that did

not complete the survey were excluded, so the missing completely at random assumption of

SEM was irrelevant (Allison, 2003; Kline, 2011). All other relevant assumptions were met.

Outliers for each regression equation were examined following recommendations by

Cohen et al. (2003) and Tabachnick and Fidell (2007). In this approach, cases that were

demonstrated to be a multivariate outlier were removed when they (1) demonstrated high

distance (e.g., standardized residual values beyond +/- 3, and Deffits values above a formulated

cut-off point) and high leverage and (2) heavily influenced the results (e.g., results became non-

significant after removal). Deffit distance values were chosen for examination over Mahalanobis

distance values because they tend to be more accurate in sample sizes of around 100 (Oyeyemi,

Bukoye, & Akeyede, 2015). Each MLR model was tested with and without the suspected cases

to determine if they were influencing the results and required removal. Cases deemed to have

undue influence in the MLR models were removed from the SEM models to determine if they

influenced the indirect, total, and conditional effects. No cases were deemed a multivariate

outlier in the primary analyses.

All statistical analyses were conducted using R (R Core Team, 2019), version 3.6.2. The

lavaan package (Rossell, 2012), version 0.6-7 was used to analyze the structural equation

models. The stats package (R Core Team, 2019), version 3.6.2 was used to model the individual

regression equations and check model assumptions and outliers of these equations.

Results

Data was collected on 171 firefighters. Of these, 147 completed all study measures and

were used in the primary analyses. The demographic variables for all 171 firefighters were tested

separately from the primary analysis in order to assess the odds of dropping out of the study.

Each variable was tested separately using logistic regression models for each sociodemographic

variable. No sociodemographic variable predicted the odds of dropping out of the study.

However, separation was clearly evident for the discrete predictors, which makes these results

tenable. For instance, of those that answered the gender question, only three cases were within

the 'non-male' and 'did not complete' cell, and these were all participants who did not complete

the study. Since there were so few female cases in general, a dummy coded variable was created

such that male was the primary factor level and was compared against all other cases. Anytime

dummy coded variables are created it is preferable to have at least 10% of data in each cell, male,

female, and decline to answer. Applying a Firth's penalized maximum likelihood estimation, a

correction method for models with separation (Šinkovec, Geroldinger, & Heinze, 2019), revealed

similar results (i.e., no relationship).

The mean age of the primary sample ($n = 147$) was 39.93 years ($SD = 8.93$). This sample

was predominately male, with 7.5% female and 1.4% declining to answer. This exceeds the

national mean for women firefighters, which is 4.5%. Recruiting for this study failed to meet

other diversity goals, however, with only 2.7% of participants identifying as Black, compared to

the national mean of 9.2% for structure firefighters; and 2.7% of participants identifying as

Latinx, while 9% of firefighters nationally identify as Latinx (BLS, 2019; NFPA, 2019). The

sample was predominately European American (83.6%) and from the northwestern region

(64.6%) or southwestern region (18.7%) of the U.S. See Table 1 for all sociodemographic

characteristics of the participants.

In general, no sociodemographic variable predicted burnout. When collapsing all regions

other than the northwest and southwest region into one reference group, the influence of region

on burnout was trending significant, $F(2, 144) = 2.35$, $p < .10$, with the southwest region having

lower burnout, $b = -4.52$, $p < .05$. However, this relationship was largely dependent on two

influential cases. After removing these two cases, the relationship was no longer significant, $F(2,$

$142) = 1.55$, $p > .1$ with the southwest region no longer different, $b = -2.99$, $p > .1$. Ultimately,

there were no influential outliers in the primary analysis $n = 147$, and when looking at the

secondary analysis of sociodemographics in the larger sample ($n = 171$) there were only two

outliers, which when removed, resulted in no sociodemographic variables that were predictive of

burnout.

Internal Consistency and Zero-Order Correlations

All measures were determined to be reliable within the acceptable range, see Table 2. In

addition, all measures were compared using Pearson zero-order correlations in order to

investigate if multicollinearity issues were present between the measured variables. No issues

with multicollinearity were found, see Table 3.

Model Fit Indices

The two models used in this study generally did not fit the data well. The first model

included all predictors (i.e., occupational stress, perceived stress, self-compassion) and a direct,

indirect, and total effect. No interaction terms or conditional effects were specified. This allowed

identification of the indirect effect. The first model had a significant goodness of fit test, $\chi^2(4) =$

35.86, $p = < .05$, indicating a poor relationship between the model-implied and observed

covariance matrices. The model fit indices also indicated a poor model fit: RMSEA = .23, CFI =

.85, SRMR = .14. The second model added the interaction terms, conditional indirect effects, and

conditional total effects to examine how perceived stress as a mediator between occupational

stress and burnout may be moderated by self-compassion. The second model showed similar

results. The goodness of fit test was $\chi^2(5) = 40.03$, $p = < .05$, RMSEA = .22, CFI = .84, SRMR =

.12. However, a chi-square difference test revealed a significant difference between the two

models, $\chi^2\Delta (1) = 4.16$, $p = < .05$. Given that the first model has a lower chi-square value, this

suggests that the first model is a better fit than the second model. It appears that self-compassion

as a moderator degrades the ability to accurately reproduce the observed covariance matrix. A

model without such interactions is also more parsimonious. This further indicates that self-

compassion may not be related to other study variables as proposed in hypothesis 3b.

Model 1 Parameters

Despite the poor model fits, model parameter estimates were examined. R^2 values of .35

for burnout and .41 for perceived stress were obtained, suggesting that occupational stress and

self-compassion account for 35% of the variance in burnout and 41% of the variance in

perceived stress, respectively. The direct effect (i.e., c') between occupational stressors and

burnout while controlling for perceived stress and self-compassion was significant, $b = 0.25$,

95% CI [0.08, 0.4]. For every one-unit increase in occupational stress, a .25 unit increase in

burnout was seen. This was consistent with hypothesis 1 which predicted that occupational

stressors would positively predict burnout in structure firefighters. The *a* path between

occupational stress and perceived stress while controlling for self-compassion was significant, *b*

= 0.28, 95% CI [0.2, 0.37]. For every one-unit increase in occupational stress, a .37 unit increase

in perceived stress was seen. The *b* path between perceived stress and burnout while controlling

for occupational stress and self-compassion was significant, $b = 0.31$, 95% CI [0.07, 0.55]. For

every one-unit increase in perceived stress, a .31 unit increase in burnout was seen. This was

consistent with hypothesis 2 which predicted that perceived stress would positively predict

burnout among structure firefighters. The relationship between self-compassion and perceived

stress while controlling for occupational stress was significant, $b = -0.29$, 95% CI [-0.37, -0.22].

Similarly, the relationship between self-compassion and burnout while controlling for

occupational stress and perceived stress was significant, $b = -0.27$, 95% CI [-0.35, -0.11]. See

Figure 2 for the model parameters. The indirect effect was significant, $b = 0.09$, 95% CI [0.02,

0.17] and total effect was significant, $b = 0.33$, 95% CI [0.2, 0.46]. The confidence interval did

not contain zero, suggesting a significant indirect effect of perceived stress between occupational

stress and burnout even when controlling for self-compassion. This was consistent with

hypothesis 3a which predicted that the relationship between occupational stressors and burnout

would be mediated by perceived stress in structure firefighters.

Model 2 Parameters

The second model examined if perceived stress as a mediator between occupational stress

and burnout is moderated by self-compassion. R^2 values of .36 for burnout and .43 for perceived

stress were obtained, suggesting occupational stressors and self-compassion account for 35% of

the variance in burnout and 41% of the variance in perceived stress. The direct effect (i.e., c')

between occupational stressors and burnout were still significant even after adding the

interaction between perceived stress and self-compassion, $b = 0.25$, 95% CI [0.1, 0.4]. The

interaction between occupational stressors and self-compassion did not predict perceived stress,

$b = 0.01$, 95% CI [-0.01, 0.02]. The relationship between occupational stressors and perceived

stress was significant for both low and high self-compassion, $b = 0.33$, 95% CI [0.22, 0.45], $b = 0.19$, 95% CI [0.04, 0.34], respectively. The interaction between perceived stress and self-compassion while controlling for occupational stressors did not predict burnout, $b = -0.01$, 95% CI [-0.02, 0.003]. The relationship between perceived stress and burnout was significant for both low (-1 SD) and high (+1 SD) self-compassion, $b = 0.26$, 95% CI [0.01, 0.5], $b = 0.42$, 95% CI [0.11, 0.74], respectively. These results suggest that self-compassion does not moderate the *a* or *b* paths which is not consistent with hypothesis 3b which predicted that the relationships between occupational stressors and perceived stress, and perceived stress and burnout would be moderated by self-compassion. See Figures 3 for all model parameters and Figure 4 and 5 for plots of these simple slopes.

All conditional effects were significant. The indirect effect at -1 SD below the mean for self-compassion (i.e., low self-compassion) was significant, $b = 0.09$, 95% CI [0.003, 0.18]. The indirect effect at +1 SD below the mean for self-compassion (i.e., high self-compassion) was also significant, $b = 0.08$, 95% CI [0.02, 0.2]. The difference between these two values was not significant, $b = 0.004$, 95% CI [-0.1, 0.1]. This suggests that self-compassion does not moderate the indirect effect of perceived stress. A similar effect is observed with the total effect. The total effect at -1 SD below the mean for self-compassion (i.e., low self-compassion) was significant, $b = 0.34$, 95% CI [0.2, 0.46]. The total effect at +1 SD below the mean for self-compassion (i.e., high self-compassion) was also significant, $b = 0.34$, 95% CI [0.18, 0.49]. The difference between these two values was not significant, $b = 0.004$, 95% CI [-0.1, 0.12].

Discussion

The primary aim of this dissertation was to assess if perceived stress mediates the relationship between occupational stressors and burnout in structure firefighters, and to evaluate

if the relationships between occupational stressors and perceived stress, and perceived stress and burnout are moderated by self-compassion.   Specifically, Hypothesis 1, that occupational stressors would positively predict burnout among structure firefighters, was well supported. Examining the coefficients of determination for Hypothesis 1, the results indicated that 25% of the variance in burnout in structure firefighters was predicted by occupational stressors, and this was statistically significant. Hypothesis 2, that perceived stress would positively predict burnout among structure firefighters, was well supported. The results indicated a that 31% of the variance in burnout among structure firefighters was predicted by perceived stress and was statistically significant. Hypothesis 3a, that in structure firefighters the relationship between occupational stressors and burnout would be mediated by perceived stress, was well supported with an indirect effect of perceived stress between occupational stressors and burnout of 9%, and a total effect of occupational stressors combined with perceived stress of 33% predicting the variance in burnout. Both the indirect and total effects were statistically significant. Finally, the last hypothesis presented in this study (3b, that the relationships between occupational stressors and perceived stress, and perceived stress and burnout will be moderated by self-compassion, such that at higher levels of self-compassion (+1SD), the relationships between occupational stressors and perceived stress and perceived stress and burnout would not be statistically significant, whereas at lower levels (-1SD) they will be statistically significant, was not supported.

The results of the primary analysis demonstrating that occupational stressors positively predict burnout in structure firefighters, as proposed by Hypothesis 1, was consistent with previous research. Previous research has demonstrated that structure firefighters experience high levels of physical occupational stressors, as well as significant psychological occupational stressors in the form of critical incident stressors (Hokanson & Wirth, 2000; Kulbarsh, 2007;

Lambert, Benight, Harrison, & Cieslak, 2012; Lesperance, 2017), and these stressors combine to directly predict the fatigue factors in burnout.

The results of the primary analysis demonstrating that perceived stress positively predicts burnout in structure firefighters, as proposed in Hypothesis 2, was consistent with previous research. A number of studies have demonstrated that perceived stress positively predicted burnout in a broad range of professions including volunteer caregivers, dental students, physicians and teachers (Akintola, Hlengwa, & Dageid, 2013; Lee et al., 2018; Montero-Marín et al., 2014; Popa-Vela, 2014; Rey, Extremera, & Pena, 2016).

The results of the primary analysis demonstrating that perceived stress mediates the relationship between occupational stressors and burnout in structure firefighters, as proposed in Hypothesis 3a, is similar to previous research. Previous researchers have found that perceived stress mediates the relationship between trauma exposure, a job stressor, and depression an alcohol use in firefighters (Kim, Park, & Kim, 2018). Depression and increased alcohol use are common symptoms of burnout, so while no previous studies looked directly at how perceived stress mediates the relationship between job stressors and burnout, prior research strongly suggested such a relationship may exist (Queiros et al., 2016).

Hypothesis 3b, that self-compassion will moderate the relationship between occupational stressors and perceived stress, and between perceived stress and burnout in structure firefighters, was not supported. This hypothesis differs from the existing research which has found self-compassion to be a protective trait when it comes to perceived stress, emotional wellbeing and positive health behaviors, all of which are involved in burnout (Bluth & Eisenlohr-Moul, 2018; Galla, 2016; Ewert et al., 2018; Homan & Sirois, 2017; Samaie & Farahani, 2011). Similarly, among law enforcement officers, self-compassion negatively predicted burnout (Dapolonia,

2018), and among college students, self-compassion positively predicted wellbeing (Van Dam et al., 2011) over and beyond other protective traits (i.e., dispositional mindfulness).

There are several possible reasons that may account for the lack of significant results when looking at self-compassion as a moderator between occupational stressors and perceived stress and burnout in structure firefighters, as proposed in Hypothesis 3b. It is possible that important predictors of burnout were omitted for this population. The relationships between the studied variables in the general population of firefighters may be different if such predictors were added. It is also possible that a small, albeit detectable, measurement error may have contributed to the poor model fits. Cole and Preacher (2014) demonstrated that even a drop in reliability from 1.0 to .8 could increase the type-II error rate from 5% to 75%.

The reason self-compassion failed to moderate the relationship between occupational stressors and perceived stress, and between perceived stress and burnout among this sample of structure firefighters may be something unique to this population itself. Like their fellow first responders, law enforcement officers, structure firefighters have historically been held in high regard by the majority of the public (Cowman, Ferrari, & Liao-Troth, 2004; O'Connor Shelley et al., 2013). This changed significantly for law enforcement officers over the last year because of increased scrutiny associated with multiple incidents of killing of unarmed black people by police (Mullinix, Bolsen, & Norris, 2020). Unlike law enforcement officers, firefighters face significantly less scrutiny in the form of oversight, public criticism, and risk of disciplinary action associated with errors. This scrutiny represents a significant source of organizational stressors in police officers (Bergman, Christopher, & Bowen, 2016; Shane, 2010; Tuckey, Winwood, & Dollard, 2012; van Gelderen, Heuven, van Veldhoven, Zeelenberg, & Croon, 2007; Violanti et al., 2018). Instead, the stressors most commonly experienced by firefighters are in the

form of critical incident stress and physical stressors such as heat stress, smoke stress, and

fatigue from heavy physical exertion (Lambert, Benight, Harrison, & Cieslak, 2012; Main et al.,

2012). It is possible that because their stressors are predominantly external, and because at

baseline firefighters tend to evaluate themselves positively, that unlike police officers, they are

less prone to the negative self-evaluation in the face of perceived stress that responds well to

high levels of self-compassion (Ascari et al., 2016; Basinska, Wiciak, & Dåderman, 2014;

Queiros, Kaiseler, & da Silva, 2013; Russell, Cole, & Jones, 2014). Absent this tendency for

negative self-evaluation, an individual's level of self-compassion may not positively moderate

the relationship between stressors and perceived stress, or perceived stress and burnout. Burnout

is strongly associated with multiple factors of exhaustion (Awa, Plaumann, & Walter, 2010;

Barnett, & Flores, 2016; Beaumont et al., 2016a). Negative self-evaluation was identified very

early on as one of the major factors associated in burnout among law enforcement officers, but it

is unclear how negative self-evaluation plays a role in burnout in firefighters (Jackson, 1979). It

is possible that it is not a significant factor, and that burnout in firefighters is predominantly a

product of physical stressors and exposure to critical incidents stress, with self-evaluation

playing a minimal or insignificant role. If this is correct, then self-compassion, which has a

substantial impact on self-evaluation may not play a primary role in firefighter burnout.

Future studies may wish to look at how individuals attribute perceived stress to internal

factors (e.g., this stress is a result or could be a result of a personal failing or error) versus

external factors (e.g., this stress is a product of outside events and is not related to me or my

character as an individual). By looking at perceived stress attribution, researchers may be able to

predict prevalence of negative self-evaluation, and in turn the probability that the individual level

self-compassion may influence response to stressors and the relationship between perceived

stress and burnout (Weinstein, Brown, & Ryan, 2009). Future studies may also wish to examine and compare the level of negative self-evaluation in structure firefighters versus other first responders such as police officers, as well as versus samples from the general population to see if this explanation holds true. Future studies may also wish to employ a self-compassion intervention to examine if changes in state self-compassion impact levels of perceived stress and/or burnout in structure firefighters differently.

Limitations

This study was conducted using snowball sampling, social media appeals, and direct contact with 348 fire stations and firefighter fraternal organizations in 8 states. Participants self-selected to participate at a single point in time and there was no intervention applied. This self-selection may be a source of bias, in that firefighters with greater symptoms of perceived stress and burnout may have been more likely to self-select not to participate. This study used self-report measures, which can be biased, and did not include objective or biological measures which might mitigate that bias. In addition, the study only collected cross sectional data which can describe directional relationships and correlations but cannot imply causality. The limited diversity in this sample is also a cause for concern. Structure firefighters in the U.S. are a very low diversity population to begin with, and despite efforts to improve diversity in recruiting this sample did not come close to estimated demographics, see Table 1 (Bureau of Labor Statistics, 2019; National Fire Protection Association, 2019; U.S. Census Bureau, 2021). The poor model fit found in this study suggests future studies may wish to include more factors predicting burnout. Studies using similar methods should take special care to ensure reliability and avoid the risk of type II error, specifically, a larger sample size may be beneficial.

In conclusion, the primary aim of this dissertation was to assess if perceived stress mediates the relationship between occupational stressors and burnout in structure firefighters, and to evaluate if the relationships between occupational stressors and perceived stress, and perceived stress and burnout are moderated by self-compassion. Results indicated that perceived stress does mediate the relationship between occupational stressors and burnout in structure firefighters, such that firefighters with lower levels of perceived stress had lower levels of burnout, even when their reported occupational stressors were high. Unfortunately, results failed to support the idea that self-compassion would moderate the relationship between occupational stressors and perceived stress or between perceived stress and burnout. This result was inconsistent with previous research on first responders and may be a result or error, or possibly some fundamental differences in structure firefighters as a population.

