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Work-Related Trauma, Alienation, and Posttraumatic and Depressive Symptoms in Medical Examiner Employees

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Objective: First-responder employees, including firefighters, police, and medical examiners, are at risk for the development of depression and posttraumatic stress disorder (PTSD) as a result of exposure to workplace trauma. However, pathways linking workplace trauma exposure to mental health symptoms are not well understood. In the context of social-cognitive models of depression/PTSD, we examined the role of negative cognitions as mediators of the cross-sectional and longitudinal relationship of workplace trauma exposure to symptoms of depression/PTSD in medical examiner (ME) employees. ***Method:*** 259 ME personnel were recruited from 8 sites nationwide and completed an online questionnaire assessing potential trauma exposure (i.e., exposure to disturbing cases and contact with distressed families of the deceased), negative cognitions, and symptoms of depression and PTSD, and 151 completed similar assessments 3 months later. ***Results:*** Longitudinal analyses indicated that increases in negative cognitions, and, in particular, thoughts about alienation predicted increases in depressive symptoms from Time 1 to Time 2. In cross-sectional analyses, but not longitudinal analyses, negative cognitions mediated the relationship of case exposure to symptoms of both depression and PTSD. Negative cognition also mediated the relationship of contact with distressed families to depressive symptoms. The strongest effects were for negative cognitions about being alienated from others. ***Conclusion:*** The results of this study support social-cognitive models of the development of posttraumatic distress in the workplace and have implications for the development of interventions to prevent and treat mental health symptoms in first responders.

Keywords: medical examiners, posttraumatic stress, cognitions, moral injury, stigmatization

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First-responder employees are at risk for symptoms of both PTSD and depression, in part due to frequent exposure to highly disturbing or threatening events during the course of their workday activities (Coleman, Delahanty, Schwartz, Murani, & Brondolo, 2016). Research suggests that the frequency and intensity of exposure is associated with higher levels of PTSD symptoms (Geronazzo-Alman et al., 2017; Weiss et al., 2010); and some, but not all, evidence suggests that the intensity of exposure may also be linked to depressive symptoms (Coleman et al., 2016). First responders may also face additional risk for secondary or vicarious traumatization through their contact with the families of victims (Brondolo, Wellington, Brondolo, Brondolo, & Delahanty, 2012; Clohessy & Ehlers, 1999). However, the mechanisms through which work-related trauma exposures increase the risk for symptoms of depression and PTSD have not been fully specified.

Social-cognitive models highlight the role of negative cognitions in the initiation and maintenance of both depressive (Beck, 2002) and PTSD symptoms (Ehlers & Clark, 2000). Negative cognitions have consistently been recognized as a clinical feature of major depression, and are now also recognized as part of the diagnostic criteria for PTSD articulated in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed; *DSM-5*; American Psychiatric Association, 2013). Symptoms of PTSD and depression frequently co-occur and may share common components including negative cognitions (Pietrzak, Goldstein, Southwick, & Grant, 2011).

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Understanding the degree to which high-risk job responsibilities contribute to the formation of negative cognitions and depression/PTSD is essential for the development of interventions designed to reduce mental health risks in the workplace. To date, studies of employee samples have indicated consistent positive relationships of negative cognitions to posttraumatic stress symptoms (PTSS) or depressive symptoms in cross-sectional studies (e.g., Yuan et al., 2011). A limited body of prospective studies of first responders suggest negative cognitions may precede the onset of depression and PTSD, and therefore serve as risk factors for the development and maintenance of these disorders (Bryant & Guthrie, 2005, 2007; Yuan et al., 2011).

However, there remain important gaps in the literature. To date, very limited research has examined the association of the type and intensity of trauma exposure to the intensity of negative cognitions. Further, to our knowledge, there has been no empirical work examining the effects of both primary and secondary/vicarious workplace trauma exposures to negative cognitions in the same employee sample. Little is known about the ways in which the types of trauma and the characteristics of job responsibilities influence the salience and impact of different types of negative cognitions. For example, firefighters who face extremely demanding and dangerous job responsibilities may be particularly susceptible to negative cognitions about their overall competence (Bryant & Guthrie, 2005). In contrast, journalists appear to be susceptible to negative cognitions about the world (Pyevich, Newman, & Daleiden, 2003).

ME employees are involved in identifying the deceased, determining cause of death, and communicating this information to relevant parties, including law enforcement, public health authorities, and families of victims (Hanzlick & Combs, 1998). ME employees are exposed to many potentially traumatic events, as they have direct exposure or contact with human remains and disturbing scenes during the process of death investigation at the scene or in the autopsy suite, and/or may be indirectly exposed to disturbing cases via contact with case files or pictures (Brondolo et al., 2012). ME employees are also at risk for vicarious exposure through their interactions with highly distressed or angry families of deceased individuals (Coleman et al., 2016). We have previously demonstrated that ME employees may be at heightened risk for depression and PTSD (Brondolo et al., 2012).

Our prior research indicated the intensity of both case-related and vicarious exposures were positively associated with symptoms of depression and PTSD (Coleman et al., 2016). The goal of the current study is to test the hypothesis that negative cognitions mediate the relationship of workplace trauma exposure to symptoms of PTSD and depression in ME employees. To assess potential workplace trauma exposure, we measured the frequency of direct and indirect exposure to disturbing cases. To assess potential vicarious trauma exposure, we measured the frequency of contact with families of the deceased. We examined ME employees in six states twice over a 3-month period, permitting both cross-sectional and longitudinal analyses of hypotheses about the relations among trauma exposures, cognitions, and symptoms.

