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## **Gap Assessment of Secondary Trauma, Burnout, Job Satisfaction and Perceived Organizational Trauma Readiness in Forensic Science Professionals**

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## **Abstract**

Secondary trauma (ST) and burnout (BO) have been described since the 1980's and extensively studied in first responders, law enforcement, legal professionals, and human services providers. There are few studies in forensic science professionals (FSPs). To determine levels of ST, BO, and compassion (job) satisfaction (CS) and relate these to demographics and job characteristics, we administered online a modified version of the Professional Quality of Life (ProQOL) questionnaire to FSPs in crime laboratories and medical examiner offices. Participants also completed a modified version of the Vicarious Trauma- Organizational Readiness Guide (VT-ORG) to measure perceptions of their organizations' efforts to address vicarious trauma and promote health and wellness. Results from 419 subjects indicated that field-based FSPs registered higher levels of ST compared to laboratory-based FSPs, but BO and CS were not significantly different between these groups or compared to managers. Demographic variables did not predict of ST, BO, or CS, but work with victims' families and testifying significantly, albeit weakly, predicted higher ST. ST scores for FSPs were comparable to those experienced by law enforcement and emergency medical services workers (EMS). Greater employee belief that their organizations were addressing issues of stress and trauma predicted lower levels of ST and BO and higher levels of CS. Comments by participants paralleled the quantitative findings. These results indicate a need to strengthen organizational efforts to address vicarious trauma and promote health and wellness, particularly in FSPs with direct field-based exposure to crime scenes, contact with victims' families, and responsibility for testifying.

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**Key Words:** Crime Laboratories, Medical Examiners, Vicarious Trauma, Trauma Readiness, ProQOL, VT-ORG

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## **Title page**

Gap Assessment of Secondary Trauma, Burnout, Job Satisfaction and Perceived Organizational  
Trauma Readiness in Forensic Science Professionals

The phenomena of "Secondary Traumatic Stress" (ST), also referred to as "Compassion Fatigue" (CF) (1), and the related construct "Vicarious Traumatization" (VT) (2), have been described since the mid-1980's, roughly coinciding with the growth in mental health treatments focused on clients who are victims of trauma. These terms vary in emphasis, but all describe a core set of responses to exposure to challenging and traumatic material from a client or on the job. Specifically, these responses can include intrusive thoughts, avoidance and withdrawal, and symptoms of tension and disturbed sleep (1). In addition to these responses, the professional may develop alterations in basic assumptions about themselves, people, society, and personal safety (2).

A large literature has documented ST in a range of professionals including first responders (3,4), law enforcement (5-8), human service professionals (9,10) and public defenders (11). Risk factors identified in these studies for the development of ST include intensity of exposure, graphic nature of the material, cases involving child victims, identification by the professional with the victim, gender, personal history of trauma, prior symptoms, organizational factors and social supports (1,8,12), although the strength and consistency of these associations has been variable (13). Further, individuals suffering symptoms of ST are more likely to overestimate risk and demonstrate impaired performance on complex cognitive and memory tasks when confronted with acute stress (14).

In addition to ST, the psychological literature has delineated the syndrome of "Burnout" (BO) (15). Burnout develops gradually due to the accumulation of stress such as the challenging nature of intensive contact with clients, work overload, and stressful work conditions. Symptoms of burnout include exhaustion, feelings of cynicism and detachment from the job, and a sense of ineffectiveness and lack of accomplishment. Risk factors for developing burnout include female

gender, overwork, the slow and erratic pace of the work, lack of success, and the tendency of the work to raise personal issues (15). The BO formulation overlaps with the constructs of depression and job satisfaction (15,16). Professionals suffering from ST and/or BO report lower job satisfaction, emotional exhaustion, increased thoughts of leaving their position, and stress in their family lives. (17).