References

Akintola, O., Hlengwa, W. M., & Dageid, W. (2013). Perceived stress and burnout among

   volunteer caregivers working in AIDS care in South Africa. *Journal of Advanced*

   Nursing, *69*(12), 2738–2749. https://doi.org/10.1111/jan.12166

Allen, A. B., Goldwasser, E. R., & Leary, M. R. (2012). Self-compassion and well-being among

   older adults. *Self and Identity*, *11*(4), 428–453.

   https://doi.org/10.1080/15298868.2011.595082

Allison, P. D. (2003). Missing data techniques for structural equation modeling. *Journal of*

   Abnormal Psychology, *112*(4), 545.

Arbona, C., Pao, C., Long, A., & Olvera, N. (2017). Perceived stress in black and latino male

   firefighters: Associations with risk and protective factors. *Ethnicity & Disease* 27(4)

   Retrieved from https://www.ethndis.org/edonline/index.php/ethndis/article/view/754

Ascari, R. A., Dumke, M., Dacol, P. M., Maus, S., De Sá, C. A., & Lautert, L. (2016).

   Prevalence of risk for burnout syndrome among military police. *Cogitare Enferm*, *21*(2),

   01–10.

Asian Firefighters Association. (2019). Retrieved November 4, 2019, from

   http://www.asianfire.org/.

Atkinson, D. M., Rodman, J. L., Thuras, P. D., Shiroma, P. R., & Lim, K. O. (2017). Examining

   burnout, depression, and self-compassion in veterans affairs mental health staff. *The*

   Journal of Alternative and Complementary Medicine, *23*(7), 551–557.

   https://doi.org/10.1089/acm.2017.0087

Awa, W. L., Plaumann, M., & Walter, U. (2010). Burnout prevention: A review of intervention

programs. *Patient Education and Counseling*, *78*(2), 184–190.

https://doi.org/10.1016/j.pec.2009.04.008

Backhaus, J., Junghanns, K., & Hohagen, F., (2004). Sleep disturbances are correlated with

decreased morning awakening salivary cortisol. *Psychoneuroendocrinology*, *29* (9):

1184–91.

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the

art. *Journal of Managerial Psychology*, *22*(3), 309–328.

https://doi.org/10.1108/02683940710733115

Bakker, A. B., & Heuven, E. (2006). Emotional dissonance, burnout, and in-role performance

among nurses and police officers. *International Journal of Stress Management*, *13*(4),

423–440. https://doi.org/10.1037/1072-5245.13.4.423

Barnett, M. D., & Flores, J. (2016). Narcissus, exhausted: Self-compassion mediates the

relationship between narcissism and school burnout. *Personality and Individual

Differences*, *97*, 102–108. https://doi.org/10.1016/j.paid.2016.03.026

Basinska, B. A., Wiciak, I., & Dåderman, A. M. (2014). Fatigue and burnout in police officers:

the mediating role of emotions. *Policing: An International Journal of Police Strategies &

Management*, *37*(3), 665–680. https://doi.org/10.1108/pijpsm-10-2013-0105

Beaton, R. D., & Murphy, S. A. (1993). Sources of occupational stress among

firefighter/EMTs and firefighter/paramedics and correlations with Job-related

outcomes. *Prehospital and Disaster Medicine*, *8*(2), 140–150.

https://doi.org/10.1017/s1049023x00040218

Beaumont, E., Durkin, M., Martin, C. J. H., & Carson, J. (2016a). Measuring relationships

between self-compassion, compassion fatigue, burnout and well-being in student

counsellors and student cognitive behavioural psychotherapists: a quantitative

survey. *Counselling and Psychotherapy Research*, *16*(1), 15–23.

https://doi.org/10.1002/capr.12054

Beaumont, E., Durkin, M., Martin, C. J. H., & Carson, J. (2016). Compassion for others, self-

compassion, quality of life and mental well-being measures and their association with

compassion fatigue and burnout in student midwives: A quantitative

survey. *Midwifery*, *34*, 239–244. https://doi.org/10.1016/j.midw.2015.11.002

Berger, J.M., Singh, P., Khrimian, L., Morgan, D.A., Chowdhury, S., Arteaga-Solis, E., Horvath,

T.L., Domingos, A.I., Marsland, A.L., Yadav, V.K., Rahmouni, K., Gao, X., & Karsenty,

G., (2019). Mediation of the acute stress response by the skeleton. *Cell Metabolism, 30*,

1-13. https://doi.org/10.1016/j.cmet.2019.08.012

Bergman, A. L., Christopher, M. S., & Bowen, S. (2016). Changes in Facets of Mindfulness

Predict Stress and Anger Outcomes for Police Officers. *Mindfulness*, *7*(4), 851–858.

https://doi.org/10.1007/s12671-016-0522-z

Barnard, L. K., & Curry, J. F. (2011). The Relationship of Clergy Burnout to Self-Compassion

and Other Personality Dimensions. *Pastoral Psychology*, *61*(2), 149–163.

https://doi.org/10.1007/s11089-011-0377-0

Bluth, K., & Eisenlohr-Moul, T. A. (2017). Response to a mindful self-compassion intervention

in teens: A within-person association of mindfulness, self-compassion, and emotional

well-being outcomes. *Journal of Adolescence*, *57*, 108–118.

https://doi.org/10.1016/j.adolescence.2017.04.001

Bollen, K. A. (1990). Overall fit in covariance structure models: Two types of sample size

effects. *Psychological Bulletin*, *107*(2), 256-259.

Bowlby, J. (1973). *Attachment and loss. Separation, anger and anxiety, Vol. 2*. London: The

  Hogarth Press.

Bryant, R. A., Creamer, M., O'Donnell, M., Forbes, D., Alexander, C. M., Silove, D., Hadzi-

  Palovic, D., (2017). Acute and chronic posttraumatic stress symptoms in the

  emergence of PTSD. *JAMA Psychiatry 74*(2): 135-142. Retrieved from

  https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2592319

Buddhaghosa, & Davids, C. R. (1975). *The Visuddhi-Magga of the Buddhaghosa*. London: Pali

  Text Soc.

The Bureau of Labor Statistics, (2019). retrieved from

  https://www.bls.gov/oes/current/oes332011.htm

Burgess, J., Duncan, M., Mallett, J., Lafleur, B., Littau, S., & Shiwaku, K. (2013).

  International comparison of fire department injuries. *Fire Technology*, 1043-

  1059.

Burger, K., & Samuel, R. (2016). The role of perceived stress and self-efficacy in

  young people's life satisfaction: A longitudinal Ssudy. Retrieved from

  https://link.springer.com/article/10.1007/s10964-016-0608-x

Cardeña, E., Classen, C., Koopman, C., & Spiegel, D. (1996). Review of the Stanford Acute

  Stress Reaction Questionnaire (SASRQ). In B. H. Stamm (Ed.), *Measurement of stress,*

  trauma and adaptation (pp. 293–297). Lutherville, MD: Sidran Press.

Cardeña, E., Koopman, C., Classen, C., Waelde, L. C., & Spiegel, D. (2000). Psychometric

  properties of the Stanford Acute Stress Reaction Questionnaire (SASRQ): A valid and

  reliable measure of acute stress. *Journal of Traumatic Stress*, *13*(4), 719–734.

  https://doi.org/10.1023/a:1007822603186

Chiang, E. S., Baley, J., Ponder, J., & Padilla, M. A. (2016). Autonomy and firefighting:

Perceived competence and stress. *Journal of Occupational and Environmental*

Medicine, *58*(12), 1223–1230. https://doi.org/10.1097/jom.0000000000000894

Cohen J., Cohen P., West S., Aiken L. (2003). *Applied multiple regression/correlation analysis*

for the behavioral sciences (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived

stress. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/6668417

Cole, D., & Preacher, K. (2014). Manifest variable path analy- sis: Potentially serious and

misleading consequences due to uncorrected measurement error. *Psychological Methods*,

19, 300–315.

Cowman, S. E., Liao-Troth, M., & Ferrari, J. R. (2003). Social Support, Sense of Community

and Caregiving Perceptions by Fire Fighters. *PsycEXTRA Dataset.*

https://doi.org/10.1037/e416902005-785

Dapolonia, E. (2018). *Improvement in self-compassion predicts improvement in burnout but not*

in aggression among LEOs (Unpublished master's thesis). Pacific University, Hillsboro,

OR.

Demerouti, Bakker, A. B., Vardakou, I., & Kantas, A. (2003). The convergent validity of two

burnout instruments: A multitrait-multimethod analysis. *European Journal of*

Psychological Assessment, 19(1), 12-23. https://doi.org/10.1027//1015-5759.19.1.12

Demerouti, E., Mostert, K., & Bakker, A. B. (2010). Burnout and work engagement: A thorough

investigation of the independency of both constructs. *Journal of Occupational Health*

Psychology, *15*(3), 209–222. https://doi.org/10.1037/a0019408

Depue, R. A., & Morrone-Strupinsky, J. V. (2005). A neurobehavioral model of affiliative

bonding: Implications for conceptualizing a human trait of affiliation. *Behavioral and Brain Sciences*, *28*(03). https://doi.org/10.1017/s0140525x05000063

Dev, V., Fernando, A. T., Lim, A. G., & Consedine, N. S. (2018). Does self-compassion mitigate the relationship between burnout and barriers to compassion? A cross-sectional quantitative study of 799 nurses. *International Journal of Nursing Studies*, *81*, 81–88. https://doi.org/10.1016/j.ijnurstu.2018.02.003

Dewa, C. S., Loong, D., Bonato, S., Thanh, N. X., & Jacobs, P. (2014). How does burnout affect physician productivity? A systematic literature review. *BMC Health Services Research*, *14*(1). https://doi.org/10.1186/1472-6963-14-325

Donoughe, K., Witestone, J., Gabler, H.C., (2012). Analysis of firetruck crashes and associated firefighter injuries in the United States. *Annals of Advances in Automotive Medicine, 56*, 69-76.

Eriksson, T., Germundsjö, L., Åström, E., & Rönnlund, M. (2018). Mindful self-compassion training reduces stress and burnout symptoms among practicing psychologists: A randomized controlled trial of a brief web-based intervention. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.02340

Ewert, C., Gaube, B., Caroline, F., & Geisler, M. (2018). Dispositional self-compassion impacts immediate and delayed reactions to social evaluation. *Personality and Individual Differences, 125*, 91-96.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160. https://doi.org/10.3758/brm.41.4.1149

Field, A. P. (2018). *Discovering statistics using Ibm Spss statistics*. London: SAGE Publications.

Finch, W. H., & French, B. F. (2015). *Latent variable modeling with R*. New York, NY:

    Routledge.

Flora, D. B. (2020). Your coefficient alpha is probably wrong, but which coefficient omega is

    right? A tutorial on using R to obtain better reliability estimates. *Advances in Methods*

    and Practices in Psychological Science, *3*(4), 484-501.

Ford, J., Klibert, J. J., Tarantino, N., & Lamis, D. A. (2016). Savouring and Self-compassion as

    Protective Factors for Depression. *Stress and Health*, *33*(2), 119–128.

    https://doi.org/10.1002/smi.2687

Freudenberger, H.J., 1974. Staff burnout. *Journal of Social Issues 30*:159–165.

Galla, B. M. (2016). Within-person changes in mindfulness and self-compassion predict

    enhanced emotional well-being in healthy, but stressed adolescents. *Journal of*

    Adolescence, *49*, 204–217. https://doi.org/10.1016/j.adolescence.2016.03.016

Garfin, D. R., Thompson, R. R., & Holman, E. A. (2018). Acute stress and subsequent health

    outcomes: A systematic review. *Journal of Psychosomatic Research*, *112*, 107–113.

    https://doi.org/10.1016/j.jpsychores.2018.05.017

Gilbert, P. (1989). *Human nature and suffering*. London: Psychology Press.

Gilbert, P. (2005). *Compassion and cruelty: A biopsychosocial approach.* In P. Gilbert (Ed.),

    Compassion: Conceptualisations, research and use in psychotherapy (pp. 9–74).

    London: Routledge.

Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis

    and empirical review. Psychological Review, 136, 351–374.

Gracia-Gracia, P., & Oliván-Blázquez, B. (2017). Burnout and Mindfulness Self-Compassion in

Nurses of Intensive Care Units. *Holistic Nursing Practice*, *31*(4), 225–233.

https://doi.org/10.1097/hnp.0000000000000215

Griffin, S.C., (2014) *Economic evaluation of injury and injury prevention interventions in

the U.S. fire service*. (unpublished doctoral dissertation) . University of Arizona,

Tucson.

Guidotti, T. L. (1992). Human factors in firefighting: ergonomic-, cardiopulmonary-, and

psychogenic stress-related issues. *International Archives of Occupational and

Environmental Health*, *64*(1), 1–12. https://doi.org/10.1007/bf00625945

Hall, S. J., Aisbett, B., Tait, J. L., Turner, A. I., Ferguson, S. A., & Main, L. C. (2016). The acute

physiological stress response to an emergency alarm and mobilization during the day and

at night. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4918669/

Hammen, C., Kim, E. Y., Eberhart, N. K., & Brennan, P. A. (2009). Chronic and acute stress and

the prediction of major depression in women. *Depression and Anxiety*, *26*(8), 718–723.

https://doi.org/10.1002/da.20571

Harvey, Lucille (2018) *Self-compassion: A moderator of the negative outcomes of stress*

(Unpublished master's thesis)*.* Bournemouth University. Bournemouth, UK.

Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behavioral

Research*, *50*(1), 1-22.

Hayes, A. F., (2018a). *Introduction to mediation, moderation, and conditional

process analysis: a regression-based approach*. New York: Guilford Press.

Hayes, A. F. (2018b). Partial, conditional, and moderated moderated mediation: Quantification,

inference, and interpretation. *Communication Monographs*, *85*(1).

https://doi.org/10.1080/03637751.2017.1352100

Hofmann, S. G., Grossman, P., & Hinton, D. E. (2011). Loving-kindness and compassion

meditation: Potential for psychological interventions. *Clinical Psychology Review*, *31*(7),

1126–1132. https://doi.org/10.1016/j.cpr.2011.07.003

Hokanson, M., & Wirth, B., (2000). The critical incident stress debriefing process for the

Los Angeles County Fire Department: Automatic and effective. *International*

Journal of Emergency Mental Health, 2(4), 249-257.

Homan, K. J., & Sirois, F. M. (2017). Self-compassion and physical health: Exploring the roles

of perceived stress and health-promoting behaviors. *Health Psychology Open*, *4*(2),

205510291772954. https://doi.org/10.1177/2055102917729542

Hong, O., Chin, D., Phelps, S., Feld, J., & Vogel, S. (2012). Occupational Injuries, duty

status, and factors associated with injuries among firefighters. *Workplace*

Health & Safety, 60(12), 517-523.

Honkonen, T., Ahola, K., Pertovaara, M., Isometsä, E., Kalimo, R., Nykyri, E., … Lönnqvist, J.

(2006). The association between burnout and physical illness in the general population—

results from the Finnish Health 2000 Study. *Journal of Psychosomatic Research*, *61*(1),

59–66. https://doi.org/10.1016/j.jpsychores.2005.10.002

Huynh, J. Y., Xanthopoulou, D., & Winefield, A. H. (2013). Social support moderates the impact

of demands on burnout and organizational connectedness: A two-wave study of volunteer

firefighters. *Journal of Occupational Health Psychology*, *18*(1), 9–15.

https://doi.org/10.1037/a0030804

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55.

IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.

International Association of Black Professional Fire Fighters. (2019). Retrieved November 4, 2019, from http://iabpf.org/.

International Association of Women in Fire & Emergency Services. (2019). Retrieved November 4, 2019, from https://www.womeninfire.org/.

International EMS & Firefighters LGBTQ Pride Alliance. (2019). Retrieved November 4, 2019, from https://www.iefpa.org/.

Jackson, Maslach (1979). Burned-out Cops and Their Families. *Psychology Today*, *12*(12), 58–62.

Jahnke, S., Poston, W., Haddock, C., Jitnarin, N., Hyder, M., & Horvath, C. (2012). The health of women in the US fire service. *BMC Women's Health, 12*(39), 2-12.

Jayaratne, S. & Chess, W.A. (1983) Job satisfaction and burnout in social work. In: *Stress and Burnout in the Human Service Professions* (ed. B. A. Farber), pp. 129–141. Pergamon Press, NewYork.

Jennings, P. A. (2014). Early childhood teachers' well-being, mindfulness, and self-compassion in relation to classroom quality and attitudes towards challenging students. *Mindfulness*, *6*(4), 732–743. https://doi.org/10.1007/s12671-014-0312-4

Jo, S., & Park, J. (2013). The relationship between depression and post-traumatic stress disorder among firefighters. *Journal of Korean Society of Hazard Mitigation,*

13(5), 219-224.

Kahn, S., Woods, J., & Rae, L. (2014). Line of duty firefighter fatalities. *Journal of*

    Burn Care & Research, 36(1), 218-224.

Katsavouni, F., Bebetsos, E., Malliou, P., & Beneka, A. (2015). The relationship between

    burnout, PTSD symptoms and injuries in firefighters. *Occupational Medicine, 66*(1), 32-

    37. https://doi.org/10.1093/occmed/kqv144

Kaufmann, G. M., & Beehr, T. A. (1989). Occupational Stressors, Individual Strains, and Social

    Supports among Police Officers. *Human Relations*, *42*(2), 185–197.

    https://doi.org/10.1177/001872678904200205

Kaurin, A., Schönfelder, S., & Wessa, M. (2018). Self-compassion buffers the link between self-

    criticism and depression in trauma-exposed firefighters. *Journal of Counseling*

    Psychology, *64*(4), 453–462.