A primary objective was to identify specific types of negative cognitions that were most closely associated with both workplace trauma exposure and mental health symptoms. Negative cognition scales (e.g., Posttraumatic Cognitions Inventory (PTCI); Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) include items which assess impairments to the sense of competence, thoughts about being alienated from others, concerns about the ability to manage negative emotions, and negative perceptions of the world at large. Although these different concerns are likely to be interrelated, we hypothesized that the work demands facing particular employee groups may influence the salience of one or more dimensions of negative cognitions.

Death investigation, like other death-related fields, tends to be a stigmatized occupation (Thompson, 1991). We speculated that this might increase the salience of negative cognitions about alienation from others. In addition, cognitions about distress intolerance (i.e., negative beliefs about one's ability to cope with or accept the experience of negative emotions) may also be salient for ME employees, as many of their job responsibilities involve exposure to circumstances which might evoke horror, helplessness, and disgust. In this study we hypothesized that (a) greater exposure to disturbing cases and to vicarious trauma would be associated with more intense negative cognitions about alienation and distress intolerance, and these cognitions would (b) mediate the relationship of trauma exposure to symptoms of depression and posttraumatic stress, and (c) predict increases in symptoms over time.

Method

Participants

Participants included 259 employees of nine ME offices located in six states. The offices were responsible for serving either a particular county or the state as a whole, and ranged in size from 16 to 87 employees. Altogether, 72.5% of the total ME employees on roster at the nine offices at the time of the study participated.

The cross-sectional sample included 95 men and 164 women. To preserve confidentiality, participants were asked to indicate their age within a range: 17.0% ($n = 44$) were less than 30 years of age, 50.2% ($n = 130$) were between 30 and 50 years of age, and 32.8% ($n = 85$) were over 50 years of age. The majority of the sample was White (79.0%, $n = 203$), with other races/ethnicities represented as follows: Latino (7.0%, $n = 18$), Black (8.6%, $n = 22$), American Indian (1.6%, $n = 4$), Asian (1.6%, $n = 4$), and Native Hawaiian (0.8%, $n = 2$) and mixed race/ethnicity or missing (3.3%, $n = 6$). Participants represented seven different job categories, including MEs/pathologist (14.8%, $n = 38$); investigator (27.3%, $n = 70$), autopsy technician (16.4%, $n = 42$), clerical and administrative (23.1%, $n = 59$), laboratory and research employee (11.3%, $n = 29$), with the remainder from other related professions (e.g., law, clergy, facilities).

A subsample of the original ME participants (58.3%, $n = 151$; 92 women) completed the assessments a second time, approximately 3 months after the first assessment, and provided data for the longitudinal analyses. The participants available for the longitudinal analyses differed from those who did not complete both assessments in job title ($p < .01$) and age ($p < .02$), but did not differ on any other predictor or outcome measure (all $ps > .06$). Participants in the investigator job category were more likely to complete measures only at Time 1, whereas employees in all other job titles were more likely to complete measures at both times. Older employees were more likely to complete surveys at both Time 1 and Time 2: with 70.6% of the members of the oldest group

versus 45.5% of the youngest group completing measures at both times.

Procedure

The principal investigator (EB) visited each participating location and discussed the program with employees. All willing employees received an email with an invitation to complete a survey via Survey Monkey. Up to five email reminders to complete the survey were sent to each potential participant. All procedures were approved by the Human Subjects Review Boards of St. John's University and Kent State University.

Measures

Sociodemographic data. A standard questionnaire was used to assess age, gender, race/ethnicity, sex, marital status, highest level of education completed, and job category.

Potential traumatic event exposure. Researchers have advocated for the development of job-specific scales assessing both the frequency and intensity of exposure to potentially traumatic work-related events (Weiss et al., 2010). Scales of this type of been developed and effectively deployed with police officers (Weiss et al., 2010), but there has been limited work to develop these scales for ME employees. In our prior work, we developed two brief scales to evaluate the frequency and type of exposure to potentially traumatic events for ME employees: the Case Exposure Scale and the Family Contact Scale. These measures have been used in our prior research (Coleman et al., 2016; Brondolo et al., 2012).

Case Exposure. The Case Exposure Scale assesses the frequency of direct and indirect exposure to 12 different types of potentially traumatic cases (i.e., 7 types of disturbing deaths and 5 types of disturbing human remains). The items on the scale were chosen following focus group discussions and key informant interviews with ME employees designed to identify the types of potentially traumatic events which are viewed as most disturbing (Brondolo et al., 2012). As noted by Weiss et al. (2010), estimating the exact frequency of common traumatic exposures is problematic. ME personnel processed many cases each month (i.e., conducting between 60 and 230 autopsies per month, depending on the site), making estimates of the exact numbers of cases per month unlikely to be reliable. The frequency of case exposure varied from month to month depending on the frequency of fatalities, including mass fatality events (e.g., major accidents, multiple fatality homicides, natural disasters, etc.) in the jurisdiction served by the office. Frequency of potentially traumatic case exposure was rated on a 4-point scale with points including *never*, *rarely (several times a year, but less than once a month)*, *about once a month*, and *several times a month*.

