

Is humor the best medicine? The buffering effect of coping humor on traumatic stressors in firefighters

MICHAEL SLITER*, ARON KALE AND ZHENYU YUAN

Department of Psychology, Indiana University–Purdue University Indianapolis, Indianapolis, Indiana, U.S.A.

Summary

Although our understanding of workplace stressors has grown across the past 30 years, this research has generally ignored traumatic workplace stressors. This is a serious omission, given that many occupations (e.g., firefighters, emergency medical technicians, and police) are frequently exposed to traumatic stressors. As such, the first purpose of the current study was to examine the impact of exposure to traumatic stressors in firefighters. Post-traumatic stress disorder (PTSD), burnout, and absenteeism were investigated as cognitive, affective, and behavioral outcomes. Additionally, we sought to investigate coping humor as a mechanism for dealing with traumatic stressors. We frame these expectations by discussing humor from a transactional theory of emotion/coping perspective, as well as through humor's social bonding feature and its ability to combat the physiological impact of stressors. We surveyed 179 firefighters at two time points on relevant variables, with dependent variables collected at Time 2. The results indicated that traumatic events significantly predicted burnout, PTSD, and absenteeism and that coping humor buffered this relationship for burnout and PTSD. We discuss the implications of these findings and call for more research investigating occupations in which traumatic stressors are a concern, as well as for more integration of humor into the workplace literature. Copyright © 2013 John Wiley & Sons, Ltd.

Keywords: humor; coping; traumatic stressors; acute stressors; absenteeism

Virtually every employee, regardless of occupation, is exposed to workplace stressors on a daily basis. These stressors are a constant part of the work environment and are therefore considered to be chronic. Examples of such chronic stressors include interpersonal conflict, organizational constraints, and workload (Spector & Jex, 1998). Chronic stressors have been shown to have a robust, negative impact on various job outcomes, including reduced job satisfaction and performance (Sullivan & Bhagat, 1992), increased physical symptoms (Cooper, Kirkcaldy, & Brown, 1994), and increased burnout (Jackson & Maslach, 1982).

Although nearly all jobs contain some level of chronic stressors, some jobs also expose employees to *traumatic stressors*. Firefighters, police officers, and emergency medical technicians are examples of employees who may have to experience traumatic stressors with relative frequency (van der Ploeg, Dorresteijn, & Kleber, 2003). This type of stressor might include exposure to danger, accidents, and/or dead/dying people. Despite the fact that millions of U.S. employees work in such “at risk” jobs, relatively little research has been conducted to determine the effects of these traumatic stressors. As such, the first purpose of the current study is to replicate and extend findings on the impact of traumatic stressors within a particular occupation—firefighters.

In addition, we seek to determine mechanisms that could potentially buffer the impact of these traumatic stressors. Namely we seek to examine humor as a method for coping with these stressors. Humor has long been thought to have curative properties, with psychologists as early as Freud (1960) touting that humor may be the most effective of all coping mechanisms. However, relatively little empirical research has been conducted to empirically test this proposition, particularly research involving the workplace. As such, the second goal of the current study is to examine whether humor is an effective coping mechanism for dealing with traumatic workplace stressors.

*Correspondence to: Michael Sliter, Department of Psychology, Indiana University–Purdue University Indianapolis, 402N. Blackford St., LD126P, Indianapolis, Indiana 46202, U.S.A. E-mail: msliter@iupui.edu

Traumatic workplace stressors

One useful conceptualization of workplace stressors is the chronic–acute distinction (Beehr, Jex, Stacy, & Murray, 2000). Chronic stressors are low in intensity and frequently experienced by employees, whereas acute stressors are relatively intense but temporary in nature, often being linked to specific, critical events (Beehr et al., 2000; Day & Livingstone, 2001; van der Ploeg et al., 2003). The severity of acute stressors can range from someone slamming a door in a bookseller's face (Beehr et al., 2000) to firefighters' involvement in the 9/11 World Trade Center disaster (Bacharach & Bamberger, 2007). Along this continuum of severity, traumatic stressors are events that cause or pose a threat to the lives and physical integrity of the self and others (American Psychiatric Association, 1994), such as combat-related traumatic events for soldiers (Schaubroeck, Riolli, Peng, & Spain, 2011). As such, traumatic stressors can be considered to be a special case of acute stressors, being located on the high-intensity end of the acute stressor spectrum.

Furthermore, it is worth noting that the *job-specific* nature of traumatic stressors is usually implied in the measurement, as opposed to the generic nature of chronic stressors (e.g., workload; Beehr et al., 2000). That is, specific exposures to traumatic stressors differ based on occupations. For instance, firefighters might be exposed to fires, car accidents, and people who are injured/dead, whereas police officers might be exposed in shootings and violent injuries. However, although the measurement of these stressors may be specific to an occupation, these stressors share commonalities regardless of job, both in terms of the themes of the stressors (e.g., threat to lives and physical integrity) and their potential negative effects. Indeed, existing studies of police officers (Stephens & Long, 2000), firefighters (Bacharach & Bamberger, 2007; Bacharach, Bamberger, & Doveh, 2008), and military personnel (Day & Livingstone, 2001; Vinokur, Pierce, Lewandowski-Romps, Hobfoll, & Galea, 2011) show that traumatic stressors within these jobs have detrimental effects on psychological well-being. Considering the potential effects of traumatic workplace stressors on both personal and job-related outcomes, it is evident that research needs to more thoroughly investigate the outcomes of these stressors.

Traumatic workplace stressors and post-traumatic stress disorder, burnout, and absenteeism

In the current study, we seek to examine the relationship between traumatic stressors and three cognitive, affective, and behavioral outcomes: post-traumatic stress symptoms (cognitive and behavioral), burnout (cognitive and affective), and absenteeism (behavioral). Post-traumatic stress disorder (PTSD) consists of distressing cognitive and behavioral symptoms that involve the re-experiencing of the trauma, avoidance and numbing (e.g., not thinking about the events or avoiding the subsequent emotions), and increased arousal (American Psychiatric Association, 1994). Two meta-analyses showed that the number of potentially traumatic events (PTEs) was an important risk factor for PTSD (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). More specifically, PTEs have been shown to be associated with PTSD in police officers (Stephens & Long, 2000), forensic doctors (van der Ploeg et al., 2003), and air force personnel (Vinokur et al., 2011). However, the impact of traumatic stressors on PTSD symptoms in firefighters is less consistent. Despite studies demonstrating the link from traumatic stressors to PTSD (Bacharach & Bamberger, 2007; Bacharach et al., 2008), some studies failed to find such a significant relationship in firefighters (Beaton, Murphy, Johnson, Pike, & Corneil, 1999; Meyer et al., 2012). Therefore, the effect of traumatic stressors on PTSD merits a closer examination.