Kemper, K. J., Mcclafferty, H., Wilson, P. M., Serwint, J. R., Batra, M., Mahan, J. D., …

    Schwartz, A. (2019). Do Mindfulness and Self-Compassion Predict Burnout in Pediatric

    Residents? *Academic Medicine*, *94*(6), 876–884.

    https://doi.org/10.1097/acm.0000000000002546

Kimbrel, N. A., Flynn, E. J., Carpenter, G. S. J., Cammarata, C. M., Leto, F., Ostiguy, W. J., …

    Gulliver, S. B. (2015). Internal consistency, test-retest reliability, and predictive validity

    for a Likert-based version of the Sources of occupational stress-14 (SOOS-14)

    scale. *Psychiatry Research*, *228*(3), 961–962.

    https://doi.org/10.1016/j.psychres.2015.05.031

Kimbrel, N.A., Steffen, L.E., Meyer, E.C., Kruse, M.I., Knight, J., Zimering, R.T., Gulliver,

    S.B., (2011). A revised measure of occupational stress for fire fighters: Psychometric

properties and relationship to PTSD, depression, and substance abuse. *Psychological Services, 8*, 294–306.

Kim, H., Ji, J., & Kao, D. (2011). Burnout and physical health among social workers: A three-year longitudinal study. *Social Work*, *56*(3), 258–268.

https://doi.org/10.1093/sw/56.3.258.

Kim, J. I., Park, H., & Kim, J.-H. (2018). The mediation effect of PTSD, perceived job stress and resilience on the relationship between trauma exposure and the development of depression and alcohol use problems in Korean firefighters: A cross-sectional study. *Journal of Affective Disorders*, *229*, 450–455. https://doi.org/10.1016/j.jad.2017.12.055.

Komarovskaya, I., Brown, A., Galatzer-Levy, I., Madan, A., Henn-Haase, C., Teater, J., . . . Chemtob, C. (2014). Early physical victimization is a risk factor for posttraumatic stress disorder symptoms among Mississippi police and firefighter first responders to hurricane Katrina. *Psychological Trauma: Theory, Research, Practice, and Policy, 6*(1), 92-96.

Khoozani, E. N., & Hadzic, M. (2010). Designing the human stress ontology: A formal framework to capture and represent knowledge about human stress. *Australian Psychologist*, *45*(4), 258–273. https://doi.org/10.1080/00050061003664811

Kline, R. B. (2012). *Principles and practice of structural equation modeling (3rd ed.).* New York, NY: The Guilford Press.

Kuehl, K., Elliot, D., Goldberg, L., Moe, E., Perrier, E., & Smith, J. (2013). Economic benefit of the PHLAME wellness programme on firefighter injury. *Occupational Medicine, 63*, 203-209.

Kulbarsh, P., (2007). Critical incident stress. Retrieved January 01, 2017, from

http://www.officer.com/article/10249385/critical-incident-stress

Kyeong, L. W. (2013). Self-compassion as a moderator of the relationship between academic

burn-out and psychological health in Korean cyber university students. *Personality and

Individual Differences*, *54*(8), 899–902. https://doi.org/10.1016/j.paid.2013.01.001

Lambert, J., Benight, C., Harrison, E., & Cieslak, R. (2012). The firefighter coping self-

efficacy scale: Measure development and validation. *Anxiety, Stress & Coping,

25*(1), 79-91.

Lee, J. Y., Kim, S. Y., Bae, K. Y., Kim, J. M., Shin, I. S., Yoon, J. S., & Kim, S. W. (2018).

The association of gratitude with perceived stress and burnout among male firefighters in

Korea. *Personality and Individual Differences*, *123*, 205–208.

https://doi.org/10.1016/j.paid.2017.11.010

LeMoult, J., Humphreys, K., King, L., Colich, N., Price, A., Ordaz, S., & Gotlib, I. (2018).

Associations Among Early Life Stress, Rumination, Symptoms of Psychopathology, and

Sex in Youth in the Early Stages of Puberty: a Moderated Mediation Analysis. *Journal of

Abnormal Child Psychology*. https://doi.org/10.1007/s10802-018-0430-x

Lesperance, M. (2017). *Critical Incident Stress Management for First Responders* (Unpublished

master's thesis). Saint Mary-of-the-Woods College, Saint Mary-of-the-Woods, Indiana.

Lewis, A. (2013) *Mindfulness, self-compassion, and leadership in wild land firefighting*.

(Unpublished doctoral dissertation). Oregon State University, Oregon.

Lin, P., Wang, J., Shih, D., Kuo, H., Liang, W. (2019). The interaction effects of burnout and

job support on peptic ulcer disease (PUD) among firefighters and policemen.

International Journal of Environmental Research and Public Health. 16, 2369

Liotti, G., & Gilbert, P. (2010). Mentalizing, motivation, and social mentalities: Theoretical

    considerations and implications for psychotherapy. *Psychology and Psychotherapy:*

    Theory, Research and Practice. https://doi.org/10.1348/147608310x520094

Ludwig, G., (2010). Firefighter/paramedic – a most stressful job. *Firehouse. 35* (6), 38.

Lourel, M., Abdellaoui, S., Chevaleyre, S., Paltrier, M., & Gana, K. (2008). Relationships

    between psychological job demands, job control and burnout among firefighters. *North*

    American Journal of Psychology, *10*(3), 489–496.

Lusa, S., Häkkänen, M., Luukkonen, R., & Viikari-Juntura, E. (2002). Perceived physical work

    capacity, stress, sleep disturbance and occupational accidents among firefighters working

    during a strike. *Work & Stress*, *16*(3), 264–274.

    https://doi.org/10.1080/02678370210163301

MacHale, S.M., Cavanagh, J.T., Bennie, J., Carroll, S., Goodwin, G.M., Lawrie, S.M., (1998).

    Diurnal variation of adrenocortical activity in chronic fatigue syndrome.

    Neuropsychobiology. **38** (4): 213–7.

Mădălina-Adriana, C., & Mirela, B. (2011). Organizational stress and its impact on work

    performance. *Annals of Faculty of Economics*, *1*, 333–337.

Main, L., Raines, J., Gatta, P.D., Wolkow, A., Snow, R., Aisbett, B., (2012). The stress of

    firefighting: Implications for long-term health outcomes. *Proceedings of Bushfire*

    CRC & AFAC 2012 Conference Research Forum.

Makara-Studzińska, M., Golonka, K., & Izydorczyk, B. (2019). Self-efficacy as a moderator

    between stress and professional burnout in firefighters. *International Journal of*

    Environmental Research and Public Health, 16(2), 183.

https://doi.org/10.3390/ijerph16020183

McDonald, R. P. (1999). Test theory: A unified treatment. L. Mahway, NJ: Erlbaum Associates.

Morris, C. E., & Chander, H. (2018). The impact of firefighter physical fitness on job

    performance: A review of the factors that influence fire suppression safety and

    success. *Safety*. *4*, 60. Retrieved from https://www.mdpi.com/2313-576X/4/4/60/htm

Montero-Marín, J., Demarzo, M. M. P., Stapinski, L., Gili, M., & García-Campayo, J. (2014).

    Perceived stress latent factors and the burnout subtypes: A structural model in dental

    students. *PLoS ONE*, *9*(6). https://doi.org/10.1371/journal.pone.0099765

Montero-Marin, J., Zubiaga, F., Cereceda, M., Demarzo, M. M. P., Trenc, P., & Garcia-

    Campayo, J. (2016). Burnout Subtypes and Absence of Self-Compassion in Primary

    Healthcare Professionals: A Cross-Sectional Study. *Plos One*, *11*(6).

    https://doi.org/10.1371/journal.pone.0157499

Mullinix, K. J., Bolsen, T., & Norris, R. J. (2020). The Feedback Effects of Controversial Police

    Use of Force. *Political Behavior*, *43*(2), 881–898. https://doi.org/10.1007/s11109-020-

    09646-x

Murphy, S. A., Beaton, R. D., Pike, K. C., & Cain, K. C. (1994). Firefighters and

    paramedics: years of service, job aspirations, and burnout. *American Association of

    Occupational Health Nurses Journal, 42*(11):534-40. Retrieved from

    https://www.ncbi.nlm.nih.gov/pubmed/7695798

Neff, K. D. (2003a). Self-compassion: An alternative conceptualization of a healthy attitude

    toward oneself. *Self and Identity, 2*, 85–102.

Neff, K. D. (2003b). Development and validation of a scale to measure self-compassion.

    Self and Identity, 2, 223–250.

National Fire Protection Association (2019), retrieved from: https://www.nfpa.org/News-and-

Research/Data-research-and-tools/Emergency-Responders/US-fire-department-profile

National Volunteer Fire Council (NVFC), (2012). Suicide in the fire and emergency services

adopting a proactive approach to behavioral health awareness and suicide prevention.

National Volunteer Fire Council, Greenbelt, MD.

Oyeyemi, G. M., Bukoye, A., & Akeyede, I. (2015). Comparison of outlier detection procedures

in multiple linear regressions. *American Journal of Mathematics and Statistics*, *5*(1), 37-

41.

Perera, M. J., Brintz, C. E., Birnbaum-Weitzman, O., Penedo, F. J., Gallo, L. C., Gonzalez, P., . .

. Llabre, M. M. (2017). Factor structure of the Perceived Stress Scale-10 (PSS) across

English and Spanish language responders in the HCHS/SOL Sociocultural Ancillary

Study. *Psychological Assessment, 29*(3), 320-328. https://doi.org/10.1037/pas0000336

Peterson, U., Demerouti, E., Bergström, G., Samuelsson, M., Åsberg, M., & Nygren, A. (2008).

Burnout and physical and mental health among Swedish healthcare workers. *Journal of

Advanced Nursing*, *62*(1).

Popa-Velea, O. (2014). Alexithymia, perceived stress, perceived social support and burnout at

physicians attending end-of-life cases: The impact of balint work. *Journal of

Psychosomatic Research*, *76*(6), 512. https://doi.org/10.1016/j.jpsychores.2014.03.073

Poston, W.S.C., Haddock, C.K., Jahnke, S.A., Jitnarin, N., Day, R.S., & Daniels, I.D.,

(2014). Health disparities among racial and ethnic minority firefighters. *Journal

of Health Disparities Research and Practice, 7*(5), 105-129.

Pruessner, J. C., Hellhammer, D. H., & Kirschbaum, C. (1999). Burnout, perceived stress, and

cortisol responses to awakening. *Psychosomatic Medicine*, *61*(2), 197–204.

https://doi.org/10.1097/00006842-199903000-00012

Qualtrics, (2019). Qualtrics [Computer software]. Provo, Utah: Qualtrics. Retrieved from

    https://www.qualtrics.com

Queiros, C., Kaiseler, M., & da Silva, A.L., (2013). Burnout as predictor of aggressivity among

    police officers. *European Journal of policing Studies, 1*(2), 110-135.

Raes, F., Pommier, E., Neff, K. D., & Gucht, D. V. (2010). Construction and factorial validation

    of a short form of the Self-Compassion Scale. *Clinical Psychology &*

    Psychotherapy, *18*(3), 250–255. https://doi.org/10.1002/cpp.702

R Core Team (2019). R: A language and environment for statistical computing. R

    Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Rey, L., Extremera, N., & Pena, M. (2016). Emotional competence relating to perceived stress

    and burnout in Spanish teachers: a mediator model. *PeerJ*. Retrieved from:

    https://www.ncbi.nlm.nih.gov/pubmed/27280077

    https://doi.org/10.7287/peerj.2087v0.1/reviews/2

Richardson, D. A., Jaber, S., Chan, S., Jesse, M. T., Kaur, H., & Sangha, R. (2016). Self-

    compassion and empathy: Impact on burnout and secondary traumatic stress in

    medical training. *Open Journal of Epidemiology*, *06*(03), 161–166.

    https://doi.org/10.4236/ojepi.2016.63017

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. *Journal of*

    Statistical Software, 48(2), 1-36.

Russell, L. M., Cole, B. M., & Jones, R. J. (2014). High-risk occupations: How leadership,

    stress, and ability to cope influence burnout in law enforcement. *Journal of Leadership,*

    Accountability and Ethics, *11*(3).

Samaie, G., & Farahani, H. (2011). Self-compassion as a moderator of the relationship between

rumination, self-reflection and stress. *Procedia - Social and Behavioral Sciences*, *30*, 978–982. https://doi.org/10.1016/j.sbspro.2011.10.190

Schaible, L. M., & Six, M. (2016). Emotional strategies of police and their varying consequences for burnout. *Police Quarterly*, *19*(1), 3–31. https://doi.org/10.1177/1098611115604448

Šinkovec, H., Geroldinger, A., & Heinze, G. (2019). Bring More Data!—A Good Advice? Removing Separation in Logistic Regression by Increasing Sample Size. *International Journal of Environmental Research and Public Health*, *16*(23), 4658.

Smith, T. D., Hughes, K., Dejoy, D. M., & Dyal, M. A. (2018). Assessment of relationships between work stress, work-family conflict, burnout and firefighter safety behavior outcomes. *Safety Science*, *103*, 287–292. https://doi.org/10.1016/j.ssci.2017.12.005

Smoktunowicz, E., Baka, L., Cieslak, R., Nichols, C. F., Benight, C. C., & Luszczynska, A. (2015). Explaining counterproductive work behaviors among police officers: The indirect effects of job demands are mediated by job burnout and moderated by job control and social support. *Human Performance*, *28*(4), 332–350. https://doi.org/10.1080/08959285.2015.1021045

Spikins, P. A., Rutherford, H. E., & Needham, A. P. (2010). From homininity to humanity: Compassion from the earliest archaics to modern humans. Time and Mind, 3, 303–326.

Stanley, I., Hom, M., Hagan, C., & Joiner, T. (2015). Career prevalence and correlates of suicidal thoughts and behaviors among firefighters. *Journal of Affective Disorders, 187*, 163-171.

Stoliker, B. E., & Lafreniere, K. D. (2015). The influence of perceived stress, loneliness, and

learning burnout on university students' educational experience. *College Student Journal*, 140–160.

Story, L. B., & Repetti, R. (2006). Daily occupational stressors and marital behavior. *Journal of Family Psychology*, *20*(4), 690–700. https://doi.org/10.1037/0893-3200.20.4.690

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics (7th ed.)*. Boston, MA: Pearson.

Taylor, J. (2015) Psychometric analysis of the ten-item Perceived Stress Scale. *Psychological Assessment, 27* (1), 90–101 Retrieved from

https://pdfs.semanticscholar.org/b9a7/54194cb4130cf36d8927514e7bcf7a20894c.pdf

Terry, M. L., Leary, M. R., & Mehta, S. (2013). Self-compassion as a buffer against homesickness, depression, and dissatisfaction in the transition to college. *Self and Identity*, *12*(3), 278–290. https://doi.org/10.1080/15298868.2012.667913

Thomas, D., Fox, R., & Miller, C. (2015). Voices from the field: Wildland fire managers and high-reliability organizing mindfulness. *Society & Natural Resources, 28*, 825-838.

U.S. Census Bureau (2021) retrieved from:

https://www.census.gov/quickfacts/fact/table/US/PST045219

Van Dam, N. T., Sheppard, S. C., Forsyth, J. P., & Earleywine, M. (2011). Self-compassion is a better predictor than mindfulness of symptom severity and quality of life in mixed anxiety and depression. *Journal of Anxiety Disorders*, *25*(1), 123–130. https://doi.org/10.1016/j.janxdis.2010.08.011

Vaulerin, J., D'Arripe-Longueville, F., Emile, M., & Colson, S. S. (2016a). Physical exercise and burnout facets predict injuries in a population-based sample of French career

firefighters. *Applied Ergonomics*, *54*, 131–135.

https://doi.org/10.1016/j.apergo.2015.12.007

Vaulerin, J., Colson, S. S., Emile, M., Scoffier-Mériaux, S., & D'Arripe-Longueville, F. (2016b).

The Big Five personality traits and French firefighter burnout. *Journal of Occupational*

and Environmental Medicine, *58*(4). https://doi.org/10.1097/jom.0000000000000679

Vinnikov, D., Tulekov, Z., Akylzhanov, A., Romanova, Z., Dushpanova, A., & Kalmatayeva, Z.,

(2019, March 14). Age and work duration do not predict burnout in firefighters.

Retrieved from https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-

6643-2

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects

of mindfulness on stress attribution, coping, and emotional well-being. *Journal of*

Research in Personality, *43*(3), 374–385. https://doi.org/10.1016/j.jrp.2008.12.008

Woodruff, S. C., Glass, C. R., Arnkoff, D. B., Crowley, K. J., Hindman, R. K., & Hirschhorn, E.