Family Contact. The Family Contact Scale was used to assess potential vicarious/secondary traumatization via the frequency of contact with family members of the deceased. The scale consists of two items concerning the frequency with which the employee had: "face-to-face contact with families of the deceased" or "contact through phone calls with families of the deceased". Responses were rated on a 4-point scale from *never* to *very often*. For both the Case Exposure and Family Contact measures, at Time 1 the survey asked about experiences over the course of working in the ME office. At Time 2, the survey asked about experiences within the three months since the previous data collection. Both scales demonstrated evidence of good reliability in this sample (Case Exposure: Cronbach's alpha = .85; Family Contact: Cronbach's alpha of 0.82). They have shown evidence of construct validity in prior research, as they have been related to mental health symptoms in ME employees (Coleman et al., 2016).

Depressive symptoms. Depressive symptoms were assessed with the Beck Depression Inventory-II (BDI-II: Beck, Steer, & Brown, 1996), a 21-item self-report measure intended to assess severity of depressive symptoms. We eliminated the item inquiring about suicidal ideation for safety reasons as these surveys were presented via the web. The BDI-II has good test–retest reliability ($r = .93$, $p < .001$) and internal consistency ($\alpha = .92$) (Beck et al., 1996), and also demonstrated good internal consistency in the present sample ($\alpha = .88$). We also created a short form of this scale, eliminating four items which overlap with the negative cognitions measured in this study, including items referring to loss of interest in others, worthlessness, feeling like a failure, and having no future.

PTSD symptoms. PTSD symptoms as reflected in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994) were assessed with the Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox, & Perry, 1997). The PDS is a self-report measure that provides an estimate of diagnostic levels of PTSD and also allows for the calculation of a continuous measure of PTSD symptom severity. In this sample, the total symptom severity score had very good internal consistency ($\alpha = .92$). We created a short form eliminating items which could be considered as referring to negative cognitions (e.g., the two items referring to emotional numbing and perceiving no future).

Negative cognitions. Negative cognitions were assessed with the PTCI (Foa et al., 1999), a 36-item inventory with three negative cognition subscales: Negative Cognitions about the Self, Negative Cognitions about the World, and Self-Blame. We eliminated the Self-Blame subscale and one item from the Negative Cognitions about the Self subscale ("My life has been destroyed by the trauma") as these were not relevant to ME work. Prior studies have demonstrated good internal consistency, reliability, and validity for the subscales (Foa et al., 1999). In this sample, the alpha for the 20-item Negative Cognitions about the Self subscale was 0.94. The alpha for the seven-item Negative Cognitions about the World subscale was 0.89.

Analytic Plan

Although the PTCI Negative Cognitions about the Self scale is a coherent and internally consistent scale, we wanted to determine if there were theoretically relevant, empirically separable, and internally consistent dimensions. If these dimensions were differentially related to mental health outcomes in this sample, they could provide more refined targets for intervention. Therefore, initial analyses included a principal components analysis with promax rotation on the 20 items of the Negative Cognitions about the Self subscale of the PTCI to determine if there were reliable subsubscales within this subscale which emerged for this employee population. Subsequent analyses included these subscales as well as the Negative Cognitions about the World subscale of the PTCI. This

is a brief stand-alone subscale, assessing a construct different from cognitions about the self.

Next, preliminary analyses evaluated gender, age, and site differences in key variables. Chi-square analyses were used for categorical variables and analyses of variance (ANOVAs) were used for continuous variables. As the initial step in hypothesis testing, we examined correlations among Case Exposure and Family Contact, types of negative cognitions, and mental health symptoms at both time points (Table 1).

To evaluate the mediating role of negative cognitions in the relationship of Case Exposure or Family Contact to symptoms of depression or PTSD, we conducted cross-sectional tests of multiple mediation at Time 1 and Time 2 using bootstrapping procedures recommended by Preacher and Hayes (2008) and the algorithms provided at processmacro.org. The analyses permit examination of the combined indirect effects of all negative cognitions, as well as the unique indirect effect of each type of cognition, controlling for the contributions of the others. Bootstrap confidence intervals (CIs) are reported as recommended by Hayes (2013).

We used correlational analyses to examine the test-retest stability of all variables over the 3-month period. Last, we conducted mediational analyses of within-person change using the same procedures employed for the cross-sectional analyses. Specifically, we calculated change scores for each variable (i.e., Time 2 − Time 1 scores) and examined whether changes in negative cognitions mediate the relationship of changes in trauma exposure to changes in symptoms. While this analysis cannot ascertain whether changes in trauma exposure preceded changes in negative cognitions which, in turn, preceded changes in symptoms (i.e., the issue of temporal ordering), it provides a stronger test of the hypothesized causal model by virtue of examining within-person change scores rather than between-person differences examined in the prior cross-sectional analyses.

As some employees were missing occasional data at baseline and a substantial number of participants did not complete the Time 2 assessment, we used multiple imputation of missing data to permit us to obtain estimates that could generalize to the full sample. For those cases with missing data on any of the variables, we used the fully conditional specification, predicted mean matching method of multiple imputation (Little & Rubin, 2002; Van Buuren, 2007), to impute these values. This step imputed missing data for predictor variables (i.e., Case Exposure and Family Contact), outcome variables (i.e., depressive symptoms and PTSS) and covariates (i.e., gender and site). Twenty data sets with all missing Time 1 and Time 2 data imputed were generated. The analyses were performed separately for each imputed data set, and the results were pooled across data sets using standard statistical procedures (Little & Rubin, 2002), as implemented in the Proc MIAnalyze procedure of SAS. All analyses were performed using SAS, Version 9.4.