In the last decade there has been increased interest in stress and its impact on forensic science professionals (FSPs). FSPs encompass a wide range of specialties including crime scene investigation (field-based work), laboratory analysis of crime scene related materials (e.g., chemicals, drugs, DNA), analysis of digital and multimedia evidence, and postmortem examinations performed by medical examiners and coroners (lab-based work). The 2009 Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council Report (18) identified a range of challenges among the forensic sciences including lack of clear standards and research needs, large backlogs, and inconsistent certification and accreditation systems. A recent NIJ report to Congress on the Needs Assessment of Forensic Laboratories and Medical Examiner/Coroner Offices indicated that personnel need resources to address workforce stress and vicarious trauma associated with the various forensic science work environments and that forensic agencies and management can implement strategies that support operational readiness, organizational health, and workforce resiliency (19)). Observations by FSPs (20,21) point to additional stressors including exposure to traumatic scenes, evidence, and other case material, expectations for perfection (or “zero tolerance” for errors), and work within an adversarial legal system.

Quantitative studies involving surveys of small groups of FSPs have documented depression, poor sleep, and changes in worldview in Rumanian forensic pathologists (22),

elevated scores on a measure of psychological symptoms in child homicide investigators (23), and a correlation between post-traumatic symptoms and homicide experience, fatigue, and years in the field in Korean forensic science investigators (24). Other findings include increased heart rates in crime scene investigators (CSIs) at crime scenes (25), PTSD symptoms in Slovenian crime scene technicians (26), and higher levels of stress triggered by trauma-related work exposure, particularly when the exposure reminded the worker of a loved one (27).

A recent survey of crime scene investigators utilizing a PTSD measure found symptoms suggestive of a clinical disorder in 9.3% of 225 CSIs (28). In the largest study to date, funded through the National Institute of Justice's Social Science Research on Forensic Science program, Holt, Blevins, Foran, & Smith (29) surveyed 899 FSPs and found a 10-20% rate of symptoms of difficulty falling asleep, irritability, difficulty concentrating, a constant state of alertness, easy startle, nightmares, detachment and emotional numbness, feelings of mistrust and betrayal, and physical aches and pains with no apparent cause. All of these symptoms overlap with ST.

In addition to broad surveys of FSPs, studies have also investigated specific disciplines. For example, studies of FSPs investigating digital crimes have identified increased risk for ST related to length of time working with pornographic materials (30) and work with materials depicting children (31,32). Despite reporting high stress, digital FSPs reported high job satisfaction (33). A study of 395 workers in medical examiner and coroner offices found 12.8% met criteria for likely diagnostic levels of PTSD, 21.0% scored at or above the mild level of depression, and nearly 30% had clinically significant levels of anxiety (34). Death investigators and administrators demonstrated more symptoms of PTSD and depression than medical examiners. Infant and child related deaths were the strongest predictors of symptoms.



Given that ST and BO predict lower job satisfaction, less productivity and higher turnover over (15, 35), research has attempted to identify organizational factors that may mitigate these responses. Rogers (36) highlighted the documented effectiveness of education, resilience workshops, problems-solving and sharing, mentoring, mindfulness, and relaxation techniques in lowering ST in health professionals. Organizations that are sensitive to the needs of trauma clients and the impact on employees of contact with trauma material have been labeled “trauma-informed” (37,38). Trauma-informed workplaces promote improved function, decreased symptoms and greater satisfaction among employees (35,37).

Studies in FSPs have identified the positive effects of individual coping strategies including social support, humor, avoidance/distraction, and disengagement in coping with ST (29,30,39). In terms of organizational interventions, Holt et al. (29) recommended increased management attention to work hours, scheduling, role-conflict, and communication between management and FSPs, although these recommendations were not directed specifically at ST but rather at overall functioning.

### *Current Study*

To date, few studies have quantified ST, BO, and job satisfaction (CS) in FSPs. Further, no studies have systematically addressed the relationship between organizational attention to trauma and ST, BO, or CS in FSPs. To address these issues, we performed a gap assessment to better characterize ST, BO, and CS in FSPs working in crime laboratories and medical examiner offices. We also measured FSP perceptions of their organization’s efforts to mitigate stress and address trauma as well as the relationship of these perceptions to ST, BO, and job satisfaction. Additionally, limited research has examined the range of responsibilities in FSPs and whether

job responsibilities and demographic characteristics predict levels of ST, BO, and CS. Specific questions for this exploratory gap assessment analyzed quantitatively and qualitatively included:

1. Are there differences in ST, BO, and CS between field-based scientists (crime scene investigators and other scientists who predominately gather evidence at the scene), lab-based scientists (those who predominately analyze materials but do not go to the crime scene), and their managers?
2. What demographic and job characteristics predict ST, BO, and/or CS?
3. Are there differences between field-based scientists, lab-based scientists, and managers in their perceptions of their facility's efforts to address stress and ST?
4. Do employee perceptions correlate with ST, BO and CS?