W. (2013). Comparing self-compassion, mindfulness, and psychological inflexibility as

predictors of psychological health. *Mindfulness*, *5*(4), 410–421.

https://doi.org/10.1007/s12671-

013-0195-9

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to

rapidity of habit-formation. *Journal of Comparative Neurology and*

Psychology - Wiley Online Library. Retrieved from

https://onlinelibrary.wiley.com/doi/abs/10.1002/cne.920180503

Zessin, U., Dickhäuser, O., & Garbade, S. (2015). The Relationship Between Self-Compassion

and Well-Being: A Meta-Analysis. *Applied Psychology: Health and Well-Being*, *7*(3),
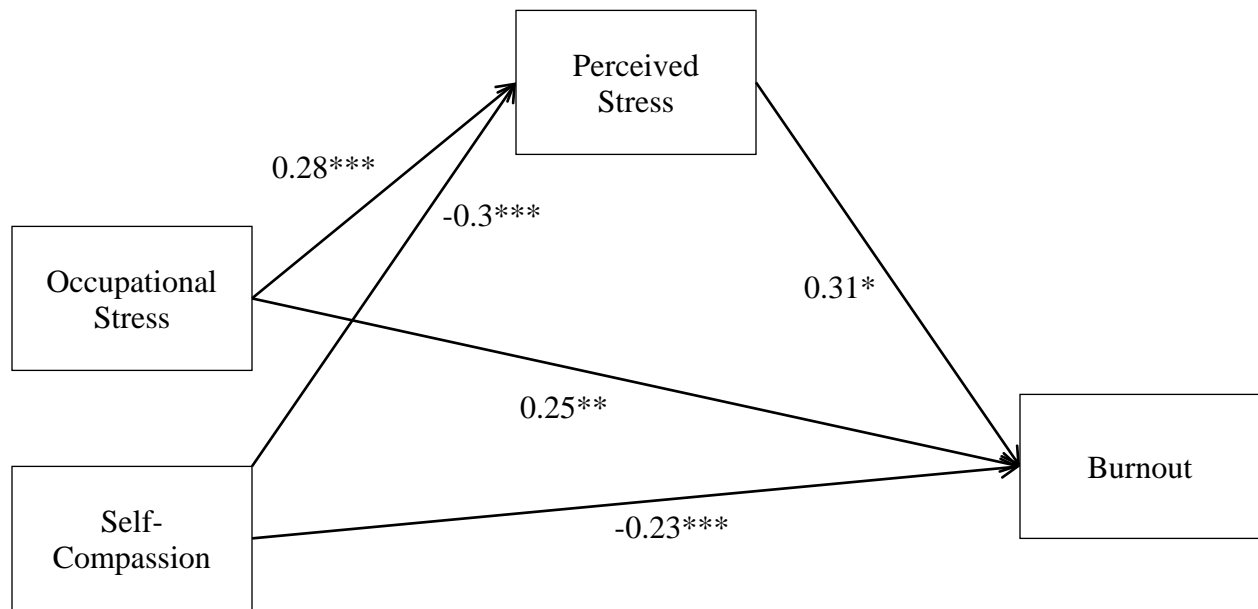
340–364. https://doi.org/10.1111/aphw.12051

Zinbarg, R. E., Revelle, W., Yovel, I., and Li, W. (2005). Cronbach's α, Revelle's β, and

McDonald's ωH: Their relations with each other and two alternative conceptualizations

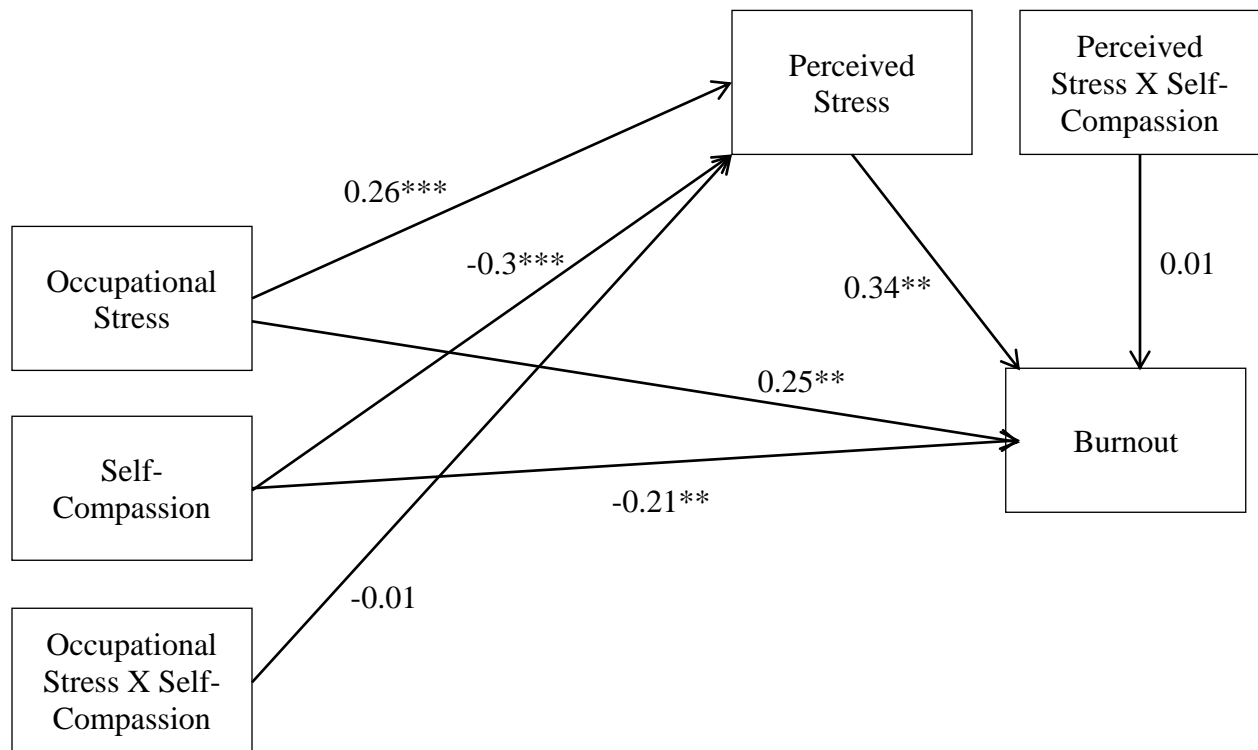of reliability. Psychometrika, 70(1), 123-133.

Figure 1

Theoretical Path Model Between Study Variables
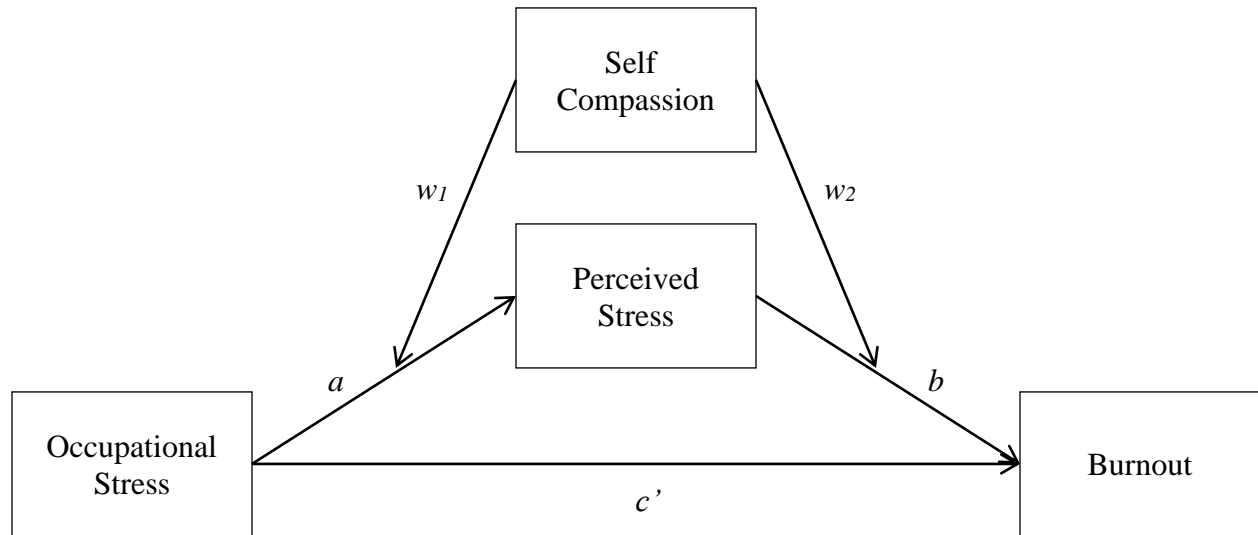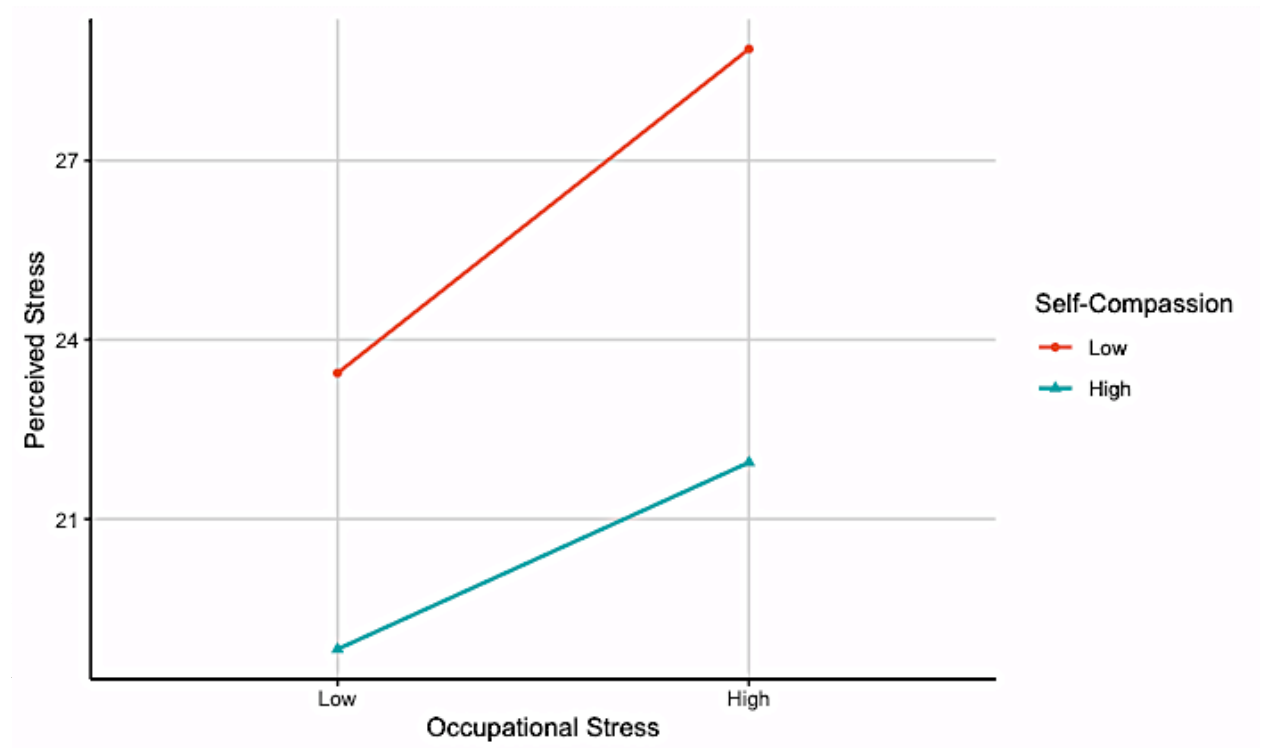

Figure 2

Statistical Indirect Effect Model

Note. Coefficients presented are unstandardized linear regression coefficients. * *p* < .05, ** *p* < .01, ***p* < .001.

Figure 3

Statistical Conditional Indirect Effect Model

Note. Coefficients presented are unstandardized linear regression coefficients. * $p < .05$, ** $p < .01$, ***$p < .001$.

Figure 4

Interaction Between Occupational Stress and Self-Compassion

Figure 5

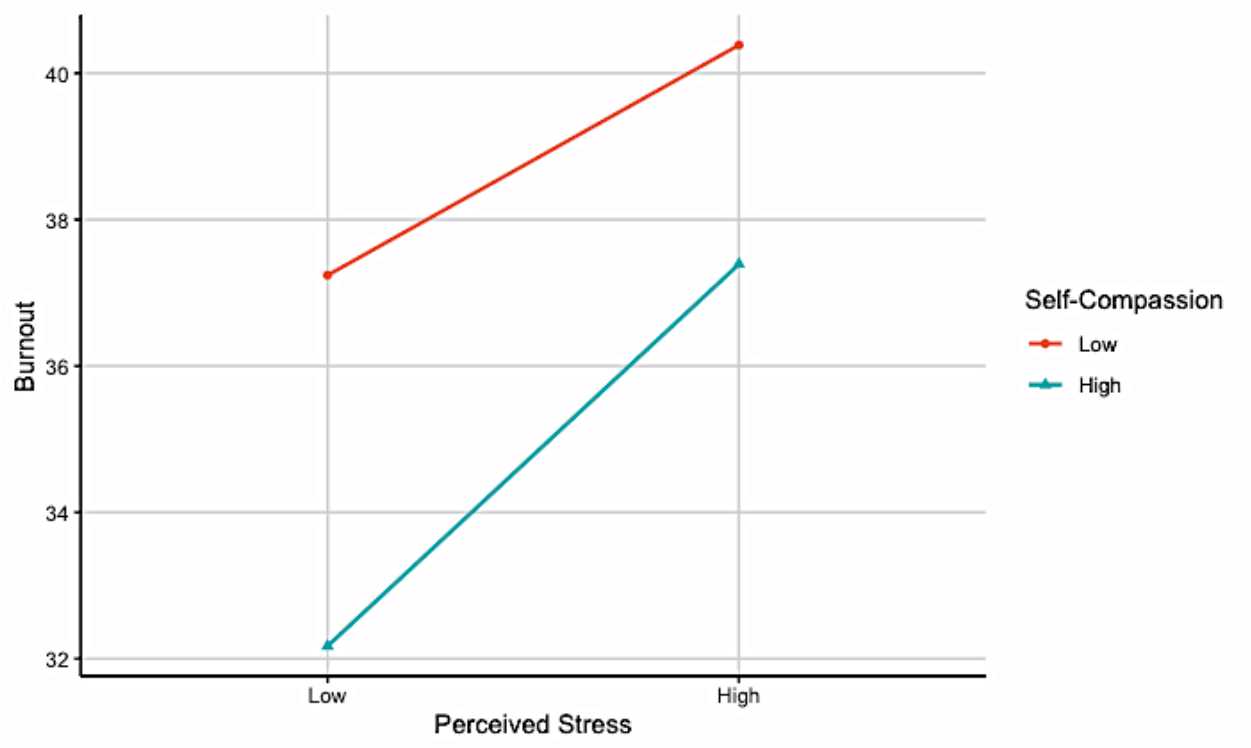*Interaction Between Perceived Stress and Self-Compassion*

Table 1

Sociodemographic Characteristics of Participants

Characteristic	*n*	*%*	*2019 US Census Est. %*
Gender			
Female	11	7.5	50.8
Male	134	91.1	49.2
Declined to answer	2	1.4	
Education			
High school diploma	33	22.5	88
Associate's degree	59	40.1	
Bachelor's degree	44	29.9	32
Master's degree	9	6.1	
Doctoral degree	2	1.4	
Ethnicity			
African American / Black	4	2.7	13.4
Asian / Pacific Islander	5	3.4	5.9
European American / White	123	83.7	60.1
Hispanic / Latina / Latino / Latinx	4	2.7	18.5
Two or more ethnicities	5	3.4	2.8
Declined to answer	6	4.1	
Region			
Midwestern US	22	14.9	
Northeastern US	1	0.7	

SELF-COMPASSION, OCCUPATIONAL STRESS, PERCEIVED STRESS

Northwestern US	95	64.6
Southeastern US	2	1.4
Southwestern US	27	18.4

Table 2

Descriptive Statistics of Study Measures

Measures	*M*	*SD*	*α*	O^1
Sources of Occupational Stresss-14	29.28	8.13	.82	.80*
Perceived Stress Scale	23.52	6.15	.85	.83*
Self-Compassion Scale	9.59	9.59	.87	.82*
Oldenburg Burnout Inventory	7.71	7.71	.89	.89*

Note. [1] O represents omega, a measure of internal consistency that is appropriate when the assumption of tau-equivalence is violated. *Indicates reliability within the acceptable range

Table 3

Pearson Correlations Between Study Measures

Measures	SOS	PSS	SCS	OBI
Sources of Occupational Stresss-14	1			
Perceived Stress Scale	.57***	1		
Self-Compassion Scale	-.43***	-.62***	1	
Oldenburg Burnout Inventory	.52***	.57***	-.55***	1

Note. *** $p < .001$

Appendix A

Dissertation Proposal

Self-compassion, Occupational Stress, Perceived Stress and Burnout in Structure Firefighters: A

Moderated Mediation Model

Eli Dapolonia, M.A., M.S.

Pacific University

Keywords: self-compassion, occupational stress, perceived stress, burnout, firefighter

Self-compassion, Occupational Stress, Perceived Stress and Burnout in Structure Firefighters: A

Moderated Mediation Model

Working as a structure firefighter is one of the most stressful jobs in the United States

(Ludwig, 2010; Kahn, Woods, & Rae, 2014). This stress contributes to a number of serious

negative physiological and psychological outcomes for firefighters including, elevated perceived

stress and burnout. Burnout is one of the most common outcomes of stress among firefighters. In

a study of the interaction effects of burnout and job support on physical illnesses in firefighters

($n = 9328$) researchers found high levels of burnout symptoms affecting one out of every four on

the job, or 24.2% (Lin, Wang, Shih, Kuo, & Liang, 2019). It is also one of the more costly

outcomes in terms of damage to the individual, their performance on the job, potential risks to

public safety, and ultimately in financial losses to municipalities (Murphy, Beaton, Pike, & Cain,

1994).

Burnout

The term burnout was first used in a research context in 1974 in reference to work fatigue

(Freudenberger, 1974). The definition of burnout has since been refined to describe a work-

related mental health impairment that results in mental and/or physical collapse caused by

overwork and/or stress, and is characterized by emotional, physical and cognitive exhaustion;

disengagement, depersonalization, and reduced personal accomplishment; as well as

deterioration in physical health. The most commonly studied factors are exhaustion,

depersonalization, and reduced personal accomplishment; while disengagement and deterioration

in physical health have only been researched more recently (Awa, Plaumann, & Walter, 2010;

Bakker & Heuven, 2006; Basinska, Wiciak, & Dåderman, 2014; Queiros, Kaiseler, & da Silva, 2013; Schaible & Six, 2016; Tett & Meyer, 1993).

Factors that can contribute to burnout include being exposed to persistent stress related to work combined with intense involvement with people which creates a constant and repetitive emotional pressure over time (Ascari et al., 2016). A number of factors predict burnout, including acute stress, chronic stress, organizational stress, and overall perceived stress. These stressors may lead to the characteristic factors of burnout: Reduced personal accomplishment, emotional exhaustion, disengagement, reduced physical health, and depersonalization (Ascari et al., 2016; Awa et al., 2010, Bakker & Demerouti, 2007). An imbalance between job reality, resources, and expectations combined with persistent work stress is one of the most significant predictors of burnout (Awa et al., 2010). Another significant predictor is the role requirement to display or not display particular emotions; for example, the need to appear calm in a situation that would normally provoke a strong emotional reaction. Burnout often happens in work where there is an asymmetrical relationship between the worker or helper, and the receiver of help, and as a result, many professional roles have high rates of burnout. For example, one study found that 20% of German physicians, 27% of physicians in the United Kingdom, and 22% of physicians in the United States suffer from burnout. The same study found rates of burnout among teachers in the United States as high as 40% (Awa et al., 2010).