Results

Principal Components Analysis

Results of the principal components analysis performed on the 20 items of the PTCI Negative Cognitions about the Self scale are shown in Table 1. Three factors with eigenvalues greater than 1 were extracted and together accounted for 65% of the variance. These three factors were subjected to promax rotation, a rotation procedure suitable for scales expected to be correlated. Items were regarded as belonging to that factor if they had rotated factor loadings of .50 or greater. The first two factors corresponded to our theoretically derived dimensions of interest. The first factor, labeled Alienation, included items which reflect the feeling of being distant and different from others. The second factor included items reflecting concerns about the capacity for emotion modulation under stress, and was labeled Distress Intolerance. The third factor appeared to reflect low self-esteem in general, and was labeled General Negative Self-Evaluation. We created three new subscales corresponding to these three dimensions, by summing those items whose loadings on a given dimension were ≥0.50. These three new subscales and the existing PTCI Negative Cognitions about the World scale each had good internal consistency (all alphas > .85).

Table 1
Factor Loadings for the Negative Cognitions About the Self Items From the PTCI

Item	Alienation	Distress Intolerance	Negative Self-Evaluation
I have permanently changed for the worse.	.85		
Nothing good can happen to me anymore.	.83		
I have no future.	.85		
I feel like I don't know myself anymore.	.88		
I will never be able to feel normal emotions again.	.71		
I feel dead inside.	.84		
I feel like an object, not like a person.	.78		
I feel isolated and set apart from others.	.79		
I used to be happy but now I am always miserable.		.51	
My reactions since working on these cases mean that I am going crazy.		.51	
My reactions since working on these cases show that I am lousy at coping.		.53	
I will not be able to control my anger and I will do something terrible.		.88	
I can't deal even with the slightest upset.		.74	
I am a weak person.			.74
There is something wrong with me as a person.			.55
I am inadequate.			.69
I can't rely on myself.			.72

Note. PTCI = Posttraumatic Cognitions Inventory (Foa et al., 1999).

Demographic Variations in Key Variables

The mean score on the Case Exposure scale was 2.38 (SD = .53), with 66.79% of the employees reporting an average exposure to each of these disturbing cases between less than once per month to about once per month, and 10.04% reporting an average exposure to each of these types of cases once a month or more. Exposure to some types of cases was common. For example, 76.54% of employees reported exposure to infant accidental deaths once a month or more, and almost half (46.09%) reported exposure to accidental dismemberment more than once per month. The mean score on the Family Contact scale was 2.71 (SD = 1.10).

ANOVAs were employed to examine gender, age, and recruitment site differences in key variables, including Case Exposure, Family Contact, depressive symptoms, PTSD symptoms, and negative cognition subscales examined without imputation for missing variables. There were no significant age differences on any of the variables (all ps > .20). There was a significant gender difference in Distress Intolerance with women expressing more concerns (men: M = 1.29; women: M = 1.56; $F(1, 232) = 5.49$, p = .02). There was a tendency for women to also report more symptoms of depression and PTSD than did men (depressive symptoms: men M = 6.45, women M = 8.73; $F(1, 233) = 3.40$, p = .07; PTSD symptoms: men: M = 2.85; women: M = 4.39; $F(1, 233) = 3.18$, p = .08). Recruitment site differences were found only for PTSD symptoms, $F(5, 229) = 2.86$, p = .02. One large site had significantly higher PTSD scores than the others. For subsequent analyses, a dummy-coded variable contrasting this site with the others was employed.

Unadjusted Relationships Among Key Variables at Time 1

As shown in Table 2, correlations derived from analyses of 20 datasets using multiple imputation indicate that Case Exposure was not related to the frequency of Family Contact. As predicted, and as we have reported previously (Coleman et al., 2016), Case Exposure was associated with symptoms of both depression and PTSD. Family Contact was associated only with symptoms of depression, but not symptoms of PTSD.

Measures of negative cognitions were all significantly interrelated. At Time 1 trauma exposures were associated with negative cognitions. Specifically, Case Exposure and Family Contact were significantly positively associated to the PTCI-derived subscales of Alienation, Distress Intolerance, and the PTCI subscale Negative Cognitions about the World, but not General Negative Self-Evaluation. All measures of negative cognitions were significantly positively associated with scores on measures of symptoms of depression and PTSD assessed.

Cross-Sectional Mediational Analyses

In a series of cross-sectional multiple mediational analyses using ordinary least squares regression and pooled estimates from 20 data sets with using multiple imputation for missing values, we assessed the degree to which the four negative cognition variables were mediators of the relationship of trauma exposure (assessed with either Case Exposure or Family Contact) to depressive or PTSD symptoms. The aim was to identify whether any of the negative cognitions had significant indirect effects over and above the other types of negative cognitions. For the mediational analyses, we used the version of the depressive and PTSD symptom scales excluding items referring to negative cognitions. However, the results of the analyses do not differ with the full versions of these scales. All analyses include gender and site as covariates. For analyses of Family Contact, Case Exposure serves as an additional covariate to permit examination of the effects associated with vicarious exposure (assessed with the Family Contact measure) above and beyond those associated with Case Exposure.