Burnout is an affective and cognitive outcome characterized by exhaustion and disengagement from work (Demerouti, Bakker, Vardakou, & Kantas, 2003) and has been linked to numerous workplace chronic stressors (Lee & Ashforth, 1996; Schaufeli, Bakker, & Van Rhenen, 2009). The link between traumatic stressors and burnout is more tenuous in the extant research, but we do expect a positive relationship between these variables. Studies on military personnel's exposure to war (Vinokur et al., 2011) and forensic doctors' experience of tragic stressors (van der Ploeg et al., 2003) provided support for the idea that traumatic stressors may be associated with burnout. In the current study, we aim to replicate the relationship between traumatic stressors and burnout in firefighters.

Existing trauma studies tend to focus on affective and cognitive outcomes (e.g., PTSD and burnout). However, the study of the detrimental effects of traumatic stressors should also be extended to work-related behavioral outcomes, particularly absenteeism. Research in this area, however, is sparse and inconclusive. The only recent study attempting to link traumatic stressors to absenteeism was conducted by Biron and Bamberger (2012), who found no empirical support for the traumatic stress-absenteeism relationship in transit workers. However, on the basis of the research on traumatic stressors, behavioral avoidance is a likely consequence of experiencing traumatic stressors (Richards, Lovell, & Marks, 1994). That is, people might not only experience the *cognitive* avoidance that characterizes PTSD but they may also *behaviorally* avoid work—consciously or unconsciously—to distance them from the workplace as a protective strategy (Biron & Bamberger, 2012; Leiter, 1991) or may be absent because of the psychosomatic symptoms related to the experience of stressors (Biron & Bamberger, 2012). In doing so, they can minimize exposure to traumatic stressors (Humphrey, Nahrgang, & Morgeson, 2007) and their associated outcomes (Breslin et al., 2007; Hendrix & Spenser, 1989). Therefore, we expect traumatic stressors to be positively related to absenteeism. With the aforementioned being considered, we propose the following:

Hypothesis 1: Traumatic workplace stressors will be positively related to PTSD.

Hypothesis 2: Traumatic workplace stressors will be positively related to burnout.

Hypothesis 3: Traumatic workplace stressors will be positively related to absenteeism.

Humor as a coping mechanism

Given the potential costs of traumatic stressors in the workplace, it is important to examine individual differences that might protect employees from their negative effects. Specifically, we seek to examine whether humor is an effective coping mechanism for dealing with traumatic workplace stressors. Before expanding on how humor could serve as an effective coping mechanism, however, it is necessary to first define the construct of humor as used in the current study. The term “humor” has been used, measured, and researched in a variety of ways, including trait humor, generation of humor, humor appreciation, and laughter (e.g., Warnars-Kleverlaan, Oppenheimer, & Sherman, 1996). In the current study, we focused generally on trait humor (sometimes called “sense of humor”), which can be defined as the propensity to create and appreciate humorous stimuli (Martin & Lefcourt, 1984). More specifically, we were interested in the use of *coping humor*, which is defined as the trait propensity to utilize humor as a method for coping with stressful or demanding situations (Chen & Martin, 2007; Martin & Lefcourt, 1983). Coping humor is conceptually distinct from other resilience-related traits, such as optimism (the inclination to expect favorable life outcomes) or positive affectivity (the tendency to experience positive emotions, such as feeling enthusiastic or energetic), as it focuses on the use of a particular behavioral strategy rather than on mood tendencies (Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992).

The notion that humor is a valuable coping mechanism is popular in our society, and past research has also generally supported the conclusion that humor can combat the effects of stress (Martin & Lefcourt, 1983; Moran & Massam, 1997; Overholser, 1992). Indeed, there is some empirical evidence supporting the notion that humor can be a valuable buffer against the negative effects of stressors that is tangentially related to the workplace. For instance, one study investigating the relationship between humor and coping with stress in the Israel Defense Forces found that trait humor (as rated by peers) was positively related to performance under stress (Bizi, Keinan, & Beit-Hallahmi, 1988). Another study suggested that sense of humor is related to lower levels of loneliness and depression in addition to higher self-esteem in college students experiencing significant levels of life stress (Overholser, 1992). Finally, another study conducted using students suggested that sense of humor moderates the relationship between stressors and mood disturbance such that subjects with low-humor scores experienced greater levels of mood disturbance in the face of negative life events (Martin & Lefcourt, 1983).

Although there is empirical evidence that humor *can* buffer the effects of some stressors, the *why* of this buffering effect is still unclear. Multiple explanations exist regarding how humor achieves this end, including positive reinterpretation, social bonding, and physiological effects. Each will briefly be discussed in turn. First, according to the transactional theory of emotion and coping (Folkman & Lazarus, 1988), the stress process involves the relationship between a person and the environment (stressor), which can be appraised as exceeding his or her resources and as threatening his or her well-being. That is, a stressor—a traumatic stressor, in our case—elicits either a positive or negative emotional response. This emotional response is interpreted as taxing or not (primary appraisal), and the situation is subsequently reappraised (secondary appraisal). During secondary appraisal, a person evaluates their internal/external coping options, with the goal of creating a more positive environment, and reducing the negative effects of the environment.

A key component of this theory is that both the primary and secondary appraisal processes are contingent on emotional responses. Therefore, humor—as a coping mechanism—can be particularly important to this process. Research has shown that individuals high in coping humor are likely to interpret, experience, and react to environmental stressors in a more positive manner than individuals low on humor (Kuiper, Grimshaw, Leite, & Kirsh, 2004). Simply put, individuals high in coping humor tend to interpret stressful events in a more positive light. Through this more positive interpretation of events, and through altering the emotions elicited by the environment, humor can buffer against the negative effects of traumatic stressors.

Additionally, humor has been recognized as a useful tool for facilitating social bonding. That is, individuals high in humor tend to report lower levels of loneliness and are often perceived as more likeable and socially attractive than their low-humor counterparts (Wanzer, Booth-Butterfield, & Booth-Butterfield, 1996). The increased likeability associated with individuals high in humor assists in the creation of interpersonal relationships, which in turn can lead to an increased sense of belonging and social support (Garrick, 2006). Indeed, research suggests that using humor to cope with a difficult situation can build rapport among both nurses and their patients, indicating that coping humor might be linked to social support (Wanzer, Booth-Butterfield, & Booth-Butterfield, 2005). Perceived social support has long been considered a key factor in determining how well an individual copes with stress (Thoits, 1995; Watson, Matthews & Allman, 2007), and the use of humor might help individuals to build valuable social relationships.

Finally, the physiology of humor has also been theorized to help buffer the effects of stress. The physical effects of using and experiencing humor have been found to be similar to those of exercise in that they can produce a relaxation effect (Moran & Massam, 1997). In other words, acknowledging and engaging in an act of humor can facilitate relaxation. When a person laughs, the pituitary gland produces endorphins, which act as natural pain killers and create an effect in the body similar to that of opiates (Berk, 1994). These physical effects may not have direct relevance to the emergency context, but they indicate that humor and laughter can contribute to feelings of well-being and add to the contention that humor may help buffer against the effects of stress (Moran & Massam, 1997).