One characteristic that most victims of burnout share is exposure to emotionally demanding interpersonal interactions. Examples may include frequent exposure to people involved in accidents, violence, and death and illness, or victims of crime. This makes members of health professions and first responders like police officers, paramedics and firefighters at particularly high risk (Bakker & Heuven, 2006). Burnout is not limited to service professionals,

but is most common among human service providers (Bakker & Heuven, 2006). In a study of police officers, researchers found that the combination of physical and psychological fatigue strongly predicted burnout, and that other factors, such as acute stress from witnessing violence, injury, and death contributed as well (Russell, Cole, & Jones, 2014; Smoktunowicz et al., 2015). They also found that organizational stress, such as navigating bureaucracy, working additional hours due to staff shortages, and perceived unfair oversight or evaluation predicted burnout. These stressors often lead to negative job-related emotions such as anger, hopelessness, or disgust, and these acute negative emotions when combined with exhaustion predict burnout (Bakker & Heuven, 2006; Basinka et al., 2014).

In a confirmatory factor analysis, Demerouti, Mostert, and Bakker (2010) found that attitude components of burnout and work engagement are opposite ends of the same continuum, with disengagement or cynicism falling on the burnout end, and dedication or enthusiasm falling at the engagement end. Thus, the attitudes associated with work engagement can be said to negatively predict burnout (Demerouti et al., 2010).

Burnout is associated with a number of negative physical health, psychological health, and job performance outcomes. Negative physical health outcomes correlated with burnout include increased risk of sleep disorders, increased risk of workplace injury, metabolic syndrome, high blood pressure, increased risk of suicide, increased risk of cardiovascular disease, skin rashes, increased physical fatigue, elevated blood pressure, migraine headaches, poor appetite, loss of sexual drive, and increased frequency of colds, with increased symptoms severity correlated with increased level of burnout (Honkonen et al., 2006; Kim, Ji, & Kao, 2011; Murphy, Beaton, Pike, & Cain, 1994; Peterson et al., 2008; Vaulerin, D'Arripe-Longueville, Emile, & Colson, 2016a).

Negative psychological health outcomes correlated with burnout include emotional

fatigue, depression, increased alcohol use, use of non-prescription drugs, apathy, irritability,

relationship problems, crying spells, anxiety, rigid thinking, social withdrawal, and feelings of

hopelessness, helplessness, guilt, inadequacy, failure, incompetence, cynicism, disillusionment,

suspicion, resignation, indifference, depersonalization, cognitive exhaustion, and increased

aggression (Jayaratne & Chess, 2013; Murphy et al., 1994; Queirós et al., 2013). Negative job

performance outcomes associated with burnout include: Reduced job satisfaction, reduced job

performance, disengagement, reduced personal accomplishment, increased work error rate,

increased likelihood of engaging in counterproductive work behaviors (CWBs), increased intent

to leave job, and turnover (Dewa, Loong, Bonato, Thanh, & Jacobs, 2014; Russell, Cole, &

Jones, 2014; Smoktunowicz et al., 2015).

Firefighting is a profession that is heavily impacted by burnout. For example, in a study

of 3,289 full-time professional structure firefighters in Greece, researchers found that 20% met

criteria for burnout (Katsavouni, Bebetsos, Malliou, & Beneka, 2015). Vinnikov et al. (2019)

found that in a study of 604 firefighters, factors like time on the job were not predictive of

burnout, but stressors like management role and uniform comfort were significantly correlated

with higher rates of firefighter burnout. Other researchers found that increased burnout

symptoms were a significant risk factor for increased risk of physical injury such as sprains,

tendinitis, and muscle tears on the job. The results suggest that the cognitive fatigue that is

associated with burnout may make firefighters more prone to mistakes resulting in injuries

(Vaulerin et al., 2016a).

Burnout as a contributor to injury among firefighters is a significant concern for a

profession that already has very high injury rates. In 2010 The National Fire Protection

Association indicated that 71,875 U.S. firefighters were injured in the line of duty, and that 45.4% of these injuries occurred during fireground operations, with a rate of injury by department as high as 23.5 injuries per 100 firefighters (Burgess et al., 2013). There are 30,000 fire truck crashes in the United States each year, and these crashes are responsible for between 20% and 25% of yearly firefighter fatalities. This makes truck crashes the second leading cause of death for firefighters following Sudden Cardiac Death (SCD) (Donoughe, Witestone, & Gabler, 2012).

Recent research suggested that three of the Big Five personality traits are associated with burnout in firefighters; with neuroticism related to cognitive exhaustion, depersonalization, and reduced personal accomplishment; and openness and conscientiousness related to physical fatigue (Vaulerin, Colson, Emile, Scoffier-Mériaux, & D'Arripe-Longueville, 2016b).

Intense or difficult interpersonal relationships are associated with increases in perceived stress, and in turn with burnout. This is true for firefighters as well. In a study of 208 firefighters, researchers found that increases in work stress combined with the stress of work-family conflict significantly predicted burnout. The same authors also determined that burnout negatively influenced firefighter communication, personal protective equipment compliance, safety reporting, and adherence to work safety practices (Smith, Hughes, Dejoy, & Dyal, 2018).

Some factors of burnout in firefighters appear to be predicted by psychological job demands and level of autonomy. In a study of 101 French firefighters, researchers found that the level of control a firefighter had over their job predicted emotional exhaustion, and that increased psychological job demands predicted both emotional exhaustion and depersonalization (Lourel, Abdellaoui, Chevaleyre, Paltrier, & Gana, 2008).

A number of studies have demonstrated the links between perceived stress and burnout. In a study of 126 volunteer caregivers serving in AIDS care in South Africa, high levels of perceived occupational stress, specifically role overload and lack of support, predicted higher levels of burnout (Akintola, Hlengwa, & Dageid, 2013). In a sample ($n = 314$) of dental students in Spain researchers found that specific dimensions of perceived stress were correlated with specific dimensions of burnout. For example, the burnout factor 'overload' was positively associated and moderately correlated with both 'tenseness' (0.45), and 'frustration' (0.38) perceived stress dimensions; and the burnout factor 'lack of development' was positively associated with the perceived stress dimension 'frustration' (0.72) (Montero-Marín et al., 2014). Popa-Vela (2014) found in a study of physicians ($n = 79$) attending end of life patients that perceived stress was positively correlated with the burnout factor of emotional exhaustion. And in a study of 489 Spanish teachers, researchers found that emotional competence mediated the relationship between perceived stress and burnout (Rey, Extremera, & Pena, 2016). Together these studies support the idea that perceived stress may predict burnout in some populations. But does this hold true in firefighters? We know that burnout in firefighters is intimately linked with perceived stress, and when interventions designed to address that stress are introduced, the risk of burnout is reduced (Lee et al., 2018). But to date no studies have looked at if perceived stress predicts burnout in firefighters.

Some research has shown that certain personality traits can moderate the relationship between stress and burnout in firefighters. In a study of 580 Polish firefighters, researchers found that higher levels of trait of self-efficacy moderated the relationship between stress and burnout such that when stress was high, in firefighters with high self-efficacy, that stress was less likely to result in increased burnout compared to firefighters with low self-efficacy. These relationships

were most significant when it came to disillusion and sense of professional inefficacy and perceived stress and psychophysical exhaustion (Makara-Studzińska, Golonka, & Izydorczyk, 2019). Another study by Korean researchers supported the relationship between perceived stress and burnout in 464 male firefighters, and found that gratitude may reduce the risk of both (Lee et al., 2018).

Stress

Stress can be subdivided into at least two different major subtypes: Acute stress and chronic stress; and these major subtypes can be further subdivided. Acute stress refers to an intense emotional reaction caused by a single incident with physiological and psychological effects that typically occur immediately and last up to one month following the event. Triggers for acute stress can include, but are not limited to, exposure to trauma such as accidents, injury, violence, intense interpersonal conflict, natural disasters, war, sexual assault, and extreme physical activity. Acute stress is associated with activation of the fight-or-flight response in which signals from the amygdala result in rapid glutamate uptake into osteoblasts in the bones, which in turn produces a surge in available osteocalcin (Berger et al., 2019). Once released into the bloodstream, osteocalcin acts to suppress the parasympathetic nervous system, which enables the body's sympathetic nervous system to trigger increased blood pressure, increased heart rate, increased production of cortisol and adrenaline, altered lipid metabolism, and activation of the hypothalamic-pituitary-adrenal axis. Repeated exposure to acute stress can lead to chronic stress and long-term negative impacts on health (Berger et al., 2019; Garfin, Thompson, & Holman, 2018).

Critical incident stress is a subset of acute stress that refers to the stress experienced by first responders and that is caused by powerful abrupt events that are usually outside the scope of

ordinary human experiences and that have an impact significant enough to overwhelm the normally effective coping skills of most individuals. Critical incidents may happen without warning and first responders are required to very quickly mentally prepare, for what they might experience when they get to the scene of the incident. Some examples of critical incident stressors that a firefighter might experience include: Natural disasters, injuries, deaths, exposure to dangerous chemicals, exposure to fire, and motor vehicle accidents (Kulbarsh, 2007; Lesperance, 2017).

Chronic stress is defined as continuing negative environmental circumstances such as continuing health problems, poor working conditions, financial difficulties, absent, and chronically and/or intermittently conflictual or unfulfilling intimate relationships with friends, children, romantic partners, or parents; and other ongoing difficulties (Hammen, Kim, Eberhart, & Brennan, 2009).

Organizational stress is generally considered a subset of chronic stress, although organizational stress can also be acute. It is defined as a physiological, emotional, behavioral, and cognitive response to harmful elements of work, organizational climate, and the work environment. It is a characterized by feelings of loss of autonomy and helplessness in solving tasks and is strongly associated with burnout. Organizational stress can be further divided into two main types. *Eustress* which refers to a positive type of stress that helps people to prepare for positive action in the future. Eustress can contribute to motivation, creativity, competitive spirit, and energy, and may improve job performance. *Distress* which occurs when something negatively impacts a person's work and may include both acute stress and chronic stress (Mădălina-Adriana & Mirela, 2011).

Stress is a normal component of daily life, and can be an important part of normal healthy functioning. Some researchers have argued that in the absence of stress there is no motivation, and thus no action toward positive goals, but they refer to stress in moderation, the pressure to write a paper, build a building, or secure a contract on time (Yerkes & Dodson, 1908). Stress can also be a source of pain and pathology, causing or contributing to serious psychological and medical problems such as high blood pressure, anxiety, depression, and burnout. Stress can generally be divided into two categories, acute stress which happens in the immediate moment, and chronic stress which is built up over time as the result of persistent repetitive and often low-level stressors (Bryant et al., 2017). Examples of acute stress include soldiers experiencing the stress of combat; police officers and firefighters who are exposed to critical incidents such as car accidents, injuries or deaths; and individuals exposed to crime, violence or trauma (Hall et al., 2016; Hokanson & Wirth, 2000). Some additional examples of chronic stress may include the stress associated with a chronic medical condition, systemic racism, systemic misogyny, the stress associated with aggressive oversite at work, poor social supports, or lack of autonomy (Arbona, Pao, Long, & Olvera, 2017; Jahnke et al., 2012; Poston et al., 2014).

Firefighters are commonly exposed to critical incident stressors that may include risk of death or injury to themselves, their coworkers, and exposure to trauma and death among members of the public (Hokanson & Wirth, 2000). Firefighter exposure to continuous stressors has been linked to negative health outcomes, problematic drinking, depression, and the development of PTSD at rates as high as 22% (Lambert, Benight, Harrison, & Cieslak, 2012). In addition to psychological stressors, firefighters are subject to lack of sleep, intermittent, intense physical labor, and work in smoky hot conditions while exposed to dust, toxic chemicals and

dangerous noise levels. Shift work also contributes to firefighter physical and psychological stress (Main et al., 2012).

Organizational stress generally refers to secondary stressors that are a byproduct or component of the work environment. Examples of acute organizational stressors for firefighters might include management that engages in aggressive oversite, or does not support firefighter autonomy. Examples of chronic organizational stress among firefighters could include things like excessive bureaucracy, paperwork, chronic lack of work autonomy, or excessively complicated regulations (Arbona et al., 2017; Bryant, et al., 2017).

Stressors vs. Stress

A stressor is anything that causes the release of stress hormones. There are two types of stressors, psychological stressors and physiological stressors (Khoozani & Hadzic, 2010). Physiological stressors impact the body directly. Examples of physiological stressors could include: Chronic illness, pain, injury, poor diet, exposure to toxins, heavy physical workload etc. Psychological stressors are situations, comments, individuals, or contexts that are perceived as threatening or negative. Examples of physiological stressors that firefighters commonly experience include: endogenous heat stress, environmental heat stress, exposure to carbon monoxide, high musculoskeletal loading, exposure to airborne particulates resulting in accelerated decline in airflow, exposure toxins, and long periods of inactivity followed by intense bursts of physical activity (Guidotti, 1992).

Examples of psychological stressors that firefighters experience might include: excessive oversite at work, responsibility for the protection of property, responsibility for saving lives, exposure to trauma, risk of injury or death, and witnessing injury or death of others (Arbona et al., 2017; Bryant, et al., 2017; Guidotti, 1992).

Stressors can be further subdivided into absolute stressors and relative stressors (Khoozani & Hadzic, 2010). Absolute stressors are objective such that any person exposed to them would find them stressful. Examples of absolute stressors are earthquakes, war, or tsunamis. Relative stressors are subjective insomuch as different individuals may react differently to them. Examples of relative stressors include paying taxes, being stuck in traffic, taking an exam, and time pressure to complete a task (Khoozani & Hadzic, 2010). Both absolute stressors and relative stressors may have different impacts on different individuals based on how those stressors are perceived.

Occupational Stressors

Occupational stressors refer to absolute and relative stressors found in the workplace (Kaufmann & Beehr, 1989; Khoozani & Hadzic, 2010; Story & Repetti, 2006). Occupational stressors may include quantitative workload, under-utilization of skills, and ambiguity around future job security or stability (Kaufmann & Beehr, 1989). Examples of occupational stressors common to firefighters may include, but are not limited to: Concern about serious injury or death due to work; discrimination based on age, gender or ethnicity; sleep disruption; isolation from family; financial strain due to inadequate pay; observing negative effects of stress on co-workers; and thoughts about past shifts that were particularly upsetting (Kimbrel et al., 2011; Kimbrel et al., 2015).

Perceived Stress

Perceived stress, as measured by the Perceived Stress Scale (PSS), is defined as the extent to which respondents find situations in their lives stressful, overloading, unpredictable, and uncontrollable, relative to their ability to cope (Cohen, Kamark & Mermelstein, 1983;

Taylor, 2015). It has been further explained as a person's stress response to stimuli (Burger & Samuel, 2016).

Perceived stress in firefighters is not only a product of the work environment, in a Finnish study of 774 firefighters, alcohol use and disturbances in their social lives were found to be the strongest predictors of perceived stress (Lusa, Häkkänen, Luukkonen, & Viikari-Juntura, 2002). Higher levels of perceived stress is dangerous for firefighters. A study of 1,036 Black and Latinx firefighters found that higher perceived stress was associated with higher alcohol use in 24% of black and 33% of Latinx firefighters (Arbona et al., 2017). And in a study of 7,151 firefighters, researchers found that level of perceived job stress and resilience can mediate the development of depression or Alcohol Use Disorders (AUDs) following trauma exposure in firefighters, with lower perceived stress reducing the risk of developing an AUD or depression after exposure to traumatic events (Kim, Park, & Kim, 2018).

Perceived stress and burnout are strongly associated in the research. In a sample of 314 dental students, researchers found that perceived stress strongly associated with burnout and specific perceived stress factors were associated with particular elements of burnout. The study found that the "overload" component of burnout was positively associated with the "frustration" and "tenseness" factors of perceived stress; and that reduced personal accomplishment, called "lack of development" in the study, was positively associated with the perceived stress factor of "frustration" and negatively associated with the "tenseness" factor. Finally, disengagement, called "neglect" in the study, showed positive association with "frustration" and negative association with the "tenseness" perceived stress factors (Montero-Marín, Demarzo, Stapinski, Gili, & García-Campayo, 2014). A study of 126 volunteer caregivers working with AIDS victims in South Africa found that perceived stress predicted burnout, particularly perceived stress

associated with lack of support and role/work overload (Akintola, Hlengwa, & Dageid, 2013). In a study of 79 physicians working with end-of-life patients, researchers found that interventions designed to reduce perceived stress were successful in reducing burnout, particularly in addressing the emotional exhaustion component of burnout (Popa-Velea, 2014).

Perceived stress in firefighters is also directly linked to factors in burnout. For example, firefighter autonomy, which is associated with the burnout factors of reduced personal accomplishment and disengagement, was directly correlated with perceived stress, such that as firefighter perceived autonomy goes down, perceived stress goes up (Chiang, Baley, Ponder, & Padilla, 2016).

Perceived stress impacts more than just a person's mental state, researchers looking at perceived stress and burnout found that people with higher levels of perceived stress produced higher spikes in levels of cortisol shortly after waking, while those with full blown burnout symptoms showed blunting of cortisol levels over three days suggesting a dysregulation of HPA axis functioning in burnout, suggesting that persistent perceived stress may eventually contribute to this HPA axis dysregulation (Pruessner, Hellhammer, & Kirschbaum, 1999). Several studies have linked blunted cortisol with chronic fatigue, insomnia, and burnout (Backhaus, Junghanns, & Hohagen, 2004; MacHale et al., 1998).

The studies described above offer strong evidence for a relationship between perceived stress and burnout, but are there inherent traits that might moderate that relationship? Self-compassion may offer one possibility.

Self-compassion

There a number of different operational definitions of self-compassion. One definition describes compassion as an "affective experience whose primary function is to facilitate

cooperation and protection of the weak and those who suffer" (Goetz, Keltner, and Simon-

Thomas, 2010, p. 351). Buddhist traditions describe compassion as a component in a system of

motivational constructs that includes equanimity, loving-kindness, and sympathetic joy

(Buddhaghosa & Davids 1975; Hofmann, Grossman, & Hinton, 2011). Other authors have

conceptualized compassion as an evolutionary construct (Depue & Morrone-Strupinsky, 2005;

Liotti & Gilbert, 2010). They suggest that compassion is linked to the mammalian evolution of

the attachment system. It is a social construct focused on the motivation to alleviate distress

utilizing attentional sensitivity, non-judgement, sympathy, empathy, and distress tolerance. This

model is based on the idea that compassion is based on the ability of social mammals to form

attachment bonds (Bowlby, 1973; Gilbert, 2005). Compassion can, therefore, be understood as a

motivational system that evolved to use connection with feelings toward others and self, and

expression of safeness of feelings of warmth and to manage affect (Gilbert, 1989; Spikins,

Rutherford, & Needham, 2010).