Time 1. As displayed in Figure 1a, the total effect of Case Exposure on depressive symptoms at Time 1 was significant (C: estimate = .149, SE = .054, 95% CI [042, .257]), p < .01). As

Table 2
Intercorrelations Among Time 1 and Time 2 Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. T1 Case Exposure															
2. T1 Family Contact	.07														
3. T1 Alienation	**.17**	**.14**													
4. T1 Distress Intolerance	**.15**	.12	**.81**												
5. T1 Neg. Self-Eval.	.07	.09	.77	**.72**											
6. T1 Negative-World	**.18**	**.13**	**.56**	**.50**	**.46**										
7. T1 Depression	**.18**	**.15**	**.75**	**.74**	**.63**	**.50**									
8. T1 PTSS	**.23**	.09	**.53**	**.47**	**.26**	**.44**	**.50**								
9. T2 Case Exposure	**.50**	−.09	**.14**	.05	.04	**.17**	.10	**.24**							
10. T2 Family Contact	.07	**.70**	.07	.07	.01	.11	.11	.08	.01						
11. T2 Alienation	.08	.09	**.72**	**.51**	**.57**	**.39**	**.55**	**.35**	**.14**	.10					
12. T2 Distress Intolerance	.09	.07	**.63**	**.64**	**.68**	**.40**	**.58**	**.30**	.10	.09	**.70**				
13. T2 Neg. Self-Eval.	.02	.09	**.56**	**.47**	**.71**	**.30**	**.48**	.11	.06	.10	**.73**	**.79**			
14. T2 Negative-World	.12	.09	**.37**	**.27**	**.27**	**.71**	**.39**	**.30**	**.22**	.13	**.43**	**.33**	**.33**		
15. T2 Depression	.12	.14	**.64**	**.52**	**.52**	**.36**	**.76**	**.40**	.12	.13	**.70**	**.60**	**.58**	**.37**	
16. T2 PTSS	**.15**	.07	**.64**	**.48**	**.31**	**.49**	**.51**	**.72**	**.20**	.08	**.50**	**.37**	**.22**	**.36**	**.51**

Note. T1 = Time 1; T2 = Time 2; PTCI = Posttraumatic Cognitions Inventory (Foa et al., 1999); Alienation = PTCI-derived Cognitions about Alienation; Distress Intolerance = PTCI-derived Cognitions about Distress Intolerance; Neg. Self-Eval. = PTCI-derived General Negative Self-Evaluation Cognitions; Negative-World = PTCI-Negative Cognitions about the World; Depression = depressive symptoms; PTSS = posttraumatic stress symptoms. Bolded values are significant at p < .05 or better. Correlations are performed on data in which multiple imputation is used to address missing values.

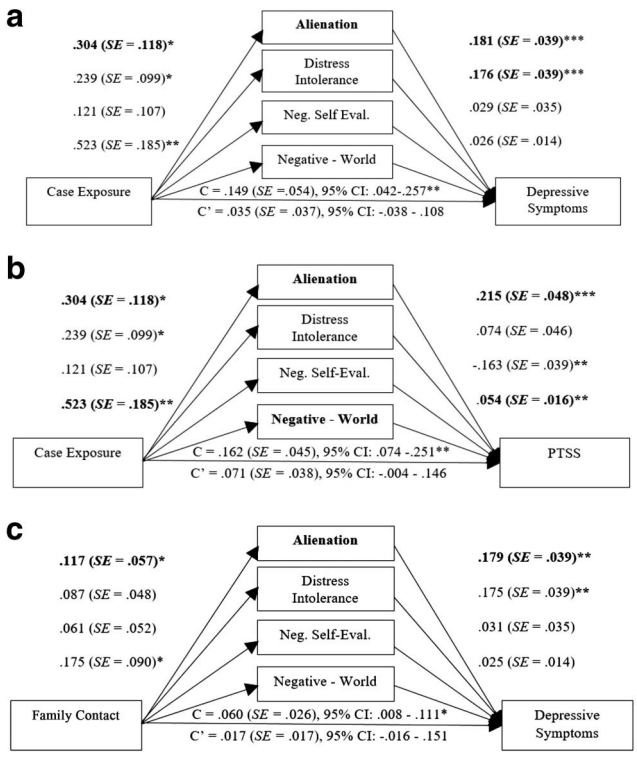

Figure 1. (a) Model testing multiple mediators of the association of Case Exposure to Depressive Symptoms at Time 1. (b) Model testing multiple mediators of the association of Case Exposure to posttraumatic stress symptoms (PTSS) at Time 1. (c) Model testing multiple mediators of the association of Family Contact to Depressive Symptoms at Time 1. The numbers provided for each path are regression coefficients and standard errors (*SE*) derived from a bootstrap procedure with 5,000 bootstrap samples. C represents the total effect of Case Exposure on depressive symptoms. C′ represents the direct effect of Case Exposure on depressive symptoms score after accounting for the effects of the mediators. Missing values in the analyses are addressed using multiple imputation. The analysis adjusts for gender and site. Bolded variable names and estimate reflect significant indirect effects. Subscales of Alienation, Distress Intolerance, and General Negative Self-Evaluation are derived from the Post-Traumatic Cognitions Inventory (PTCI: Foa et al., 1999). Neg. Self-Eval = General Negative Self-Evaluation subscale; Negative-World = PTCI-Negative Cognitions about the World. * $p < .05$. ** $p < .01$. *** $p < .001$.

displayed in Figure 1a, Case Exposure indirectly influenced depressive symptoms through effects on Alienation and Distress Intolerance. Greater Case Exposure was associated with greater Alienation (a path estimate = .304) and greater Distress Intolerance (a path = .239), and in turn, both Alienation (b path estimate = .181) and Distress Intolerance (b path estimate = .176) were associated with higher levels of depressive symptoms. The CIs for the indirect effects of Alienation (estimate = .055, 95% CI [.013, .111]) and Distress Intolerance (estimate = .042, 95% CI [.006, .089]) were entirely above zero, but crossed zero for the remaining negative cognitions. The nonsignificant direct effect (C′: estimate = .035, *SE* = .037, $p > .34$) indicates there was no evidence that Case Exposure influenced depressive symptoms independent of its effects on negative cognitions.