Hypotheses of the buffering effects of humor

On the basis of the combination of past theory and research, we propose that humor will act as a mechanism for coping with stress and will buffer against the negative outcomes assessed in the present study: PTSD, burnout, and absenteeism. As these outcomes are cognitive, affective, and behavioral in nature, we will discuss each buffering expectation in turn.

Post-traumatic stress disorder manifests primarily as a cognitive outcome (re-experiencing trauma and cognitive avoidance) with some behavioral components (avoiding stimuli that elicit the negative memories). As such, humor should act to buffer the traumatic stressor–PTSD relationship by affecting the cognitive appraisal of traumatic events. People who are high in coping humor, according to the transactional model of coping, should appraise traumatic stressors as less negative than people who are low in coping humor (Kuiper & Nicholl, 2004). These

employees will be less likely to ruminate over, and re-experience, these events through use of humor; past research has shown that, along with positive reinterpretation, individuals who use adaptive forms of humor (e.g., coping humor) are less likely to ruminate about stressful life events (Olson, Hugelshofer, Kwon, & Reff, 2005). In fact, literature on post-traumatic growth has shown that people who use humor and other adaptive coping strategies (e.g., positive reinterpretation) to cope with difficult life events are more likely to grow—or experience positive outcomes—as a result of these events (Armeli, Gunthert, & Cohen, 2001). Growth, here, refers to a better outlook on life (e.g., appreciation of what one has), feelings of personal strength, and feelings of self-reliance—primarily cognitive outcomes. On the basis of this theory and past research, we propose the following:

Hypothesis 4: Humor will buffer the relationship between traumatic events and PTSD, such that the relationship between traumatic events and PTSD will be weaker for those who are high in coping humor.

Burnout is a potential affective (exhaustion) and cognitive (disengagement) outcome of traumatic stressors. As such, we can once again frame the buffering effect of coping humor by using the transactional model of emotion and coping. As discussed earlier, use of humor in the face of a traumatic event can have cognitive benefits, primarily through reappraisal, which can affect the likelihood of people becoming disengaged from work. That is, if traumatic stressors are appraised as less stressful for people high in coping humor, then they will have less of a reason for cognitively distancing themselves from the job to cope with these stressors. In terms of the affective portion of burnout, the transactional model can be applied to coping humor from an emotional perspective, as well. Per this model, initial appraisal of an environmental stressor is understood through emotional manifestation. That is, traumatic stressors should elicit emotions of sadness, anger, or fear, which would impact the primary appraisal of the stressor. At the point of secondary appraisal, a person works out how to best deal with the situation, and some people would choose coping humor, which is an emotion-based coping strategy. The use of this emotion-based strategy should ameliorate the impact of traumatic stressors on affective outcomes—coping humor will result in fewer negative emotions and more positive emotions as a result of exposure to traumatic stressors. Taken together, we posit the following:

Hypothesis 5: Humor will buffer the relationship between traumatic stressors and burnout, such that the relationship between traumatic stressors and burnout will be weaker for those who are high in coping humor.

Finally, absenteeism is potentially a behavioral outcome of traumatic stressors, and both the social and physiological benefits of humor point to coping humor as a possible buffer of the traumatic stressor-absenteeism relationship. Given the social bonding features of the workplace, coping humor might lead to development of stronger interpersonal relationships (Garrick, 2006), and employees might be less likely to be absent from work, even in the face of traumatic stressors. Research by Uden (1996) found that belonging support (i.e., how well people get along) and a supportive environment (i.e., camaraderie and a relaxed work environment) were associated with lower levels of absenteeism. In the context of traumatic stressors, employees who use coping humor, particularly in a group context, might be less likely to be absent because this humor creates a supportive environment.

In addition to a positive social bonding effect, using humor for coping can have a positive physiological effect. Absenteeism is sometimes explained using the psychosomatic model of stress (Biron & Bamberger, 2012; Hendrix & Spenser, 1989), where stressors lead to physiological symptoms, which subsequently impact absenteeism. It is relatively well established that exposure to traumatic stressors can impact physical health (e.g., Friedman & Schnurr, 1995), and coping humor—through its positive physiological effects (Moran & Massam, 1997)—could potentially lessen the symptoms associated with stressors and therefore the likelihood of illness-related absenteeism. With all this information, we propose the following:

Hypothesis 6: Humor will buffer the relationship between traumatic events and absenteeism, such that the relationship between traumatic events and absenteeism will be weaker for those who are high in coping humor.

Method

Research context

Firefighters who participated in this study were from a large, Midwestern city. Because of budgetary issues, few firefighters have been hired across the past 10 or so years, which results in older, but more experienced, fire personnel. Represented in the current study are three job types: pumper, hook and ladder, and rescue squad. Pumper employees are primarily responsible for fire suppression, whereas hook and ladder employees are primarily responsible for victim rescue. Rescue squad personnel are first responder units, and respond to fires, medical emergencies, and car accidents.

The first of two waves of surveys was sent to participants in mid-January, which, in the Midwest, translates to large amounts of snowfall. This means that this is a busier time for firefighters, as they will have to respond to more calls related to the weather, such as car accidents, injuries (e.g., falling on ice) and house fires (e.g., space heaters, fireplaces, and furnace issues). As such, during the first survey, firefighters were likely exposed to more traumatic stressors than they would have been if the survey were given in the summer. No major events took place during the collection of this data that were unique to the fire department.

Participants and procedures

Firefighters were recruited to participate in this grant-funded study. In order to facilitate participation, the Fire Chief issued a formal departmental order, encouraging participation and ensuring confidentiality. For Time 1, a total of 685 survey packets were sent to the home addresses of all firefighters working in suppression (i.e., 24-hour shift work). The packets included a letter from the Chief, an informed consent document, the survey, and a postage-paid return envelope. A link to an internet survey was also provided in case the participant would prefer filling out the survey online. A total of 208 firefighters participated in Time 1 and were provided with a \$15 gift card as an incentive.

Three months later, the second wave of surveys was sent out, following the same procedure as Time 1. A total of 179 usable surveys were returned for Time 2, wherein each participant received a \$25 incentive for their continued participation. Overall, the response rate was 29 percent. The final group of participants were all male, with an average age of 48.0 years ($SD = 6.66$). The majority of participants were Caucasian (79 percent) and had been employed as a firefighter for an average of 20.9 years ($SD = 6.91$). Most participants were ranked as a firefighter (60 percent), although many lieutenants (27 percent) and higher ranks participated.