## **Methods**

### *Participants*

The assessment questionnaire was solicited to approximately 1,690 individuals from seven crime laboratories and medical examiner offices in the United States in the summer/ fall of 2019. The American Society of Crime Laboratory Directors (ASCLD) Trauma and Stress work group assisted with outreach to identify facilities that were interested in participating. The responses rate was 34% with 574 respondents participating in the assessment. Fifty-five respondents were excluded from the final data set: six who did not consent to the questionnaires, 35 who did not complete the majority of the demographic portion of the questionnaires, and 14 who identified as administration or clerical only and not forensic science professionals. The final sample size for demographics included 519 participants. As shown in Table 1, the majority of

participants were female ( $N = 366$ ; 70.5%), white ( $N = 372$ ; 70.1%), and married/common law ( $N = 278$ ; 53.6%). 238 (45.9%) held a master's degree, and 112 (21.6%) were 25- 30 years old.

Participants were asked to identify the role in their current position. Respondents could only select one response and the choices included field-based (crime scene investigators and other scientists who predominately gather evidence at the scene), lab-based (those who predominately analyze materials but do not go to the crime scene), managers/supervisors (have supervisory responsibility), or clerical staff. Excluding clerical staff and those who identified themselves as administrators, among the FSPs, fifty-two individuals identified as field-based scientists (10.1%), 351 as lab-based scientists (67.6%), and 116 as managers or supervisors (22.3%). As shown in Table 2, the majority of participants did not work with victims ( $n = 425$ ; 81.9%), victim families ( $n = 459$ ; 88.4%), or victim services ( $n = 487$ ; 93.8%). Additionally, the majority of participants did not testify ( $n = 286$ ; 55.1%), were unsworn ( $n = 434$ ; 82.6%), and worked overtime ( $n = 326$ ; 62.8%). Participants were also asked to identify their primary activities (e.g., DNA, controlled substance, digital/multimedia evidence) during the last two years. Participants were able to select multiple areas. As shown in Table 3, the most common activities were DNA ( $n = 149$ ) and administrative ( $n = 95$ ). An additional 89 participants were removed for missing responses on the ProQOL and VT-ORG. The sample size for statistical analysis for the research questions of the current study was 419.

### *Measurement*

The online, anonymous questionnaire included four sections: demographics, job responsibilities, the Vicarious Trauma- Organizational Readiness Guide (VT-ORG) (35), and the Professional Quality of Life (ProQOL) (40). The job responsibilities section queried specific job

discipline, time spent testifying, sworn v. unsworn status, hours worked per week and overtime, and work with victims, victims' families, and victims' services.

The VT-ORG was developed by Hallinan et al. (35), at Northeastern University funded by the Department of Justice (DOJ), Office of Justice Programs, Office for Victims of Crime to assist organizations in evaluating their efforts to address trauma for first responders including EMS, fire fighters, services, and victim services. The instrument includes five subscales: Leadership and Mission (LM), Management and Supervision (MS), Employee Empowerment and Work Environment (EE), Training and Professional Development (TPD), and Staff Health and Wellness (SH). Questions ask the employee to rate their perceptions of their organization's communication around and promotion of activities during the last six months in each of the five VT-ORG subscale areas using a 1 = "never" to 5= "always" Likert scale. For example, "My managers are readily accessible to support staff members following a critical or acute incident" from the MS section, or "Differentiation between work and non-work hours is recognized and respected" in the SH section. The VT-ORG was modified in the current assessment to include vocabulary relevant to forensic scientists (e.g., "My facility" verses "The department"). The unvalidated modified VT-ORG can be found in the Supplemental Materials. Cronbach's alpha for each of the subscales in the current sample were: LM ( $\alpha = .85$ ); MS( $\alpha = .89$ ); Employee EE ( $\alpha = .89$ ); TP ( $\alpha = .79$ ); and SH ( $\alpha = .85$ ).