Kristin Neff, the creator of the self-compassion scale (SCS) defines self-compassion as

"being touched by and open to one's own suffering, not avoiding or disconnecting from it,

generating the desire to alleviate one's suffering and to heal oneself with kindness. Self-

compassion also involves offering nonjudgmental understanding to one's pain, inadequacies and

failures, so that one's experience is seen as part of the larger human experience (Neff, 2003b,

p.87)."

Among anxious help-seeking patients, self-compassion accounted for more variance in

the prediction of mental health symptom severity and life quality than other factors (Van Dam,

Sheppard, Forsyth, & Earleywine, 2011). Researchers have found that burnout is negatively

correlated with self-compassion, and that individuals who are high in self-compassion reported

less burnout than those who have low self-compassion scores (Beaumont, Durkin, Martin, & Carson, 2015). Another study that looked at a variety of different variables and their relationship to burnout in employees at the Department of Veterans Affairs found that self-compassion was consistently the strongest predictor of burnout, and that staff with the highest self-compassion scores had the lowest risk of burnout (Atkinson, Rodman, Thuras, Shiroma, & Lim, 2017). Other authors have found that self-compassion interventions may reduce risk of burnout in first responders (Beaumont, et al., 2015; Dapolonia, 2018; Richardson et al., 2016).

There are only a few research studies looking at self-compassion and firefighters. In one German study ($n = 123$), researchers looked at how self-compassion moderates the relationship between self-criticism and depression, and found significant protective effects in self-compassion (Kaurin, Schonfelder, & Wessa, 2018). In another study ($n = 289$), self-compassion was a significant predictor for perceived supervisor leadership in wildland firefighters (Lewis, 2013).

Self-compassion may be a protective trait

There are a number of studies that look at the power of self-compassion to moderate the effects of stress and other factors on negative outcomes. In a study looking at how self-compassion moderates the relationship between physical health and subjective well-being in older adults, researchers found that in adults with poorer physical health self-compassion was associated with better subjective well-being (Allen, Goldwasser, & Leary, 2012). This finding was further supported by a meta-analysis looking at the relationship between self-compassion and well-being across 79 studies ($n = 16,416$) where authors found the magnitude of the relationship between self-compassion and well-being was $r = .47$ (Zessin, Dickhäuser, & Garbade, 2015). Another study looked at the moderating effect of self-compassion on the

relationship between academic burden and psychological health in Korean university students (n = 350), and using a multiple regression analysis they found that self-compassion moderated the relationship between academic burn-out and psychological well-being, as well as the relationship between academic burn-out and depression (Kyeong, 2013). In a study of 799 nurses in New Zealand, researchers found that self-compassion moderated the relationship between burnout and burnout-related barriers to compassion (Dev, Fernando, Lim, & Consedine, 2018). In a study of hospital staff (n = 281) looking at how self-compassion moderates the relationship between stress and sleep quality, depression, mental well-being, and anxiety, researchers found that self-compassion moderates the relationship between stress and depression with high self-compassion corresponding to a weaker association between stress and depression. They concluded that these support previous studies that suggest self-compassion is associated with resilience and can behave as a protective factor.

Another way that self-compassion may be a protective trait is in how it impacts perceived stress. In a small study of 44 adolescents, researchers found that self-compassion co-varied with perceived stress and depressive symptoms, and that kids with higher self-compassion tended to have lower depression and perceived stress (Bluth & Eisenlohr-Moul, 2018). While researchers looking at how self-compassion predicts emotional wellbeing in healthy (but stressed) adolescents (n = 132) found that increases in self-compassion predicted decreases in negative affect, perceived stress, depressive symptoms, and rumination (Galla, 2016). Ewert, Gaube, Caroline, and Geisler (2018) found that those with higher self-compassion experienced lower perceived stress following an event that evoked embarrassment or shame. In a study of 176 individuals, researchers found that self-compassion mediated the relationship between perceived stress and physical health, and that that those higher in self-compassion were likely to be lower

in perceived stress and therefore more likely to engage in positive health behaviors (Homan &

Sirois, 2017).

In addition, in a small study ($n = 51$) looking at self-compassion as an acquired skill

(state) as an intervention to reduce stress and self-compassion, researchers found that increased

self-compassion was correlated with reductions in both stress and burnout in practicing

psychologists (Eriksson, Germundsjö, Åström, & Rönnlund, 2018). Self-compassion moderates

the relationship between rumination and stress, which are direct contributors to burnout (Samaie

& Farahani, 2011).

Several studies have found that self-compassion moderates the relationship between a

perceived stressor such as negative life events like homesickness and dissatisfaction, and

depression (Ford, Klibert, Tarantino, & Lamis, 2016; Harvey, 2018, Terry, Leary, & Mehta,

2013). Although self-compassion is inversely related to burnout, few studies have assessed trait

self-compassion as a predictor of burnout, particularly in a first responder sample (Dapolonia,

2018). Therefore, the primary aim of this dissertation is to assess if self-compassion moderates

the relationship between perceived stress and burnout in firefighters.

Hypotheses

Hypothesis 1: *Occupational stressors will positively predict burnout among structure*

firefighters.

Hypothesis 2: *Perceived stress will positively predict burnout among structure firefighters.*

Hypothesis 3: *(a) In structure firefighters the relationship between occupational stressors and*

burnout will be mediated by perceived stress, and (b) the relationships between occupational

stressors and perceived stress, and perceived stress and burnout with be moderated by self-

compassion, such that at higher levels of self-compassion (+1SD), the relationships between

occupational stressors and perceived stress and perceived stress and burnout will not be

statistically significant, whereas at lower levels (-1SD) they will be statistically significant.

Method

Participants

Based on the use of a linear multiple regression with three tested predictors, occupational stress, perceived stress and burnout, a medium anticipated effect size $f^2 = 0.15$, an alpha of 0.05, and power (1-β error probability) of 0.95, a power analysis using G*Power indicated a sample size of at least 119 participants is required (Faul, Erdfelder, Buchner, & Lang, 2009). According to the Bureau of Labor Statistics (2019) there are 321,570 full-time paid firefighters working in the United States with an average age of 38.8, 4.5% were women, 9.2% identified as Black, with 9% identified as Latinx (BLS, 2019; NFPA, 2019).

Approximately 130 structure firefighters will be recruited from local, regional and national fire departments in the United States and Canada. Participants will be limited to structure firefighters, age 18 or older, English speaking, currently working full-time in the United States or Canada. Demographic variables collected will include age, shift, position (rank), geographic region, gender, race, ethnicity, job type, and education level. The sampling method will focus on direct recruitment using email, fliers, and in-person presentations, with additional participants recruited using snowball sampling and social media. Because firefighters are a low diversity population in the United States, efforts will be made in sampling to increase the diversity of the sample by targeting specific groups to recruit participants (BLS, 2019; NFPA, 2019). Targeted groups will include the International Association of Women in Fire & Emergency Service (Women in Fire), International Association of Black Professional Fire Fighters (IABPFF), National Association of Hispanic Firefighters (NAHFF), International EMS

& Firefighters LGBTQ Pride Alliance, and the Asian Firefighters Association (AFA) (Asian

Firefighters Association, 2019; International Association of Black Professional Fire Fighters,

2019; International Association of Women in Fire & Emergency Services, 2019; International

EMS & Firefighters LGBTQ Pride Alliance, 2019).

　　 All participants will have the option to receive a $10.00 gift card from a national outdoor

sporting goods store as compensation for their participation.

Measures

　　 All measures will be delivered via online survey using Qualtrics (Qualtrics, 2019).

　　 The Occupational Stress-14 scale (SOOS-14) is a measure of occupational stressors

developed for use with emergency responders such as paramedics and firefighters. It was derived

from Beaton & Murphy's 57-item Sources of Occupational Stress (SOOS). Researchers

reviewed the test–retest reliability of the measure over three months, and results indicated that

the SOOS-14 was moderately stable, $r=0.51$, $p < 0.001$. Cronbach's alphas across several studies

ranged from adequate at, $\alpha = 0.78$, to good at $\alpha = 0.86$. Researchers found the SOOS-14

demonstrated similar validity and reliability and validity as the longer SOOS, and benefited

superior factor structure (Beaton & Murphy, 1993; Kimbrel et al., 2011; Kimbrel et al., 2015).

　　 The Perceived Stress Scale (Cohen et al., 1983; PSS-10) is a 10-item measure designed to

evaluate an individual's perception of stress. Items are constructed to examine how overloaded,

uncontrollable, and unpredictable respondents feel their lives are. The scale also includes a

number of direct queries about current levels of experienced stress. The PSS-10 includes direct

questions about current perception of stress and is designed using community norms with at least

an eighth-grade education. Research on the PSS-10 has shown the questions have good internal

consistency, convergent validity, reliability (adequate at $\alpha = .70$) and consistency across

language groups (Lee, 2012). The PSS-10 asks questions about thoughts and feelings that

occurred over the last month. Respondents are asked how frequently they felt a particular way

using a 0 to 4 Likert-type scale that ranges from *never* to *very often* (Cohen et al., 1983; Perera et

al., 2017).

   The *Self-Compassion Scale-Short Form* (SCS-SF; Neff, 2003b; Raes, Pommier, Neff, &

Van Gucht, 2011) is a brief 12-item variant of the 26-item SCS (Neff, 2003a, Neff, 2003b). It

measures the ability to hold painful feelings and thoughts in mindful awareness, to have

understanding and kindness toward oneself in situations of failure or pain; and perception that

our own individual experiences are part of a larger human experience. The SCS-SF has shown

good factorial validity, internal consistency, and correlations with other constructs as expected

(Raes et al., 2011).

   The *Oldenburg Burnout Inventory* (OLBI; Demerouti, Bakker, Vardakou, & Kantas,

2003) is a burnout scale consisting of 16 items, and was developed to address the psychometric

problems of previous measures of burnout, as well as to provide a measure that could be utilized

for a broader range of occupations than previous measures. The OLBI examines burnout across

two dimensions, disengagement and exhaustion. The measure uses a five-point, Likert-type scale

with anchors that range from strongly disagree (1) to strongly agree (5). Higher scores indicate

higher levels of burnout symptoms. When testing the OLBI's psychometric properties developers

found acceptable internal consistency; with Cronbach's alpha ranging from .74 to .87. When

they measured test-retest reliability they found time 1 and time 2 were moderately correlated (r

=.51, $p < .001$, for exhaustion; and $r = .34$, $p <.01$, for disengagement). Examination of factorial,

construct, convergent and divergent validity also yielded acceptable psychometric properties

(Demerouti, Bakker, Vardakou, & Kantas, 2003; Demerouti, Mostert, & Bakker, 2010).

Proposed analysis

Study data will be collected from Qualtrics and analyzed using SPSS-25.0.0.0 (IBM

Corp., 2017; Qualtrics, 2019). Data will be cleaned to determine normality of distribution i.e.,

skewness, leptokurtic and platykurtic kurtosis, as well as to check for missing data, and to find

possible outliers. To check for normality Kolmogorov-Smirnov and Shapiro-Wilk tests will be

run on the data using SPSS. If the test is non-significant at ($p > .05$) it indicates the distribution is

not significantly different from a normal distribution, but if it is significant at ($p < .05$) the

distribution is non-normal (Field, 2018). A Mahalanobis distance calculation will be conducted

to determine if there are any multivariate outliers (Field, 2018, p198, p306, p307, p878; Goode et

al., 1998). To reduce potential bias, any extreme outliers will be trimmed or Winsorized, which

involves substituting outliers with the highest value that is not an outlier (Field, 2018). A Pearson

Product-Moment correlation matrix will be produced to check for multicollinearity which may

cause coefficients to be estimated with higher standard errors and as a result, greater uncertainty

(Field, 2018).

Using SPSS, regressions will be run to determine if occupational stressors and perceived

stress positively predict burnout in firefighters, to see if perceived stress mediates the

relationship between occupational stressors and burnout, and finally to examine how self-

compassion moderates the relationship between occupational stressors and perceived stress, and

between perceived stress and burnout using the SPSS PROCESS macro version 3.4 (Hayes,

2018). All predictors will be centered in the analyses.

Specifically, hypothesis 1 will be tested by using a simple linear regression to examine if

occupational stressors predict burnout in firefighters at a significance of ($p < .05$). A semipartial-

squared correlation will be calculated to determine effect sizes. A significant medium to large

effect size would suggest occupational stressors predict burnout in firefighters and would support

hypothesis 1 (Field, 2018; Judd, McClelland, & Culhane, 1995).

Hypothesis 2 will be tested by using a simple linear regression to examine if perceived

stress predicts burnout in firefighters at a significance of ($p < .05$). A semipartial-squared

correlation will be calculated to determine effect sizes. A significant medium to large effect size

would suggest perceived stress predicts burnout in firefighters and would support hypothesis 2

(Field, 2018; Judd, McClelland, & Culhane, 1995).

To test hypothesis 3, using the SPSS PROCESS macro version 3.4 (a) the relationship

between occupational stressors and burnout will be evaluated to see if it is mediated by perceived

stress. At $p < .05$, if results yield a medium to large effect size, then the first part of hypothesis 3

will be supported. Second, (b) occupational stressors X self-compassion, and the perceived stress

X self-compassion interaction terms will be evaluated for statistical significance ($p < .05$).

Simple slope analysis (Field, 2018) will be used to assess the statistical significance of the simple

regression of occupational stressors predicting perceived stress at low (-1 SD), medium (M), and

high (+1 SD) levels of self-compassion, and perceived stress predicting burnout at low (-1 SD),

medium (M), and high (+1 SD) levels of self-compassion. If simple slope analysis shows

significance that when self-compassion is high the relationship between occupational stressors

and perceived stress is weaker than when self-compassion is low, and that the relationship

between perceived stress and burnout is weaker than when self-compassion is low, then the

results will support the second part of hypothesis 3 (Field, 2018; Hayes, 2013; Hayes, 2018a;

Hayes, 2018b; LeMoult et al., 2018). The statistical model is shown in *Figure 1*. Examples of

potential simple slope outcomes is shown in *Figures 2 and 3*.

In this analysis self-compassion did not moderate the relationship between job stressors and perceived stress, nor did it moderate the relationship between perceived stress and burnout in structure firefighters. This contradicts previous studies of other first responders, specifically law enforcement officers, for whom lower levels of self-compassion were a significant predictor of increased symptoms of burnout. The reason for this may be unique to this population itself. Unlike their fellow first responders, LEOs, structure firefighters are held in high regard by the majority of the public. They face significantly less scrutiny in the form of oversight, a significant source of organizational stress in police officers. Instead, the stressors experienced by firefighters are in the form of critical incident stress and physical stressors such as heat stress, smoke stress, and fatigue from heavy physical exertion. It is possible that because their stressors are external, and because at baseline firefighters tend to evaluate themselves positively, that unlike police officers and the general public, they are less prone to the negative self-evaluation in the face of perceived stress that responds well to high levels of self-compassion. Absent this tendency for negative self-evaluation, an individual's level of self-compassion may not positively moderate the relationship between stressors and perceived stress, or perceived stress and burnout. In addition, future studies may wish to look at how individuals attribute perceived stress to internal factors (this stress is a result or could be a result of a personal failing or error) versus external factors (this stress is a product of outside events and is not related to me or my character as an individual). By looking at perceived stress attribution, researchers may be able to predict prevalence of negative self-evaluation, and in turn the probability that the individual level self-compassion may influence response to stressors and the relationship between perceived stress and burnout. Future studies may wish to examine and compare the level of negative self-

evaluation in structure firefighters versus other first responders such as police officers, as well as

versus samples from the general population to see if this explanation holds true.