Measures (Time 1)

Traumatic stressors

Traumatic workplace stressors were measured using a traumatic stressors scale that was developed specifically for firefighters by Allen (1995). This scale was developed by the author meeting with focus groups of firefighters who described common traumatic stressors that they routinely experienced. On the basis of their responses, the author created 17 items that detail different acutely stressful events. Respondents are asked to think about the last month and report how often each event has occurred, ranging from *never* (1) to *extremely often* (5), and a mean score was created from these responses to approximate the number of PTEs a person experiences. Example items include “A serious car accident causing death or injury,” “A large fire causing death or injury,” and “An event that placed you in danger of death or great injury.” Internal consistency is inappropriate for measures of disparate events.

Coping humor

Propensity to cope using humor was measured using the Coping Humor Scale (Martin & Lefcourt, 1983). This 7-item scale ($\alpha = .71$) assesses the degree to which people use humor as a means for dealing with stressful experiences.

Example items include “I usually look for something comical to say when I am in tense situations” and “I can usually find something to laugh or joke about even in trying situations.” Items were rated on a 4-point agreement scale.

Measures (Time 2)

Burnout

Burnout was measured using the Oldenburg Burnout Inventory (Demerouti et al., 2003). Participants were asked to think about the past month and rate each statement along a 5-point Likert scale, ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The scale consists of two dimensions: disengagement (“Over time, one can become disconnected from this type of work”) and exhaustion (“There are days when I feel tired before I arrive at work”). As these dimensions were highly correlated ($r = .64$), and a good-fit confirmatory factor analysis indicated a single factor solution, we computed a composite burnout score by summing all items across the two dimensions ($\alpha = .86$).

Post-traumatic stress

Post-traumatic stress was assessed with the Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979). The IES (15 items; $\alpha = .89$) was designed to assess symptoms of intrusion and avoidance in response to traumatic incidences. Items were written to assess both intrusion (e.g., “I thought about it when I didn’t mean to”) and avoidance (e.g., “I tried not to think about it”). Participants were asked to use the past month as a time frame for assessing these symptoms, and the items were rated on a 5-point frequency scale (1 = *not at all* and 5 = *very often*).

Absenteeism

Data on absenteeism were obtained directly from management of the fire department. Archival records data on absenteeism (i.e., the number of days missed) were provided for each of the 179 participants. The number of days missed was counted by halves; that is, firefighters could receive a 0.5 missed day if half of their shift was missed. Three months of this data was released following the first wave of data collection, and it was matched to the employee survey data. This measure does not include days in which employees missed work because of an on-the-job injury.

Control variables

Two control variables were used for the current study: work experience and negative affectivity (NA). As years of experience likely relate to past exposure to traumatic events, this was controlled for. Negative affectivity is a trait characterized by the tendency to experience negative emotions in everyday life, even to relatively neutral stimuli (Watson, Clark, & Tellegen, 1988). Some researchers believe that people high in NA might be more likely to report, rather than experience, higher instances of negative symptoms (Brief, Burke, George, Robinson, & Webster, 1988). Given that we measured several variables that could potentially be related to NA (e.g., burnout, PTSD, and traumatic stressors), we controlled for NA. NA was measured using the Positive and Negative Affect Schedule (Watson et al., 1988), which consisted of 10 items ($\alpha = .87$). These items are adjectives describing feelings or emotions, and participants responded on how often they feel this way in general. These items were rated on a 5-point Likert scale, ranging from 1 = *very slightly or not at all* to 5 = *very often*. NA was assessed at Time 2.

Results

Analytic strategy

To test the main effect hypotheses, we conducted basic hierarchical regression analysis, where the control variables (experience and NA) were entered in the first step and the predictors were added in the second step. In order to test for moderator effects, we used the hierarchical regression procedure outlined by Baron and Kenny (1986). In the first step, the control variables were entered. In the second step, the independent variable and moderator variable were

added to the equation. Finally, in the third step, a cross-product of the independent and moderator variables was added into the regression equation. Before computing this cross-product, the variables were standardized, which reduces interpretation problems associated with multicollinearity (Cohen, Cohen, West, & Aiken, 2003). If there is a significant change in the variance explained from step 2 to step 3, this is evidence of a significant moderation effect. Significant interactions were graphed, and simple slope analyses (Aiken & West, 1991) were calculated to determine whether the change in slopes was significant from low levels of the moderator to high levels of the moderator.

Descriptive statistics

Descriptive statistics and correlations among all study variables are available in Table 1. First, we examined the distribution of absenteeism, an objective variable that has often been shown to be skewed (Steel & Rentsch, 1995). The average number of days absent was 1.23 ($SD = 1.31$), with a modal value of 0 and a median of 1. This indicates a positive skew in the data (.78), although absence values of 1 ($n = 35$), 2 ($n = 36$), and 3 days ($n = 22$) were relatively common. This level of skewness is not uncommon in absenteeism data (Steel & Rentsch, 1995) and is not problematic enough to merit corrections for non-normality (Somers, 1995).

Additionally, we examined the distribution of PTSD within the sample to determine what proportion of the sample might be characterized as having PTSD. The IES is not formally used to diagnose this disorder, but certain cutoff scores have been empirically validated to indicate the likelihood of a PTSD diagnosis from a trained professional (Horowitz, 1986). According to these criteria, 30 percent of the sample is at no risk of a PTSD diagnosis, 43 percent have a possibility of a PTSD diagnosis, and likely exhibit some symptoms of partial PTSD, 21 percent of the participants have a 75 percent chance of a PTSD diagnosis, and 5 percent have a nearly 100 percent chance of this diagnosis.

Hypothesis testing

Hypothesis 1, which examined whether traumatic stressors predicted PTSD, was supported ($\beta = .20, p < .01$). Hypothesis 2, which examined whether traumatic stressors predicted burnout, was also supported ($\beta = .17, p < .05$). Finally, Hypothesis 3, which predicted that traumatic stressors would relate to absenteeism, was supported ($\beta = .20, p < .01$).

To test whether coping humor buffered the negative effects of exposure to traumatic stressors, we used the aforementioned hierarchical regression procedure (Table 2). That coping humor will buffer the relationship between traumatic stressors and PTSD was examined first. The significant interaction term ($\beta = -.25, p < .01$) explained an additional 5.7 percent of the variance in PTSD, above and beyond the controls, traumatic stressors, and humor. This interaction was plotted (Figure 1), and the observed relationship was consistent with our expectations. A simple slope

Table 1. Descriptive statistics and correlations among all measures.

Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Experience	20.9	6.91	—	—	—	—	—	—	—
2. NA	1.5	0.43	-.05	.86	—	—	—	—	—
3. Trauma	2.4	0.46	-.07	.05	—	—	—	—	—
4. Humor	2.9	0.54	-.14	-.05	.06	.71	—	—	—
5. Burnout	2.2	0.55	-.09	.18*	.18*	-.24**	.86	—	—
6. PTSD	1.9	0.73	-.08	.20**	.20**	-.19*	.50*	.89	—
7. Absenteeism	1.2	1.31	-.14	.04	.21	.04	.05	.01	1

Values on diagonal represent internal consistency, where applicable.