The ProQOL was developed as a self-report instrument for helping professionals to measure levels of ST, BO, and compassion satisfaction (CS, a measure of job satisfaction.) (40). The 30 questions ask participants to rate their experiences on a 1= "never" to 5= "very often" scale over the prior 30 days. For example, "I feel as though I am experiencing the trauma of someone I have helped" in the ST section, "I feel worn out because of my work as a helper" in

the BO section, and “I am pleased with how I am able to keep up with new techniques and protocols” in the CS section. The ProQOL authors indicate that the instrument can be modified to match the group under study. In the current study, the ProQOL was modified (See Supplemental Materials) to include vocabulary relevant to forensic scientists (e.g., substituting “cases” for “someone I have helped”). Cronbach’s alpha in the current study for the subscales were: ST ( $\alpha = .84$ ); BO ( $\alpha = .80$ ); and CS ( $\alpha = .92$ ). Subscales for both the VT-ORG and the ProQOL met the reliability threshold of 0.7 as described by Kline (41). Further, the Cronbach’s alphas for the current study were similar to previous research which used the VT-ORG (35) and the ProQOL (40).

The questionnaires ended with write-in questions enabling participants to provide additional information or comments regarding the questionnaire topic, consistent with the methodology of intra-method mixing, i.e., quantitative survey with open-ended questions (42). Creswell and Plano Clark (43) refer to this approach as a data-validation variant of the convergent design in which open- and closed-ended questions are analyzed separately and then integrated to confirm or validate results. In the current study, main themes were identified and described in the discussion section.

### *Procedures*

During the project development phase, researchers conducted onsite visits at each of the seven facilities that volunteered to participate, meeting with administration to promote participation and refine demographic and job responsibility language in the questionnaires. During these meetings, it also emerged that there was a range of efforts by the seven organization to address stress in employees. As an incentive for participation, we offered follow-

up meetings to each interested facility to present overall findings as well as site-specific aggregate results to aid in development of strategies to address ST, BO, and CS.

Potential participants at each facility then received an email from management introducing the study, followed by an email that included a Study Information Sheet, which detailed the nature of the study. Participants were then directed to Qualtrics. The first page of the questionnaire was the consent form, which required participants to agree or decline participation in the assessment, per IRB protocol. All participation was voluntary and anonymous. No identifying information (e.g., name, social security number, IP address) was collected and the researchers did not have access to the participants e-mail addresses at any time. Data was collected from participants at each facility and kept strictly confidential. Participants could quit the questionnaires at any time. Potential participants received a reminder two weeks after the initial email. Questionnaires were left open for a period of four to six weeks (this varied between facilities due to vacation periods). The study was approved by the DOJ Office of Justice Programs Institutional Review Board (IRB). All respondents were treated in accordance with the ethical standards set forth by the American Psychological Association. Per the IRB, all follow-up presentations were completed with strict employee anonymity and only group statistics were offered.

### *Analysis Plan*

The data was downloaded from the survey platform and uploaded to the statistical package, IBM SPSS version 25. In accordance with Cramer and Bock (44), a MANOVA was performed to help protect against inflating the Type 1 error rate in the follow-up post-hoc comparisons. However, prior to conducting the MANOVA, a series of Pearson correlations were

performed between all of the dependent variables (VT-ORG and ProQOL subscales) in order to test the MANOVA assumption that the dependent variables would be correlated with each other in the moderate range (i.e., .20 - .60) (45). As shown in Table 6, a meaningful pattern of correlations was observed amongst most of the dependent variables, suggesting the appropriateness of a MANOVA. A MANOVA was then conducted to determine differences between field-based scientists, lab-based scientists, and managers' scores on the three ProQOL subscales and five VT-ORG subscales. To measure the relationship between the three ProQOL subscales and the five VT-ORG subscales a two-tail, zero-order correlation was conducted. Additionally, three multiple regressions examined the contributions of demographic and job responsibility variables in predicting ST, BO, and CS. Following Creswell and Plano Clark (43), the write-in response question was analysed separately by identification of main themes.