Limitations

This study was conducted using snowball sampling, social media appeals, and direct

contact with ___ fire stations and firefighter fraternal organizations in ___ states. Participants

self-selected to participate at a single point in time and there was no intervention applied. Future

studies may wish to employ a self-compassion intervention to examine if changes in state self-

compassion impact levels of perceived stress and/or burnout in structure firefighters differently.
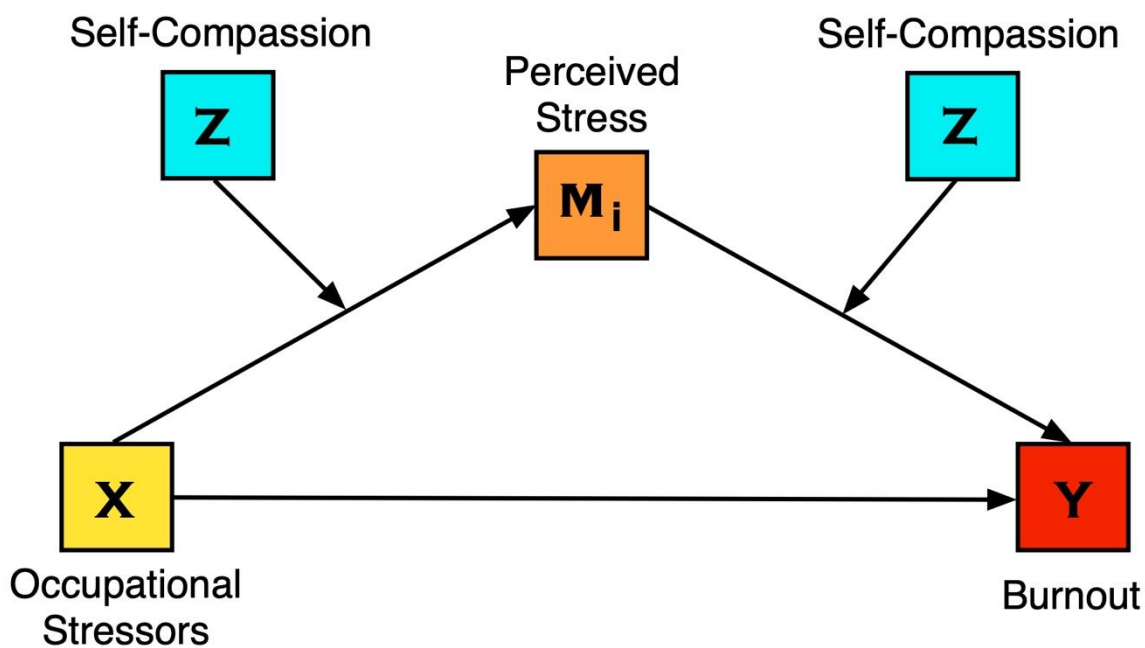
Figure 1. Model of how (a) the relationship between occupational stressors (X) and burnout (Y)

will be mediated by perceived stress (M_i), and (b) the relationships between occupational

stessors (X) and perceived stress (M_i), and perceived stress (M_i) and burnout (Y) with be

moderated by self-compassion (Z), such that at higher levels of self-compassion (Z) (+1SD), the

relationships between occupational stressors (X) and perceived stress (M_i) and perceived stress

(M_i) and burnout (Y) will not be statistically significant, whereas at lower levels (-1SD) they will

be statistically significant.
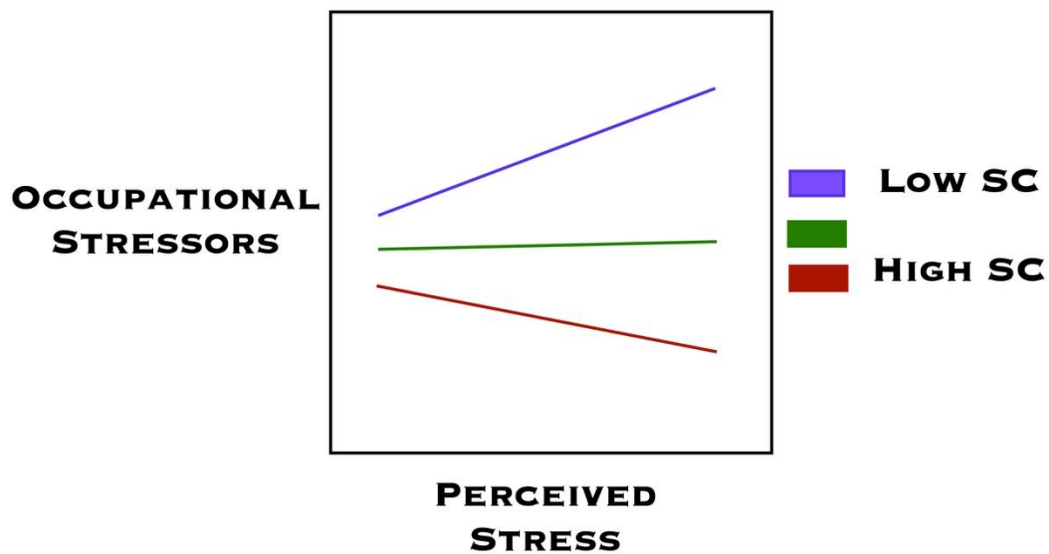
Figure 2. Example of a potential simple slope outcome of how self-compassion might moderate

the relationship between occupational stressors and perceived stress.

Figure 3. Example of a potential simple slope outcome of how self-compassion might moderate

the relationship between perceived stress and burnout.

References

Akintola, O., Hlengwa, W. M., & Dageid, W. (2013). Perceived stress and burnout among

volunteer caregivers working in AIDS care in South Africa. *Journal of Advanced

Nursing*, *69*(12), 2738–2749. https://doi.org/10.1111/jan.12166

Allen, A. B., Goldwasser, E. R., & Leary, M. R. (2012). Self-compassion and well-being among

older adults. *Self and Identity*, *11*(4), 428–453.

https://doi.org/10.1080/15298868.2011.595082

Allison, P. D. (2003). Missing data techniques for structural equation modeling. *Journal of

Abnormal Psychology*, *112*(4), 545.

Arbona, C., Pao, C., Long, A., & Olvera, N. (2017). Perceived stress in black and latino male

firefighters: Associations with risk and protective factors. *Ethnicity & Disease* 27(4)

Retrieved from https://www.ethndis.org/edonline/index.php/ethndis/article/view/754

Ascari, R. A., Dumke, M., Dacol, P. M., Maus, S., De Sá, C. A., & Lautert, L. (2016).

Prevalence of risk for burnout syndrome among military police. *Cogitare Enferm*, *21*(2),

01–10.

Asian Firefighters Association. (2019). Retrieved November 4, 2019, from

http://www.asianfire.org/.

Atkinson, D. M., Rodman, J. L., Thuras, P. D., Shiroma, P. R., & Lim, K. O. (2017). Examining

burnout, depression, and self-compassion in veterans affairs mental health staff. *The

Journal of Alternative and Complementary Medicine*, *23*(7), 551–557.

https://doi.org/10.1089/acm.2017.0087

Awa, W. L., Plaumann, M., & Walter, U. (2010). Burnout prevention: A review of intervention

programs. *Patient Education and Counseling*, *78*(2), 184–190.

https://doi.org/10.1016/j.pec.2009.04.008

Backhaus, J., Junghanns, K., & Hohagen, F., (2004). Sleep disturbances are correlated with

decreased morning awakening salivary cortisol. *Psychoneuroendocrinology*, *29* (9):

1184–91.

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the

art. *Journal of Managerial Psychology*, *22*(3), 309–328.

https://doi.org/10.1108/02683940710733115

Bakker, A. B., & Heuven, E. (2006). Emotional dissonance, burnout, and in-role performance

among nurses and police officers. *International Journal of Stress Management*, *13*(4),

423–440. https://doi.org/10.1037/1072-5245.13.4.423

Barnett, M. D., & Flores, J. (2016). Narcissus, exhausted: Self-compassion mediates the

relationship between narcissism and school burnout. *Personality and Individual

Differences*, *97*, 102–108. https://doi.org/10.1016/j.paid.2016.03.026

Basinska, B. A., Wiciak, I., & Dåderman, A. M. (2014). Fatigue and burnout in police officers:

the mediating role of emotions. *Policing: An International Journal of Police Strategies &

Management*, *37*(3), 665–680. https://doi.org/10.1108/pijpsm-10-2013-0105

Beaton, R. D., & Murphy, S. A. (1993). Sources of occupational stress among

firefighter/EMTs and firefighter/paramedics and correlations with Job-related

outcomes. *Prehospital and Disaster Medicine*, *8*(2), 140–150.

https://doi.org/10.1017/s1049023x00040218

Beaumont, E., Durkin, M., Martin, C. J. H., & Carson, J. (2016a). Measuring relationships

between self-compassion, compassion fatigue, burnout and well-being in student

counsellors and student cognitive behavioural psychotherapists: a quantitative

survey. *Counselling and Psychotherapy Research*, *16*(1), 15–23.

https://doi.org/10.1002/capr.12054

Beaumont, E., Durkin, M., Martin, C. J. H., & Carson, J. (2016). Compassion for others, self-

compassion, quality of life and mental well-being measures and their association with

compassion fatigue and burnout in student midwives: A quantitative

survey. *Midwifery*, *34*, 239–244. https://doi.org/10.1016/j.midw.2015.11.002

Berger, J.M., Singh, P., Khrimian, L., Morgan, D.A., Chowdhury, S., Arteaga-Solis, E., Horvath,

T.L., Domingos, A.I., Marsland, A.L., Yadav, V.K., Rahmouni, K., Gao, X., & Karsenty,

G., (2019). Mediation of the acute stress response by the skeleton. *Cell Metabolism, 30*,

1-13. https://doi.org/10.1016/j.cmet.2019.08.012

Barnard, L. K., & Curry, J. F. (2011). The Relationship of Clergy Burnout to Self-Compassion

and Other Personality Dimensions. *Pastoral Psychology*, *61*(2), 149–163.

https://doi.org/10.1007/s11089-011-0377-0

Bluth, K., & Eisenlohr-Moul, T. A. (2017). Response to a mindful self-compassion intervention

in teens: A within-person association of mindfulness, self-compassion, and emotional

well-being outcomes. *Journal of Adolescence*, *57*, 108–118.

https://doi.org/10.1016/j.adolescence.2017.04.001

Bollen, K. A. (1990). Overall fit in covariance structure models: Two types of sample size

effects. *Psychological Bulletin*, *107*(2), 256-259.

Bowlby, J. (1973). *Attachment and loss. Separation, anger and anxiety, Vol. 2*. London: The

Hogarth Press.

Bryant, R. A., Creamer, M., O'Donnell, M., Forbes, D., Alexander, C. M., Silove, D., Hadzi-

Palovic, D., (2017). Acute and chronic posttraumatic stress symptoms in the

emergence of PTSD. *JAMA Psychiatry 74*(2): 135-142. Retrieved from

https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2592319

Buddhaghosa, & Davids, C. R. (1975). *The Visuddhi-Magga of the Buddhaghosa*. London: Pali

Text Soc.

The Bureau of Labor Statistics, (2019). retrieved from

https://www.bls.gov/oes/current/oes332011.htm

Burgess, J., Duncan, M., Mallett, J., Lafleur, B., Littau, S., & Shiwaku, K. (2013).

International comparison of fire department injuries. *Fire Technology*, 1043-

1059.

Burger, K., & Samuel, R. (2016). The role of perceived stress and self-efficacy in

young people's life satisfaction: A longitudinal Ssudy. Retrieved from

https://link.springer.com/article/10.1007/s10964-016-0608-x

Cardeña, E., Classen, C., Koopman, C., & Spiegel, D. (1996). Review of the Stanford Acute

Stress Reaction Questionnaire (SASRQ). In B. H. Stamm (Ed.), *Measurement of stress,

trauma and adaptation* (pp. 293–297). Lutherville, MD: Sidran Press.

Cardeña, E., Koopman, C., Classen, C., Waelde, L. C., & Spiegel, D. (2000). Psychometric

properties of the Stanford Acute Stress Reaction Questionnaire (SASRQ): A valid and

reliable measure of acute stress. *Journal of Traumatic Stress*, *13*(4), 719–734.

https://doi.org/10.1023/a:1007822603186

Chiang, E. S., Baley, J., Ponder, J., & Padilla, M. A. (2016). Autonomy and firefighting:

Perceived competence and stress. *Journal of Occupational and Environmental

Medicine*, *58*(12), 1223–1230. https://doi.org/10.1097/jom.0000000000000894

Cohen J., Cohen P., West S., Aiken L. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.).* Mahwah, NJ: Lawrence Erlbaum Associates.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/6668417

Cole, D., & Preacher, K. (2014). Manifest variable path analy- sis: Potentially serious and misleading consequences due to uncorrected measurement error. *Psychological Methods*, *19*, 300–315.

Dapolonia, E. (2018). *Improvement in self-compassion predicts improvement in burnout but not in aggression among LEOs* (Unpublished master's thesis). Pacific University, Hillsboro, OR.

Demerouti, Bakker, A. B., Vardakou, I., & Kantas, A. (2003). The convergent validity of two burnout instruments: A multitrait-multimethod analysis. *European Journal of Psychological Assessment, 19*(1), 12-23. https://doi.org/10.1027//1015-5759.19.1.12

Demerouti, E., Mostert, K., & Bakker, A. B. (2010). Burnout and work engagement: A thorough investigation of the independency of both constructs. *Journal of Occupational Health Psychology*, *15*(3), 209–222. https://doi.org/10.1037/a0019408

Depue, R. A., & Morrone-Strupinsky, J. V. (2005). A neurobehavioral model of affiliative bonding: Implications for conceptualizing a human trait of affiliation. *Behavioral and Brain Sciences*, *28*(03). https://doi.org/10.1017/s0140525x05000063

Dev, V., Fernando, A. T., Lim, A. G., & Consedine, N. S. (2018). Does self-compassion mitigate the relationship between burnout and barriers to compassion? A cross-sectional quantitative study of 799 nurses. *International Journal of Nursing Studies*, *81*, 81–88. https://doi.org/10.1016/j.ijnurstu.2018.02.003

Dewa, C. S., Loong, D., Bonato, S., Thanh, N. X., & Jacobs, P. (2014). How does burnout affect physician productivity? A systematic literature review. *BMC Health Services Research*, *14*(1). https://doi.org/10.1186/1472-6963-14-325

Donoughe, K., Witestone, J., Gabler, H.C., (2012). Analysis of firetruck crashes and associated firefighter injuries in the United States. *Annals of Advances in Automotive Medicine, 56*, 69-76.

Eriksson, T., Germundsjö, L., Åström, E., & Rönnlund, M. (2018). Mindful self-compassion training reduces stress and burnout symptoms among practicing psychologists: A randomized controlled trial of a brief web-based intervention. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.02340

Ewert, C., Gaube, B., Caroline, F., & Geisler, M. (2018). Dispositional self-compassion impacts immediate and delayed reactions to social evaluation. *Personality and Individual Differences, 125*, 91-96.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160. https://doi.org/10.3758/brm.41.4.1149

Field, A. P. (2018). *Discovering statistics using Ibm Spss statistics*. London: SAGE Publications.

Finch, W. H., & French, B. F. (2015). *Latent variable modeling with R*. New York, NY: Routledge.

Flora, D. B. (2020). Your coefficient alpha is probably wrong, but which coefficient omega is right? A tutorial on using R to obtain better reliability estimates. *Advances in Methods and Practices in Psychological Science*, *3*(4), 484-501.

Ford, J., Klibert, J. J., Tarantino, N., & Lamis, D. A. (2016). Savouring and Self-compassion as

Protective Factors for Depression. *Stress and Health*, *33*(2), 119–128.

https://doi.org/10.1002/smi.2687

Freudenberger, H.J., 1974. Staff burnout. *Journal of Social Issues 30*:159–165.

Galla, B. M. (2016). Within-person changes in mindfulness and self-compassion predict

enhanced emotional well-being in healthy, but stressed adolescents. *Journal of*

Adolescence, *49*, 204–217. https://doi.org/10.1016/j.adolescence.2016.03.016

Garfin, D. R., Thompson, R. R., & Holman, E. A. (2018). Acute stress and subsequent health

outcomes: A systematic review. *Journal of Psychosomatic Research*, *112*, 107–113.

https://doi.org/10.1016/j.jpsychores.2018.05.017

Gilbert, P. (1989). *Human nature and suffering*. London: Psychology Press.

Gilbert, P. (2005). *Compassion and cruelty: A biopsychosocial approach.* In P. Gilbert (Ed.),

Compassion: Conceptualisations, research and use in psychotherapy (pp. 9–74).

London: Routledge.

Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis

and empirical review. Psychological Review, 136, 351–374.

Gracia-Gracia, P., & Oliván-Blázquez, B. (2017). Burnout and Mindfulness Self-Compassion in

Nurses of Intensive Care Units. *Holistic Nursing Practice*, *31*(4), 225–233.

https://doi.org/10.1097/hnp.0000000000000215

Griffin, S.C., (2014) *Economic evaluation of injury and injury prevention interventions in*

the U.S. fire service. (unpublished doctoral dissertation). University of Arizona,

Tucson.

Guidotti, T. L. (1992). Human factors in firefighting: ergonomic-, cardiopulmonary-, and

psychogenic stress-related issues. *International Archives of Occupational and*

Environmental Health, *64*(1), 1–12. https://doi.org/10.1007/bf00625945

Hall, S. J., Aisbett, B., Tait, J. L., Turner, A. I., Ferguson, S. A., & Main, L. C. (2016). The acute physiological stress response to an emergency alarm and mobilization during the day and at night. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4918669/

Hammen, C., Kim, E. Y., Eberhart, N. K., & Brennan, P. A. (2009). Chronic and acute stress and the prediction of major depression in women. *Depression and Anxiety*, *26*(8), 718–723. https://doi.org/10.1002/da.20571

Harvey, Lucille (2018) *Self-compassion: A moderator of the negative outcomes of stress* (Unpublished master's thesis). Bournemouth University. Bournemouth, UK.

Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behavioral Research*, *50*(1), 1-22.

Hayes, A. F., (2018a). *Introduction to mediation, moderation, and conditional process analysis: a regression-based approach*. New York: Guilford Press.

Hayes, A. F. (2018b). Partial, conditional, and moderated moderated mediation: Quantification, inference, and interpretation. *Communication Monographs*, *85*(1). https://doi.org/10.1080/03637751.2017.1352100

Hofmann, S. G., Grossman, P., & Hinton, D. E. (2011). Loving-kindness and compassion meditation: Potential for psychological interventions. *Clinical Psychology Review*, *31*(7), 1126–1132. https://doi.org/10.1016/j.cpr.2011.07.003

Hokanson, M., & Wirth, B., (2000). The critical incident stress debriefing process for the Los Angeles County Fire Department: Automatic and effective. *International Journal of Emergency Mental Health, 2*(4), 249-257.

Homan, K. J., & Sirois, F. M. (2017). Self-compassion and physical health: Exploring the roles

of perceived stress and health-promoting behaviors. *Health Psychology Open*, *4*(2),

205510291772954. https://doi.org/10.1177/2055102917729542

Hong, O., Chin, D., Phelps, S., Feld, J., & Vogel, S. (2012). Occupational Injuries, duty

status, and factors associated with injuries among firefighters. *Workplace

Health & Safety, 60*(12), 517-523.

Honkonen, T., Ahola, K., Pertovaara, M., Isometsä, E., Kalimo, R., Nykyri, E., … Lönnqvist, J.

(2006). The association between burnout and physical illness in the general population—

results from the Finnish Health 2000 Study. *Journal of Psychosomatic Research*, *61*(1),

59–66. https://doi.org/10.1016/j.jpsychores.2005.10.002

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:

Conventional criteria versus new alternatives. *Structural Equation Modeling: A

Multidisciplinary Journal*, *6*(1), 1-55.

IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM

Corp.

International Association of Black Professional Fire Fighters. (2019). Retrieved November 4,

2019, from http://iabpf.org/.

International Association of Women in Fire & Emergency Services. (2019). Retrieved November

4, 2019, from https://www.womeninfire.org/.

International EMS & Firefighters LGBTQ Pride Alliance. (2019). Retrieved November 4, 2019,

from https://www.iefpa.org/.

Jahnke, S., Poston, W., Haddock, C., Jitnarin, N., Hyder, M., & Horvath, C. (2012). The

health of women in the US fire service. *BMC Women's Health, 12*(39), 2-12.

Jayaratne, S. & Chess, W.A. (1983) Job satisfaction and burnout in social work. In: *Stress and Burnout in the Human Service Professions* (ed. B. A. Farber), pp. 129–141. Pergamon Press, NewYork.