*Significance at the .05 level;

**Significance at the .01 level.

Table 2. Regression and moderated regression results

	Step 1	Step 2	Step 3
<i>Dependent variable: PTSD</i>			
Age	-.10	-.10	-.08
NA	.20**	.18*	.16*
Traumatic events		.20**	.20**
Humor		-.18**	-.12
Traumatic events \times Humor			-.25**
R^2	.04	.12	.18
ΔR^2		.07	.06
<i>Dependent variable: burnout</i>			
Age	-.08	-.10	-.09
NA	.18*	.16*	.13
Traumatic events		.17*	.17*
Humor		-.27**	-.20**
Traumatic events \times Humor			-.25**
R^2	.04	.13	.19
ΔR^2		.09	.06
<i>Dependent variable: absenteeism</i>			
Age	-.15*	-.13	-.13
NA	.02	.01	.01
Traumatic events		.20**	.20**
Humor		.01	.01
Traumatic events \times Humor			-.01
R^2	.02	.06	.06
ΔR^2		.04	.00

$N = 179$. Standardized beta is reported. * $p < .05$; ** $p < .01$.

analysis indicated that the relationship between traumatic stressors and PTSD was stronger for those who are low in coping humor ($\beta = .40, p < .001$) than those high in coping humor ($\beta = .12, ns$). As such, Hypothesis 4 was supported.

Next, we examined and proposed that coping humor will buffer the relationship between traumatic stressors and burnout. The interaction term ($\beta = -.25, p < .01$) explained an additional 5.9 percent of variance in burnout. This interaction was plotted (Figure 2), and the form was, again, as predicted. A simple slope analysis showed that the relationship between traumatic stressors and burnout was stronger for those low in coping humor ($\beta = .37, p < .01$) than for those high in coping humor ($\beta = .03, ns$). As such, Hypothesis 5 was supported.

Hypothesis 6, that coping humor will buffer the relationship between traumatic stressors and absenteeism, was not supported. The interaction term was not significant, indicating no buffering effect of humor for the traumatic stressor-absenteeism relationship.

Discussion

Despite the possible impact of traumatic workplace stressors across many occupations, the majority of workplace stress research has focused on chronic stressors. This appears to be an omission, and the current study sought to (i) replicate and extend research on the cognitive, affective, and behavioral impact of experiencing traumatic workplace stressors in firefighters and (ii) determine the efficacy of humor as a coping mechanism for dealing with these stressors. Our hypotheses were tested in a sample of firefighters, a group that is often exposed to traumatic stressors in their work (Moran & Colless, 1995) and a group that is often associated with using humor to cope with the stress of their jobs (Regehr, Dimitropoulos, Bright, George, & Henderson, 2005).

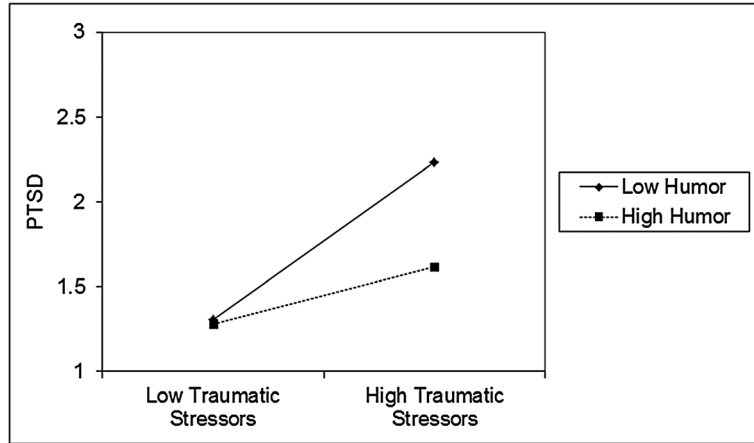


Figure 1. The buffering effect of coping humor on the traumatic stressor–PTSD relationship

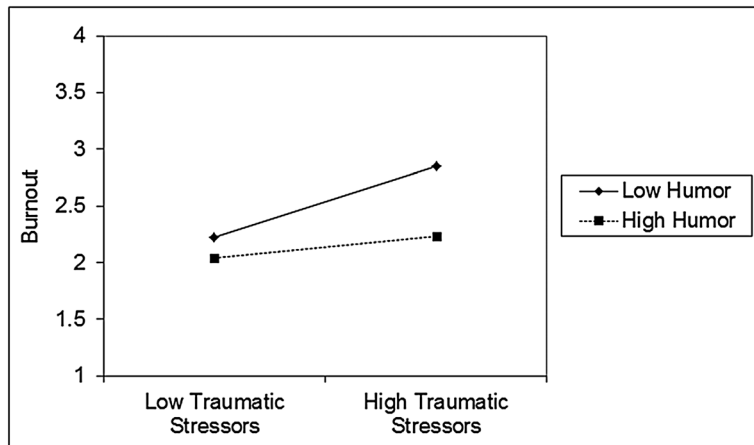


Figure 2. The buffering effect of humor on the traumatic stressor–burnout relationship

The majority of our hypotheses were supported, consistent with our expectations, previous research, and theoretical propositions. To begin, we found that exposure to traumatic stressors tended to predict cognitive (PTSD symptoms), affective (burnout), and behavioral (absenteeism) outcomes in firefighters. The relationship between these stressors and PTSD is not surprising—it has been well established, particularly in the military literature—that exposure to a high number of PTEs is a risk factor for PTSD symptomatology (Brewin et al., 2000; Ozer et al., 2003). We additionally found a significant link between traumatic stressors and burnout, which is a partial replication of the sparse research that links these variables (van der Ploeg et al., 2003; Vinokur et al., 2011). The model of burnout that we utilized in the current study (exhaustion and disengagement; Demerouti et al., 2003) is distinct from those used in the extant literature, which utilized either the Maslach Burnout Inventory (emotional exhaustion, cynicism, and personal accomplishment; Maslach & Jackson, 1986) or the Shirom–Melamud Burnout Measure (emotional, cognitive, and physical exhaustion; Melamed, Shirom, Kahana, Lerman, & Froom, 1999). As such, the current study advances current knowledge by demonstrating that, regardless of how burnout is conceptualized, traumatic stressors will have a negative impact on this important employee outcome.

Finally, the results indicated that exposure to traumatic stressors related positively to absenteeism, which is a link that has not been supported in previous research. This demonstrates that traumatic stressors do negatively impact cognitive and affective outcomes in employees and can also impact the organization through employee avoidance behavior. Although we did not explicitly measure the reasons for this absenteeism, a good deal of absenteeism research theorizes that employees might use absenteeism as a coping mechanism—distancing themselves from stressors in order to avoid subsequent exposure (Biron & Bamberger, 2012; Leiter, 1991). Alternately, PTSD literature posits that cognitive and behavioral avoidance can co-occur, with a person avoiding both environmental triggers and thoughts of an event. However, as mentioned in the succeeding text, the exact mechanisms by which traumatic stressors impact absenteeism are something that could be investigated in future research.