As displayed in Figure 1b, the total effect of Case Exposure on PTSS was significant (C: estimate = .162, *SE* = .045, 95% CI [.074, .251], $t = 362$, $p < .001$). Case Exposure indirectly influenced PTSS through effects on Alienation and Negative Cognitions about the World. Greater Case Exposure was associated with greater Alienation (a path estimate = .304) and greater Negative Cognitions about the World (a path estimate = .524). Both Alienation (b path estimate = .215) and Negative Cognitions about the World (b path estimate = .054) were associated with higher levels of PTSS. The confidence intervals for the indirect effects of Alienation (estimate = .065, 95% CI [.013, .137]) and Negative Cognitions about the World (estimate = .028, 95% CI [.005, .058]) were entirely above zero, but crossed zero for the remaining negative cognitions. The nonsignificant direct effect (C′: estimate = .071, *SE* = .038, 95% CI [−.004, .146], $p < .06$) indicates there was no evidence that Case Exposure influenced PTSS independent of its effects on negative cognitions.

As shown in Figure 1c, the total effect of Family Contact on Depressive Symptoms was significant (C: estimate = .060, *SE* = .026, 95% CI [.008, .111], $p < .03$). Family Contact indirectly influenced depressive symptoms through its effects on Alienation, as greater Family Contact was associated with greater Alienation (a path estimate = .117). Greater Alienation was associated with higher levels of depressive symptoms (b path estimate = .179). The confidence interval for Alienation (estimate = .021, 95% CI [.001, .044]) was above zero, but crossed zero for the remaining negative cognitions. The nonsignificant direct effect (C′: estimate = .017, *SE* = .017, 95% CI [−.016, .051], $p > .31$) indicates there was no evidence that Family Contact influenced depressive symptoms independent of its effects on negative cognitions.

Time 2. Analyses examining the potential mediators of relationship of Case Exposure to depressive symptoms or PTSS at Time 2 largely replicate the indirect effects of Alienation seen at Time 1. Figures depicting these analyses are included in the online supplemental materials (Figure 2a and 2b). In both analyses confidence intervals associated with the indirect effect of Alienation were entirely above zero (depressive symptoms: estimate = .068, 95% CI [.021, .121]; PTSS: estimate = .062, 95% CI [.017, .116]) but crossed zero for the remaining negative cognitions. Analyses of the mediators of the relationship of Family Contact to depressive symptoms indicated that none of the indirect effects associated with any of the negative cognitions was significant.

Longitudinal Analyses

Stability across time. As shown in Table 1, Case Exposure, Family Contact, all types of Negative Cognitions, and PTSS and depressive symptoms were moderately stable from Time 1 to Time 2, an interval that averaged 3 months. Over the course of the 3-month period, 34% of employees demonstrated an increase of 1 point or more in depressive symptoms, and 32% of employees demonstrated an increase of 1 point or more in PTSS.

Mediation analyses of change scores. These mediational analyses examine whether within-person changes in negative cognitions during the 3-month period from Time 1 to Time 2 mediated the relationship of changes in Case Exposure (or Family Contact) to changes in depressive symptoms or PTSS. In each of the analyses the total effect of Case Exposure or Family Contact on either depressive symptoms or PTSS was not significant, and none of the indirect effects were significant. In particular, change in the frequency of Case Exposure were not associated with change in

any of the negative cognitions (a path estimates: all $ps > .05$). However, change in Alienation from Time 1 to Time 2 was positively associated with change in depressive symptoms (b path estimate = .158, $SE = .049$, 95% CI [.058, .258], $t = 3.20$, $p < .003$). In analyses of Family Contact controlling for total case exposure, change in Family Contact was positively associated with changes in General Negative Self-Evaluation (a path estimate = 1.38, $SE = .069$, 95% CI [−.000, .276], $t = 2.00$, $p = .05$), and very nearly statistically significant. The association of change in Alienation with change in depressive symptoms was essentially identical to the prior analysis (b path estimate = .158, $SE = .049$, 95% CI [.059, .257], $t = 3.21$, $p < .003$), even with controls for total Case Exposure. As was the case in analyses of the effects of Case Exposure, no other cognitions were associated with depressive symptoms. Neither the a paths nor the b paths were significant in analyses predicting change in PTSS.

The final set of analyses examined whether the relationships might operate in reverse with symptoms heightening attentiveness to trauma. This hypothesis did not receive support. Time 1 depressive symptoms did not predict Time 2 Case Exposure ($r(258) = .036$, 95% CI [−.126, .197], $p > .66$), controlling for Time 1 Case Exposure; and Time 1 depressive symptoms did not predict Time 2 Family Contact ($r(258) = .016$, 95% CI [−.165, .196], $p > .86$), controlling for Time 1 Family Contact. Similarly, Time 1 PTSS did not predict Time 2 Family Contact ($r(258) = .026$, 95% CI [−.164, .214], $p > .78$). Time 1 PTSS were weakly correlated with Time 2 Case Exposure ($r(258) = .180$, 95% CI [.002, .347], $p < .05$); however, the effects were no longer significant following Bonferroni correction for multiple comparisons.