Jennings, P. A. (2014). Early childhood teachers' well-being, mindfulness, and self-compassion in relation to classroom quality and attitudes towards challenging students. *Mindfulness*, *6*(4), 732–743. https://doi.org/10.1007/s12671-014-0312-4

Jo, S., & Park, J. (2013). The relationship between depression and post-traumatic stress disorder among firefighters. *Journal of Korean Society of Hazard Mitigation, 13*(5), 219-224.

Kahn, S., Woods, J., & Rae, L. (2014). Line of duty firefighter fatalities. *Journal of Burn Care & Research, 36*(1), 218-224.

Katsavouni, F., Bebetsos, E., Malliou, P., & Beneka, A. (2015). The relationship between burnout, PTSD symptoms and injuries in firefighters. *Occupational Medicine, 66*(1), 32-37. https://doi.org/10.1093/occmed/kqv144

Kaufmann, G. M., & Beehr, T. A. (1989). Occupational Stressors, Individual Strains, and Social Supports among Police Officers. *Human Relations*, *42*(2), 185–197. https://doi.org/10.1177/001872678904200205

Kaurin, A., Schönfelder, S., & Wessa, M. (2018). Self-compassion buffers the link between self-criticism and depression in trauma-exposed firefighters. *Journal of Counseling Psychology*, *64*(4), 453–462.

Kemper, K. J., Mcclafferty, H., Wilson, P. M., Serwint, J. R., Batra, M., Mahan, J. D., … Schwartz, A. (2019). Do Mindfulness and Self-Compassion Predict Burnout in Pediatric

Residents? *Academic Medicine*, *94*(6), 876–884.

https://doi.org/10.1097/acm.0000000000002546

Kimbrel, N. A., Flynn, E. J., Carpenter, G. S. J., Cammarata, C. M., Leto, F., Ostiguy, W. J., …

Gulliver, S. B. (2015). Internal consistency, test-retest reliability, and predictive validity

for a Likert-based version of the Sources of occupational stress-14 (SOOS-14)

scale. *Psychiatry Research*, *228*(3), 961–962.

https://doi.org/10.1016/j.psychres.2015.05.031

Kimbrel, N.A., Steffen, L.E., Meyer, E.C., Kruse, M.I., Knight, J., Zimering, R.T., Gulliver,

S.B., (2011). A revised measure of occupational stress for fire fighters: Psychometric

properties and relationship to PTSD, depression, and substance abuse. *Psychological

Services, 8*, 294–306.

Kim, H., Ji, J., & Kao, D. (2011). Burnout and physical health among social workers: A three-

year longitudinal study. *Social Work*, *56*(3), 258–268.

https://doi.org/10.1093/sw/56.3.258.

Kim, J. I., Park, H., & Kim, J.-H. (2018). The mediation effect of PTSD, perceived job stress and

resilience on the relationship between trauma exposure and the development of

depression and alcohol use problems in Korean firefighters: A cross-sectional

study. *Journal of Affective Disorders*, *229*, 450–455.

https://doi.org/10.1016/j.jad.2017.12.055.

Komarovskaya, I., Brown, A., Galatzer-Levy, I., Madan, A., Henn-Haase, C., Teater, J., .

. . Chemtob, C. (2014). Early physical victimization is a risk factor for

posttraumatic stress disorder symptoms among Mississippi police and firefighter

first responders to hurricane Katrina. *Psychological Trauma: Theory, Research,*

Practice, and Policy, 6(1), 92-96.

Khoozani, E. N., & Hadzic, M. (2010). Designing the human stress ontology: A formal

framework to capture and represent knowledge about human stress. *Australian*

Psychologist, *45*(4), 258–273. https://doi.org/10.1080/00050061003664811

Kline, R. B. (2012). *Principles and practice of structural equation modeling (3rd ed.).* New York,

NY: The Guilford Press.

Kuehl, K., Elliot, D., Goldberg, L., Moe, E., Perrier, E., & Smith, J. (2013). Economic

benefit of the PHLAME wellness programme on firefighter injury. *Occupational*

Medicine, 63, 203-209.

Kulbarsh, P., (2007). Critical incident stress. Retrieved January 01, 2017, from

http://www.officer.com/article/10249385/critical-incident-stress

Kyeong, L. W. (2013). Self-compassion as a moderator of the relationship between academic

burn-out and psychological health in Korean cyber university students. *Personality and*

Individual Differences, *54*(8), 899–902. https://doi.org/10.1016/j.paid.2013.01.001

Lambert, J., Benight, C., Harrison, E., & Cieslak, R. (2012). The firefighter coping self-

efficacy scale: Measure development and validation. *Anxiety, Stress & Coping,*

25(1), 79-91.

Lee, J. Y., Kim, S. Y., Bae, K. Y., Kim, J. M., Shin, I. S., Yoon, J. S., & Kim, S. W. (2018).

The association of gratitude with perceived stress and burnout among male firefighters in

Korea. *Personality and Individual Differences*, *123*, 205–208.

https://doi.org/10.1016/j.paid.2017.11.010

LeMoult, J., Humphreys, K., King, L., Colich, N., Price, A., Ordaz, S., & Gotlib, I. (2018).

Associations Among Early Life Stress, Rumination, Symptoms of Psychopathology, and

Sex in Youth in the Early Stages of Puberty: a Moderated Mediation Analysis. *Journal of Abnormal Child Psychology*. https://doi.org/10.1007/s10802-018-0430-x

Lesperance, M. (2017). *Critical Incident Stress Management for First Responders* (Unpublished master's thesis). Saint Mary-of-the-Woods College, Saint Mary-of-the-Woods, Indiana.

Lewis, A. (2013) *Mindfulness, self-compassion, and leadership in wild land firefighting*. (Unpublished doctoral dissertation). Oregon State University, Oregon.

Lin, P., Wang, J., Shih, D., Kuo, H., Liang, W. (2019). The interaction effects of burnout and job support on peptic ulcer disease (PUD) among firefighters and policemen. *International Journal of Environmental Research and Public Health. 16*, 2369

Liotti, G., & Gilbert, P. (2010). Mentalizing, motivation, and social mentalities: Theoretical considerations and implications for psychotherapy. *Psychology and Psychotherapy: Theory, Research and Practice*. https://doi.org/10.1348/147608310x520094

Ludwig, G., (2010). Firefighter/paramedic – a most stressful job. *Firehouse. 35* (6), 38.

Lourel, M., Abdellaoui, S., Chevaleyre, S., Paltrier, M., & Gana, K. (2008). Relationships between psychological job demands, job control and burnout among firefighters. *North American Journal of Psychology*, *10*(3), 489–496.

Lusa, S., Häkkänen, M., Luukkonen, R., & Viikari-Juntura, E. (2002). Perceived physical work capacity, stress, sleep disturbance and occupational accidents among firefighters working during a strike. *Work & Stress*, *16*(3), 264–274. https://doi.org/10.1080/02678370210163301

MacHale, S.M., Cavanagh, J.T., Bennie, J., Carroll, S., Goodwin, G.M., Lawrie, S.M., (1998). Diurnal variation of adrenocortical activity in chronic fatigue syndrome. *Neuropsychobiology*. **38** (4): 213–7.

Mădălina-Adriana, C., & Mirela, B. (2011). Organizational stress and its impact on work

   performance. *Annals of Faculty of Economics*, *1*, 333–337.

Main, L., Raines, J., Gatta, P.D., Wolkow, A., Snow, R., Aisbett, B., (2012). The stress of

   firefighting: Implications for long-term health outcomes. *Proceedings of Bushfire*

   CRC & AFAC 2012 Conference Research Forum.

Makara-Studzińska, M., Golonka, K., & Izydorczyk, B. (2019). Self-efficacy as a moderator

   between stress and professional burnout in firefighters. *International Journal of*

   Environmental Research and Public Health, 16(2), 183.

https://doi.org/10.3390/ijerph16020183

McDonald, R. P. (1999). Test theory: A unified treatment. L. Mahway, NJ: Erlbaum Associates.

Morris, C. E., & Chander, H. (2018). The impact of firefighter physical fitness on job

   performance: A review of the factors that influence fire suppression safety and

   success. *Safety*. *4*, 60. Retrieved from https://www.mdpi.com/2313-576X/4/4/60/htm

Montero-Marín, J., Demarzo, M. M. P., Stapinski, L., Gili, M., & García-Campayo, J. (2014).

   Perceived stress latent factors and the burnout subtypes: A structural model in dental

   students. *PLoS ONE*, *9*(6). https://doi.org/10.1371/journal.pone.0099765

Montero-Marin, J., Zubiaga, F., Cereceda, M., Demarzo, M. M. P., Trenc, P., & Garcia-

   Campayo, J. (2016). Burnout Subtypes and Absence of Self-Compassion in Primary

   Healthcare Professionals: A Cross-Sectional Study. *Plos One*, *11*(6).

   https://doi.org/10.1371/journal.pone.0157499

Murphy, S. A., Beaton, R. D., Pike, K. C., & Cain, K. C. (1994). Firefighters and

   paramedics: years of service, job aspirations, and burnout. *American Association of*

   Occupational Health Nurses Journal, 42(11):534-40. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/7695798

Neff, K. D. (2003a). Self-compassion: An alternative conceptualization of a healthy attitude

toward oneself. *Self and Identity, 2*, 85–102.

Neff, K. D. (2003b). Development and validation of a scale to measure self-compassion.

Self and Identity, 2, 223–250.

National Fire Protection Association (2019), retrieved from: https://www.nfpa.org/News-and-

Research/Data-research-and-tools/Emergency-Responders/US-fire-department-profile

National Volunteer Fire Council (NVFC), (2012). Suicide in the fire and emergency services

adopting a proactive approach to behavioral health awareness and suicide prevention.

National Volunteer Fire Council, Greenbelt, MD.

Oyeyemi, G. M., Bukoye, A., & Akeyede, I. (2015). Comparison of outlier detection procedures

in multiple linear regressions. *American Journal of Mathematics and Statistics*, *5*(1), 37-

41.

Perera, M. J., Brintz, C. E., Birnbaum-Weitzman, O., Penedo, F. J., Gallo, L. C., Gonzalez, P., . .

. Llabre, M. M. (2017). Factor structure of the Perceived Stress Scale-10 (PSS) across

English and Spanish language responders in the HCHS/SOL Sociocultural Ancillary

Study. *Psychological Assessment, 29*(3), 320-328. https://doi.org/10.1037/pas0000336

Peterson, U., Demerouti, E., Bergström, G., Samuelsson, M., Åsberg, M., & Nygren, A. (2008).

Burnout and physical and mental health among Swedish healthcare workers. *Journal of*

Advanced Nursing, *62*(1).

Popa-Velea, O. (2014). Alexithymia, perceived stress, perceived social support and burnout at

physicians attending end-of-life cases: The impact of balint work. *Journal of*

Psychosomatic Research, *76*(6), 512. https://doi.org/10.1016/j.jpsychores.2014.03.073

Poston, W.S.C., Haddock, C.K., Jahnke, S.A., Jitnarin, N., Day, R.S., & Daniels, I.D.,

 (2014). Health disparities among racial and ethnic minority firefighters. *Journal*

 of Health Disparities Research and Practice, 7(5), 105-129.

Pruessner, J. C., Hellhammer, D. H., & Kirschbaum, C. (1999). Burnout, perceived stress, and

 cortisol responses to awakening. *Psychosomatic Medicine*, *61*(2), 197–204.

 https://doi.org/10.1097/00006842-199903000-00012

Qualtrics, (2019). Qualtrics [Computer software]. Provo, Utah: Qualtrics. Retrieved from

 https://www.qualtrics.com

Queiros, C., Kaiseler, M., & da Silva, A.L., (2013). Burnout as predictor of aggressivity among

 police officers. *European Journal of policing Studies, 1*(2), 110-135.

Raes, F., Pommier, E., Neff, K. D., & Gucht, D. V. (2010). Construction and factorial validation

 of a short form of the Self-Compassion Scale. *Clinical Psychology &*

 Psychotherapy, *18*(3), 250–255. https://doi.org/10.1002/cpp.702

R Core Team (2019). R: A language and environment for statistical computing. R

 Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Rey, L., Extremera, N., & Pena, M. (2016). Emotional competence relating to perceived stress

 and burnout in Spanish teachers: a mediator model. *PeerJ*. Retrieved from:

 https://www.ncbi.nlm.nih.gov/pubmed/27280077

 https://doi.org/10.7287/peerj.2087v0.1/reviews/2

Richardson, D. A., Jaber, S., Chan, S., Jesse, M. T., Kaur, H., & Sangha, R. (2016). Self-

 compassion and empathy: Impact on burnout and secondary traumatic stress in

 medical training. *Open Journal of Epidemiology*, *06*(03), 161–166.

 https://doi.org/10.4236/ojepi.2016.63017

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. *Journal of Statistical Software, 48*(2), 1-36.

Russell, L. M., Cole, B. M., & Jones, R. J. (2014). High-risk occupations: How leadership, stress, and ability to cope influence burnout in law enforcement. *Journal of Leadership, Accountability and Ethics*, *11*(3).

Samaie, G., & Farahani, H. (2011). Self-compassion as a moderator of the relationship between rumination, self-reflection and stress. *Procedia - Social and Behavioral Sciences*, *30*, 978–982. https://doi.org/10.1016/j.sbspro.2011.10.190

Schaible, L. M., & Six, M. (2016). Emotional strategies of police and their varying consequences for burnout. *Police Quarterly*, *19*(1), 3–31. https://doi.org/10.1177/1098611115604448

Šinkovec, H., Geroldinger, A., & Heinze, G. (2019). Bring More Data!—A Good Advice? Removing Separation in Logistic Regression by Increasing Sample Size. *International Journal of Environmental Research and Public Health*, *16*(23), 4658.

Smith, T. D., Hughes, K., Dejoy, D. M., & Dyal, M. A. (2018). Assessment of relationships between work stress, work-family conflict, burnout and firefighter safety behavior outcomes. *Safety Science*, *103*, 287–292. https://doi.org/10.1016/j.ssci.2017.12.005

Smoktunowicz, E., Baka, L., Cieslak, R., Nichols, C. F., Benight, C. C., & Luszczynska, A. (2015). Explaining counterproductive work behaviors among police officers: The indirect effects of job demands are mediated by job burnout and moderated by job control and social support. *Human Performance*, *28*(4), 332–350. https://doi.org/10.1080/08959285.2015.1021045

Spikins, P. A., Rutherford, H. E., & Needham, A. P. (2010). From homininity to humanity:

Compassion from the earliest archaics to modern humans. Time and Mind, 3, 303–326.

Stanley, I., Hom, M., Hagan, C., & Joiner, T. (2015). Career prevalence and correlates of suicidal thoughts and behaviors among firefighters. *Journal of Affective Disorders, 187*, 163-171.

Stoliker, B. E., & Lafreniere, K. D. (2015). The influence of perceived stress, loneliness, and learning burnout on university students' educational experience. *College Student Journal*, 140–160.

Story, L. B., & Repetti, R. (2006). Daily occupational stressors and marital behavior. *Journal of Family Psychology*, *20*(4), 690–700. https://doi.org/10.1037/0893-3200.20.4.690

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics (7ᵗʰ ed.)*. Boston, MA: Pearson.

Taylor, J. (2015) Psychometric analysis of the ten-item Perceived Stress Scale. *Psychological Assessment, 27* (1), 90–101 Retrieved from https://pdfs.semanticscholar.org/b9a7/54194cb4130cf36d8927514e7bcf7a20894c.pdf

Terry, M. L., Leary, M. R., & Mehta, S. (2013). Self-compassion as a buffer against homesickness, depression, and dissatisfaction in the transition to college. *Self and Identity*, *12*(3), 278–290. https://doi.org/10.1080/15298868.2012.667913

Thomas, D., Fox, R., & Miller, C. (2015). Voices from the field: Wildland fire managers and high-reliability organizing mindfulness. *Society & Natural Resources, 28*, 825-838.

Van Dam, N. T., Sheppard, S. C., Forsyth, J. P., & Earleywine, M. (2011). Self-compassion is a better predictor than mindfulness of symptom severity and quality of life in mixed

anxiety and depression. *Journal of Anxiety Disorders*, *25*(1), 123–130.

https://doi.org/10.1016/j.janxdis.2010.08.011

Vaulerin, J., D'Arripe-Longueville, F., Emile, M., & Colson, S. S. (2016a). Physical exercise and

burnout facets predict injuries in a population-based sample of French career

firefighters. *Applied Ergonomics*, *54*, 131–135.

https://doi.org/10.1016/j.apergo.2015.12.007

Vaulerin, J., Colson, S. S., Emile, M., Scoffier-Mériaux, S., & D'Arripe-Longueville, F. (2016b).

The Big Five personality traits and French firefighter burnout. *Journal of Occupational*

and Environmental Medicine, *58*(4). https://doi.org/10.1097/jom.0000000000000679

Vinnikov, D., Tulekov, Z., Akylzhanov, A., Romanova, Z., Dushpanova, A., & Kalmatayeva, Z.,

(2019, March 14). Age and work duration do not predict burnout in firefighters.

Retrieved from https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-

6643-2

Woodruff, S. C., Glass, C. R., Arnkoff, D. B., Crowley, K. J., Hindman, R. K., & Hirschhorn, E.

W. (2013). Comparing self-compassion, mindfulness, and psychological inflexibility as

predictors of psychological health. *Mindfulness*, *5*(4), 410–421.

https://doi.org/10.1007/s12671-

013-0195-9

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to

rapidity of habit-formation. *Journal of Comparative Neurology and*

Psychology - Wiley Online Library. Retrieved from

https://onlinelibrary.wiley.com/doi/abs/10.1002/cne.920180503

Zessin, U., Dickhäuser, O., & Garbade, S. (2015). The Relationship Between Self-Compassion

and Well-Being: A Meta-Analysis. *Applied Psychology: Health and Well-Being*, *7*(3),

340–364. https://doi.org/10.1111/aphw.12051

Zinbarg, R. E., Revelle, W., Yovel, I., and Li, W. (2005). Cronbach's α, Revelle's β, and

McDonald's ωH: Their relations with each other and two alternative conceptualizations

of reliability. Psychometrika, 70(1), 123-133.