The second goal of the current study was to examine humor as a coping mechanism in firefighters. We found that humor tended to act as a buffer in the relationships between exposure to traumatic stressors and both burnout and PTSD symptoms, but not absenteeism. That is, people who have high levels of humor coping tend to generally experience a lessened negative impact as the result of exposure to traumatic stressors than do people who are low in coping humor. As mentioned earlier, this buffering effect could be the result of a couple of different processes—reappraisal, social bonding, and physiological. Although not measured explicitly, each of these mechanisms could act to combat the possible cost of traumatic stressors, and we expand on this later when discussing future directions.

We did not find a significant buffering effect of humor in the relationship between traumatic stressors and absenteeism. This may have been for a couple of different reasons. First, humor might be effective in buffering the affective and cognitive consequences of dealing with traumatic stressors (i.e., burnout and PTSD), but not as effective in combating the behavioral consequences (i.e., absenteeism). Second, as we note in the limitations, any objective measure of absenteeism can be flawed, as absenteeism can occur for both voluntary and involuntary reasons. Because of the error in this measure, there may have not been enough power to detect a buffering relationship. Finally, humor may simply not be an effective coping mechanism in terms of reducing absenteeism, suggesting that the results of this study indicate a “true” relationship.

What should also be included in the discussion of coping humor is what is called “black” or “gallows humor.” Gallows humor is most common among individuals who face death and dying regularly (e.g., police officers, firefighters, and medical personnel) and refers to a type of humor used in the face of, or in response to, a grim or hopeless situation. Gallows humor arises from stressful, traumatic, or life-threatening situations and is often described as the “only way to get by” in such a scenario (Garrick, 2006). It is a method for maintaining sanity in an “insane” situation (Kuhlman, 1988) and might give people a sense of control over the uncontrollable (Thorson, 1985). Although gallows humor was not explicitly measured in the current study, anecdotal evidence has shown that firefighters often utilize this type of humor. It may be that gallows humor is effective in dealing with stressors, although this should be empirically examined.

Practical implications

In terms of practical implications, the results from the current study suggest that traumatic workplace stressors can impact both the well-being of employees and the well-being of the organization (through absenteeism). Although many employers recognize that traumatic work stressors can be difficult, and often provide debriefing and/or counseling at employees’ or supervisors’ requests (e.g., Harris, Baloglu, & Stacks, 2002), research investigating the direct effects of these stressors is relatively sparse. That is, a good deal of research examines the base rate of symptoms (e.g., PTSD) in at-risk occupations, but little research, with a few exceptions, links the stressors directly to the symptoms. As such, the current study can be considered to be a step toward better understanding these stressors, with results suggesting that both researchers and practitioners should pay more attention to these stressors across jobs. Additionally, the results suggest that managers in organizations in which traumatic stressors are common should examine ways to help employees cope with these stressors.

Along these lines, our findings indicated that humor can be an effective coping mechanism, which can have some practical implications. Training could potentially be developed to teach employees how to cope with stressors, and there could be an emphasis on humor. Although coping mechanisms are typically conceptualized and measured as stable traits (Beutler & Moos, 2003), research has shown that competent trainers can develop programs that effectively change people's coping strategies, primarily through using cognitive strategies (Moggi, Ouimette, Finney, & Moos, 1999). Training coping humor can emphasize restructuring the situation to make it seem less stressful (Abel, 2002) and focus on reappraising the situation. Researchers have only just begun to examine the efficacy of humor training, and these studies primarily focus on clinical populations, such as people suffering from depression (Falkenberg, Buchkremer, Bartels, & Wild, 2010). The results of this research, however, are promising, showing that people are able to generalize new humor coping skills outside of the immediate context of training. Given that typical traumatic stress debriefing at work has been shown to be of little effectiveness (e.g., Harris et al., 2002), coping training—with an emphasis on humor—may be a viable starting point.

Limitations and directions for future research

Although the current study has several strengths (e.g., multiple time points and use of an objective measure), it is not without limitations. First, the majority of the measures (excluding absenteeism) were assessed using self-report, which raises concerns regarding the common method variance (CMV; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). That is, it is possible that some of the relationships found in the current study were partially influenced by the method rather than true relationships. We did, however, take steps to reduce CMV. First, to alleviate biases related to personality, we statistically controlled for NA (Burke, Brief, & George, 1993), which could especially impact the report of traumatic stressors. Second, to reduce effects associated with fatigue, the order of the Time 1 survey was randomized for the online version, and four orders of paper surveys were sent out. Third, in order to reduce measurement context effects, the predictor variable (e.g., traumatic events) and the outcomes were measured at separate points in time.

Another limitation is that we were unable to control for prior exposure to traumatic stressors. That is, although the firefighters should likely experience similar levels of traumatic stressors across the years, this may very well differ based on location of the firehouse, where some firehouses might be dispatched more frequently than others to emergency situations. Past experience to traumatic stressors could impact the reaction to current traumatic stressors, and—although we controlled for work experience—we were unable to fully model this prior experience.

A third limitation of the study is the fact that the study is confidential rather than anonymous. That is, participant identities were known to the researchers, and providing this information may have made some participants hesitant to provide their data and to have their absenteeism records released. As such, this may have resulted in a self-selection bias—past research has shown that when sensitive information is being collected, people may self-select out of participating (Durant, Carey, & Schroder, 2002). We took every effort to reduce this bias, with both the Chief and us assuring firefighters that these data would not be shared with management, but we cannot completely rule out selection effects.

A final limitation is in regard to our propositions on the buffering effect of humor. That is, we theorized that coping humor would act to buffer the traumatic stressor–strain relationship through reappraisal, social bonding, and physiological means. These theoretical mechanisms were not explicitly tested, which is not unique in the literature that examined humor as a coping mechanism (Moran & Massam, 1997). This does leave the exact process by which humor works to buffer the stressor–strain relationship up to interpretation and limits the theoretical contribution of this study. However, establishing the basic buffering effect of coping humor in the workplace is an important first step in determining whether it is worth the research investment to further explore these mechanisms. Given the findings of the current study, future research should examine these theoretical explanations for the buffering effect of coping humor. For instance, it would be relatively easy to test the social bonding component of coping humor by examining use of humor as a group-level construct.

Additionally, it would be interesting to examine *subsets* of humor that may be more likely to be utilized by firefighters and other emergency service workers. That is, as discussed earlier, gallows humor may be often utilized by people in these occupations and maybe have similar or different moderating effects when compared with general coping humor. Additionally, gallows humor—at least the verbalization of gallows humor—may be a group-level construct as well and may differ from workgroup to workgroup and occupation to occupation.