Discussion

This study examined negative cognitions as potential mediators of the relationship of workplace trauma exposure to PTSD and depressive symptoms in a high risk but understudied group: ME employees. To our knowledge, this is the first study to explicitly test the hypothesis that negative cognitions mediate the relationship of both primary work-related events (i.e., disturbing and frightening events) and secondary (i.e., vicarious) work-related trauma exposures to PTSD and depressive symptoms. The findings are consistent with social-cognitive models of depression and PTSD (Beck, 2002; Ehlers & Clark, 2000; Foa & McLean, 2016), and suggest that these models can be applied to the evaluation of the effects of workplace stressors on mental health.

We hypothesized that different types of workplace demands might shape employees' cognitions about trauma exposure and their own reactions to that exposure. Results of a factor analysis on the PTCI Self scale in this sample of ME employees yielded factors (Alienation and Distress Intolerance) which include cognitions that may be specific to the job demands of ME personnel. ME personnel face job responsibilities that present significant emotional demands (e.g., can evoke disgust, horror, or helplessness) and may tax the individual's perceptions of her or her own ability to cope and potentially lead to a sense of alienation from others. The longitudinal analyses support the notion that contact with distressed families may serve as an acute stressor, activating negative cognitions about one's own worth.

Cognitions about alienation emerged as the most consistent significant indirect effect in analyses of the cross-sectional relationship of direct and vicarious trauma to PTSS and depressive symptoms. Negative cognitions did not mediate the relationship of trauma exposure to changes in depressive symptoms or PTSS over time. However, cognitions about alienation were a significant predictor of increases in depression over time, and may contribute to the maintenance of depressive symptoms. For some, increases in alienation may override the benefits of engaging in interesting and important work.

The effects of Alienation on depressive symptoms were significant above and beyond the effects of General Negative Self-Evaluation. This suggests that depressive symptoms do not simply reflect general decrements in perceptions of overall competence and worth. Instead they may reflect specific concerns that arise in the context of the demands facing ME employees, including disturbing situations (e.g., deaths of children, death due to domestic violence or torture) which are outside the normal workday experiences of individuals employed in other occupations. ME personnel may find these experiences difficult or inappropriate to share with others outside of the workplace. Further, experiences in the workplace may change their emotional reactions to other distressing events commonly experienced by others (e.g., car accidents). This disparity in emotional experience may lead ME personnel to feel alienated from others, contributing to the development of depressive symptoms (Coleman et al., 2016).

These findings may also be considered in the context of theories of moral injury emerging from studies of military veterans (Nash & Litz, 2013). ME personnel may experience moral injury because they frequently bear witness to acts, including homicides of infants, that may threaten their beliefs and expectations about justice, safety, and the moral integrity of others. These disrupted expectations may contribute to alienation and other types of negative cognitions.

Limitations

The negative cognition subscales that were derived from the PTCI Self scale were highly intercorrelated, raising concerns about multicollinearity. However, variance inflation indices suggest that the overlap among scales does not substantially distort the findings. The findings suggest that the specific cognitions have unique importance.

Differences between volunteers and employees who did not participate could not be ascertained. However, we were able to obtain participants from every type of employee group and from sites that varied substantially in caseload and size. Past literature has had difficulty clearly articulating differences among types of trauma. We chose one strategy for organizing types of trauma exposure (i.e., distinguishing between case exposure and vicarious exposure), but other categorization methods are possible. We relied on self-reported PTSD and depressive symptoms and did not have clinical assessments. The PDS and BDI-II are both well-validated measures, and the literature suggests that self-report scores on these measures correspond highly with clinical ratings (Beck et al., 1996; Foa et al., 1997). Longitudinal analyses followed only a subset of the original sample. Given the potential limits to power and generalizability, we employed multiple imputation analyses. Statistics concerning the relative efficiency of these analyses suggest that imputation does not have a major effect on the reliability of the analyses. The longitudinal analyses do not

fully replicate the cross-sectional analyses: changes in alienation predicted changes in depressive symptoms but not PTSS, and changes in the frequency of trauma exposure do not predict changes in symptom reports. The 3-month follow-up period may have been too short to identify the effects of changes in the frequency of trauma exposure. Moderate, day-to-day changes in the frequency of cases may not substantially alter a sense of alienation that developed earlier in the employees' career. Instead, qualitative differences in the nature of the case may intensify or attenuate alienation, and may affect the relationship of alienation to PTSD. The Case Exposure scale focuses on the frequency of highly disturbing cases, but does not capture qualitative changes in the nature of the disturbing cases. Our sample was made up of experienced ME employees. We are not able to capture the social-cognitive effects of initial exposure to workplace trauma, and the results of this study may not generalize to new employees prior to prolonged trauma exposure in the workplace. We did not investigate the effects of work duration or other factors (e.g., family stress or support) which may moderate the effects of trauma. Longitudinal studies which assess employees when they are first hired can yield important insights into the interactions of person-level factors and workplace demands in the development of mental health symptoms among first responders (Galatzer-Levy, Brown, Henn-Haase, & Metzler, 2013).

Conclusion

Despite these limitations, the findings suggest that workplace stressors have specific, identifiable effects on social-cognitive processes that contribute to mental health risks. Both primary and vicarious exposures were associated with the development of negative cognitions, and negative cognitions appear to maintain and exacerbate mental health symptoms over time. Negative cognitions associated with workplace trauma may provide targets for prevention and intervention (Beck, 2002).