More generally speaking, we would like to call for more research on traumatic stressors in the workplace, focusing on jobs in which employees may be exposed to traumatic stressors almost chronically. Workers who might be exposed to these stressors make up a decent portion of the workforce, and better understanding acute or traumatic stressors can have a strong impact in organizational research. The results of the current study have shown that traumatic stressors can have an impact on both employees and organizations, highlighting the need for more general research in this area, particularly on examining mechanisms by which traumatic stressors impact important outcomes, such as PTSD, burnout, and absenteeism.

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Author biographies

Michael Sliter received his doctorate in industrial–organizational psychology at Bowling Green State University in 2012 and is currently an assistant professor in the Industrial–Organizational Psychology program at Indiana University–Purdue University Indianapolis (IUPUI). His research tends to focus on workplace incivility, counterproductive workplace behavior, emotions and emotional labor, and, more recently, positive psychology topics (e.g., engagement and coping).

Aron Kale is a second-year master's student in the Industrial–Organizational Psychology program at Indiana University–Purdue University Indianapolis. His research interests center on leadership, motivation, and team behavior.

Zhenyu Yuan is a first-year master's student in the Industrial–Organizational Psychology program at Indiana University–Purdue University Indianapolis. His research interests include job burnout, engagement, and workplace safety.

References

- Abel, M. H. (2002). Humor, stress, and coping strategies. *Humor, 15*, 365–381.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Allen, S. (1995). *An examination of the relationship between two types of occupational stressors: Chronic stressors and traumatic events*. Unpublished dissertation, Central Michigan University, Mount Pleasant, MI.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th edn). Washington, DC: Author.
- Armeli, S., Gunther, K. C., & Cohen, L. H. (2001). Stressor appraisals, coping, and post-event outcomes: The dimensionality and antecedents of stress-related growth. *Journal of Social and Clinical Psychology, 20*, 366–395.
- Bacharach, S. B., & Bamberger, P. A. (2007). 9/11 and New York City firefighters' post hoc unit support and control climates: A context theory of the consequences of involvement in traumatic work-related events. *Academy of Management Journal, 50*, 849–868.
- Bacharach, S. B., Bamberger, P. A., & Doveh, E. (2008). Firefighters, critical incidents, and drinking to cope: The adequacy of unit-level performance resources as a source of vulnerability and protection. *Journal of Applied Psychology, 93*, 155–169.
- Baron, R. M., & Kenny, D. A. (1986). The mediator-moderator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

- Beaton, R., Murphy, S., Johnson, C., Pike, K., & Corneil, W. (1999). Coping responses and post-traumatic stress symptomatology in urban fire-service personnel. *Journal of Traumatic Stress, 12*, 293–308.
- Beehr, T. A., Jex, S. M., Stacy, B. A., & Murray, M. A. (2000). Work stressors and coworker support as predictors of individual strain and job performance. *Journal of Organizational Behavior, 21*, 391–405.
- Berk, L. S. (1994). New discoveries in psychoneuroimmunology. *Humor and Health Letter, 3*, 1–8.
- Beutler, L. E., & Moos, R. H. (2003). Coping, treatment planning, and treatment outcomes. *Journal of Clinical Psychology, 59*, 1151–1167.
- Biron, M., & Bamberger, P. (2012). Aversive workplace conditions and absenteeism: Taking referent group norms and supervisor support into account. *Journal of Applied Psychology, 97*, 901–912.
- Bizi, S., Keinan, G., & Beit-Hallahmi, B. (1988). Humor and coping with stress: A test under real-life conditions. *Personality and Individual Differences, 9*, 951–956.
- Breslin, F. C., Pole, J. D., Tompa, E., Amick, B. C., Smith, P., & Johnson, S. H. (2007). Antecedents of work disability absence among young people: A prospective study. *Annals of Epidemiology, 17*, 814–820.
- Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology, 68*, 748–766.
- Brief, A. P., Burke, M. J., & George, J. M., Robinson, B., & Webster, J. (1988). Should negative affectivity remain an unmeasured variable in the study of job stress?. *Journal of Applied Psychology, 6*, 290–304.
- Burke, M. J., Brief, A., & George, J. M. (1993). The role of negative affectivity in understanding relationship between self-report stressors and strains: A comment on the applied psychology literature. *Journal of Applied Psychology, 78*, 402–412.
- Chen, G.-H., & Martin, R. A. (2007). A comparison of humor styles, coping humor, and mental health between Chinese and Canadian university students. *Humor, 20*, 215–234.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd edn). Mahwah, NJ: Erlbaum.
- Cooper, C. L., Kirkcaldy, B. D., & Brown, J. (1994). A model of job stress and physical health: The role of individual differences. *Personality and Individual Differences, 16*, 653–655.
- Day, A. L., & Livingstone, H. A. (2001). Chronic and acute stressors among military personnel: Do coping styles buffer their negative impact on health? *Journal of Occupational Health Psychology, 6*, 348–360.
- Demerouti, E., 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*, 12–23.
- Durant, L. E., Carey, M. P., & Schroder, K. E. E. (2002). Effects of anonymity, gender, and erotophilia on the quality of data obtained from self-reports of socially sensitive behaviors. *Journal of Behavioral Medicine, 25*, 438–467.
- Falkenberg, I., Buchkremer, G., Bartels, M., & Wild, B. (2010). Implementation of a manual-based training of humor abilities in patients with depression: A pilot study. *Psychiatry Research, 186*, 454–457.
- Folkman, S., & Lazarus, R. S. (1988). Coping as a mediator of emotion. *Journal of Personality and Social Psychology, 54*(3), 466–475.
- Freud, S. (1960). *Jokes and their relation to the unconscious*. New York, NY: Norton
- Friedman, M., & Schnurr, P. (1995). The relationship between trauma, post-traumatic stress disorder, and physical health. In M. Friedman, D. Charney, & Y. Ariel (Eds.), *Neurobiological and clinical consequences of stress: From normal adaptation to post-traumatic stress disorder* (pp. 507–524). Philadelphia, PA: Lippincott Williams & Wilkins Publishers.
- Garrick, J. (2006). The humor of trauma survivors. *Journal of Aggression, Maltreatment, and Trauma, 12*, 169–182.
- Harris, M. B., Baloglu, M., & Stacks, J. R. (2002). Mental health of trauma-exposed firefighters and critical incident stress debriefing. *Journal of Loss and Trauma, 7*, 223–238.
- Hendrix, W. H., & Spenser, B. A. (1989). Development and test of a multivariate model of absenteeism. *Psychological Reports, 64*, 923–958.
- Horowitz, M. (1986). Stress response syndromes: A review of posttraumatic and adjustment disorders. *Hospital & Community Psychiatry, 37*, 241–249.
- Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of Event Scale: A measure of subjective stress. *Psychosomatic Medicine, 41*, 209–218.
- Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: A meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology, 92*, 1332–1356.
- Jackson, S. E., & Maslach, C. (1982). After-effects of job-related stress: Families as victims. *Journal of Occupational Behavior, 3*, 63–77.
- Kuhlman, T. (1988). Gallows humor for a scaffold setting: Managing aggressive patients in a maximum-security forensic unit. *Hospital & Community Psychiatry, 39*, 1085–1090.
- Kuiper, N. A., Grimshaw, M., Leite, C., & Kirsh, G. (2004). Humor is not always the best medicine: Specific components of sense of humor and psychological well-being. *Humor: International Journal of Humor Research, 17*, 135–168.
- Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology, 81*, 123–133.