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Beck, A. T. (2002). Cognitive models of depression. In R. L. Leahy & E. T. Dowd (Eds.), *Clinical advances in cognitive psychotherapy: Theory and application* (pp.29–61). New York, NY: Springer.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory manual* (2nd ed.). San Antonio, TX: Psychological Corporation.

Brondolo, E., Wellington, R., Brondolo, E. M., Brondolo, T. J., & Delahanty, D. (2012). Work-related predictors of psychological distress among medical examiner and coroner personnel. *Academic Forensic Pathology, 2,* 80–91. http://dx.doi.org/10.23907/2012.011

Bryant, R. A., & Guthrie, R. M. (2005). Maladaptive appraisals as a risk factor for posttraumatic stress: A study of trainee firefighters. *Psychological Science, 16,* 749–752. http://dx.doi.org/10.1111/j.1467-9280.2005.01608.x

Bryant, R. A., & Guthrie, R. M. (2007). Maladaptive self-appraisals before trauma exposure predict posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 75,* 812–815. http://dx.doi.org/10.1037/0022-006X.75.5.812

Clohessy, S., & Ehlers, A. (1999). PTSD symptoms, response to intrusive memories and coping in ambulance service workers. *British Journal of Clinical Psychology, 38,* 251–265. http://dx.doi.org/10.1348/014466599162836

Coleman, J. A., Delahanty, D. L., Schwartz, J., Murani, K., & Brondolo, E. (2016). The moderating impact of interacting with distressed families of decedents on trauma exposure in medical examiner personnel. *Psychological Trauma: Theory, Research, Practice and Policy, 8,* 668–675. http://dx.doi.org/10.1037/tra0000097

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy, 38,* 319–345. http://dx.doi.org/10.1016/S0005-7967(99)00123-0

Foa, E. B., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of posttraumatic stress disorder: The Posttraumatic Diagnostic Scale. *Psychological Assessment, 9,* 445–451. http://dx.doi.org/10.1037/1040-3590.9.4.445

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The Posttraumatic Cognitions Inventory (PTCI): Development and validation. *Psychological Assessment, 11,* 303–314.

Foa, E. B., & McLean, C. P. (2016). The efficacy of exposure therapy for anxiety-related disorders and its underlying mechanisms: The case of OCD and PTSD. *Annual Review of Clinical Psychology, 12,* 1–28.

Galatzer-Levy, I. R., Brown, A. D., Henn-Haase, C., Metzler, T. J., Neylan, T. C., & Marmar, C. R. (2013). Positive and negative emotion prospectively predict trajectories of resilience and distress among high-exposure police officers. *Emotion, 13,* 545.

Geronazzo-Alman, L., Eisenberg, R., Shen, S., Duarte, C. S., Musa, G. J., Wicks, J., . . . Hoven, C. W. (2017). Cumulative exposure to work-related traumatic events and current post-traumatic stress disorder in New York City's first responders. *Comprehensive Psychiatry, 74,* 134–143. http://dx.doi.org/10.1016/j.comppsych.2016.12.003

Hanzlick, R., & Combs, D. (1998). Medical examiner and coroner systems: History and trends. *Journal of the American Medical Association, 279,* 870–874. http://dx.doi.org/10.1001/jama.279.11.870

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Little, R. J., & Rubin, D. B. (2002). Bayes and multiple imputation. *Statistical analysis with missing data* (2nd ed., pp. 200–220). Hoboken, NJ: John Wiley & Sons, Inc.

Nash, W. P., & Litz, B. T. (2013). Moral injury: A mechanism for war-related psychological trauma in military family members. *Clinical Child and Family Psychology Review, 16,* 365–375. http://dx.doi.org/10.1007/s10567-013-0146-y

Pietrzak, R. H., Goldstein, R. B., Southwick, S. M., & Grant, B. F. (2011). Prevalence and Axis I comorbidity of full and partial posttraumatic stress disorder in the United States: Results from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Anxiety Disorders, 25,* 456–465. http://dx.doi.org/10.1016/j.janxdis.2010.11.010

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40,* 879–891. http://dx.doi.org/10.3758/BRM.40.3.879

Pyevich, C. M., Newman, E., & Daleiden, E. (2003). The relationship among cognitive schemas, job-related traumatic exposure, and posttraumatic stress disorder in journalists. *Journal of Traumatic Stress, 16,* 325–328. http://dx.doi.org/10.1023/A:1024405716529

Thompson, W. E. (1991). Handling the stigma of handling the dead: Morticians and funeral directors. *Deviant Behavior, 12,* 403–429. http://dx.doi.org/10.1080/01639625.1991.9967888

Van Buuren, S. (2007). Multiple imputation of discrete and continuous data by fully conditional specification. *Statistical methods in medical research, 16,* 219–242.

Weiss, D. S., Brunet, A., Best, S. R., Metzler, T. J., Liberman, A., Pole, N., . . . Marmar, C. R. (2010). Frequency and severity approaches to indexing exposure to trauma: The Critical Incident History Questionnaire for police officers. *Journal of Traumatic Stress, 23,* 734–743. http://dx.doi.org/10.1002/jts.20576

Yuan, C., Wang, Z., Inslicht, S. S., McCaslin, S. E., Metzler, T. J., Henn-Haase, C., . . . Marmar, C. R. (2011). Protective factors for posttraumatic stress disorder symptoms in a prospective study of police officers. *Psychiatry Research, 188,* 45–50. http://dx.doi.org/10.1016/j.psychres.2010.10.034

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