- Leiter, M. P. (1991). Coping patterns as predictors of burnout: The function of control and escapist coping patterns. *Journal of Organizational Behavior*, *12*, 123–144.
- Marshall, G. N., Wortman, C. B., Kusulas, J. W., Hervig, L. K., & Vickers, R. R., Jr. (1992). Distinguishing optimism from pessimism: Relations to fundamental dimensions of mood and personality. *Journal of Personality and Social Psychology*, *62*, 1067–1074.
- Martin, R. A., & Lefcourt, H. M. (1983). Sense of humor as a moderator of the relation between stressors and moods. *Journal of Personality and Social Psychology*, *45*, 1313–1324.
- Martin, R.A. & Lefcourt, H.M. (1984). Situational humor response questionnaire: Quantitative measure of sense of humor. *Journal of Personality and Social Psychology*, *47*, 145–55.
- Maslach, C., & Jackson, S. E. (1986). *Maslach Burnout Inventory: Manual research edition*. Palo Alto, CA: Consulting Psychologist Press.
- Melamed, S., Shirom, A., Kahana, L., Lerman, Y., & Froom, P. (1999). Chronic burnout, somatic arousal, and elevated cortisol levels. *Journal of Psychosomatic Research*, *46*, 591–598.
- Meyer, E. C., Zimering, R., Daly, E., Knight, J., Kamholz, B. W., & Gulliver, S. B. (2012). Predictors of posttraumatic stress disorder and other psychological symptoms in trauma-exposed firefighters. *Psychological Services*, *9*, 1–15.
- Moggi, F., Ouimette, P., Finney, J., & Moos, R. (1999). Dual diagnosis patients in substance abuse treatment: Relationships among general coping and substance-specific coping and one-year outcomes. *Addiction*, *94*, 1805–1816.
- Moran, C. C., & Colless, E. (1995). Perceptions of work stress in Australian firefighters. *Work and Stress*, *9*, 405–415.
- Moran, C., & Massam, M. (1997). An evaluation of humour in emergency work. *The Australasian Journal of Disaster and Trauma Studies*, *3*, 1–11.
- Olson, M. L., Hugelshofer, D. S., Kwon, P., & Reff, R. C. (2005). Rumination and dysphoria: The buffering role of adaptive forms of humor. *Personality and Individual Differences*, *39*, 1419–1428.
- Overholser, J. C. (1992). Sense of humor when coping with life stress. *Personality and Individual Differences*, *13*, 799–804.
- Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, *129*, 52–73.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J., & Podsakoff, N.P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*, 879–903.
- Regehr, C., Dimitropoulos, G., Bright, E., George, S., & Henderson, J. (2005). Behind the brotherhood: Rewards and challenges for wives of firefighters. *Family Relations*, *54*, 423–435.
- Richards, D. A., Lovell, K., & Marks, I. M. (1994). Post-traumatic stress disorder: Evaluation of a behavioral treatment program. *Journal of Traumatic Stress*, *7*, 669–680.
- Schaubroeck, J. M., Riolli, L. T., Peng, A. C., & Spain, E. S. (2011). Resilience to traumatic exposure among soldiers deployed in combat. *Journal of Occupational Health Psychology*, *16*, 18–37.
- Schaufeli, W. B., Bakker, A. B., & van Rhenen, W. (2009). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. *Journal of Organizational Behavior*, *30*, 893–917.
- Somers, M. J. (1995). Organizational commitment, turnover, and absenteeism: An examination of direct and interaction effects. *Journal of Organizational Behavior*, *16*, 49–58.
- Spector, P. E., & Jex, S. M. (1998). Development of four self-report measures of job stressors and strain: Interpersonal conflict at work scale, organizational constraints scale, quantitative workload inventory, and physical symptoms inventory. *Journal of Occupational Health Psychology*, *3*, 356–367.
- Steel, R. P., & Rentsch, J. R. (1995). Influence of cumulation strategies on the long-range prediction of absenteeism. *Academy of Management Journal*, *38*, 1616–1634.
- Stephens, C., & Long, N. (2000). Communication with police supervisor and peer as a buffer of work-related traumatic stress. *Journal of Organizational Behavior*, *21*, 407–424.
- Sullivan, S. E., & Bhagat, R. S. (1992). Organizational stress, job satisfaction, and job performance: Where do we go from here? *Journal of Management*, *18*, 353–374.
- Thoits, P. A. (1995). Stress, coping, and social support processes: Where are we? What next? *Journal of Health and Social Behavior*, *53*–79.
- Thorson, J. A. (1985). A funny thing happened on the way to the morgue: Some thoughts on humor and death, and a taxonomy of the humor associated with death. *Death Studies*, *9*, 204–216.
- Uden, A. (1996). Social support at work and its relationship to absenteeism. *Work and Stress*, *10*, 46–61.
- Van der Ploeg, E., Dorresteyn, S. M., & Kleber, R. J. (2003). Critical incidents and chronic stressors at work: Their impact on forensic doctors. *Journal of Occupational Health Psychology*, *8*, 157–166.
- Vinokur, A. D., Pierce, P. F., Lewandowski-Romps, L., Hobfoll, S. E., & Galea, S. (2011). Effects of war exposure on air force personnel's mental health, job burnout and other organizational related outcomes. *Journal of Occupational Health Psychology*, *16*, 3–17.
- Wanzer, M., Booth-Butterfield, M., & Booth-Butterfield, S. (2005). "If we didn't use humor, we'd cry": Humorous coping communication in health care settings. *Journal of Health Communication*, *10*(2), 105–125.

- Wanzer, M. B., Booth-Butterfield, M., & Booth-Butterfield, S. (1996). Are funny people popular? An examination of humor orientation, loneliness, and social attraction. *Communication Quarterly*, *44*, 42–52.
- Warnars-Kleverlaan, N., Oppenheimer, L., & Sherman, L. (1996). To be or not to be humorous: Does it make a difference? *Humor* *9*, 117–141.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063–1070.
- Watson, K. K., Matthews, B. J., & Allman, J. M. (2007). Brain activation during sight gags and language-dependent humor. *Cerebral Cortex*, *17*(2), 314–324.