## **Results**

A one-way multivariate analysis of variance (MANOVA) was conducted to compare field-based scientists and lab-based scientists scores on the ProQOL subscales (Secondary Trauma [ST]; Burn Out [BO]; Compassion Satisfaction [CS]) as shown in Table 4. There was a statistically significant difference in ST between field versus lab-based scientists,  $F(3, 311) = .384, p = .01$ ; Wilk's  $\Lambda = 0.96$ , partial  $\eta^2 = .04$ . Results revealed that field-based scientists reported significantly more ( $M=54.09$ ) ST than lab-based scientists ( $M = 49.01$ ),  $F(1, 315) = 9.34, p = .002$ ;  $\eta^2 = .03$ . There were no significant differences in BO ( $M = 50.43$  v.  $49.82$ ) or CS ( $M = 50.42$  v.  $50.12$ ) between field and lab-based FSPs.

In a post-hoc analysis, the Tukey-Kramer test to account for the unequal sample sizes was performed to examine individual mean difference comparisons across the two groups of

scientists (46). Results revealed that the post-hoc mean comparison for the mean score of ST between field verses lab-based scientists was statistically significant ( $p = .007$ ).

A one-way multivariate analysis of variance (MANOVA) was also conducted to compare the mean differences between lab-based scientist's and manager/supervisor scores on the ProQOL subtests. There were no statistically significant differences in ST ( $M = 49.01$  v.  $51.06$ ), BO ( $M = 49.82$  v.  $50.36$ ), or CS ( $M = 50.12$  v.  $49.91$ ), between lab-based scientists verses managers/supervisors,  $F(3, 366) = 1.13$ ,  $p = .34$ ; Wilk's  $\Lambda = 0.99$ , partial  $\eta^2 = .009$  (See Table 4).

A one-way multivariate analysis of variance (MANOVA) was conducted to compare the mean differences between field-based scientists and lab-based scientists' scores on the VT-ORG subscales (Leadership and Mission [LM], Management and Supervision [MS], Employee Empowerment and Work Environment [EE], Training and Professional Development [TPD], Staff Health and Wellness [SH]) as shown in Table 5. There was no statistically significant difference in the belief that the facility is adequately addressing vicarious trauma between lab verses field-based scientists  $F(5, 301) = 2.15$ ,  $p = .06$ ; Wilk's  $\Lambda = 0.96$ , partial  $\eta^2 = .03$  (See Table 5).

A one-way multivariate analysis of variance (MANOVA) was also conducted to compare the mean differences between lab-based scientist's and manager/supervisor scores on the VT-ORG subtests. Results from the MANOVA found a statistically significant difference in the belief that the facility is adequately addressing vicarious trauma between lab-based scientist's verses managers/supervisors  $F(5, 354) = 4.19$ ,  $p = .001$ ; Wilk's  $\Lambda = 0.94$ , partial  $\eta^2 = .05$ . A post-hoc analysis was performed to examine individual mean difference comparisons across all five subtests of the VT-ORG. Although the MANOVA was significant, results of the post-hoc



analysis were insignificant ( $p = .16-.94$ ) across all five subtests due to unequal sample sizes (See Table 5).

Three multiple regressions were conducted to test if gender, race, education, overtime, sworn/unsworn, testifying, and work with victims, victim families, and victim services predicted ST, BO, and CS. Predictor variables were re-coded prior to running the multiple regression as follows: Gender (Female, Other), Race (White, Other), Education (Higher Education Degree, Other), Overtime (Yes, No), Testifying (Yes, No), and Sworn (Sworn/Unsworn). The additional variables of work with victims, victim services, and victim families did not require recoding because they were already dichotomous (Yes/No). As suggested by the analysis of variance (ANOVA), the model significantly predicted 6.3 % of the variance of ST,  $F(1,387) = 3.24, p = .001$ . Only two variables significantly predicted ST: testifying ( $t = -1.98, p = .05$ ), and working with victim families ( $t = -2.12, p = .04$ ). As suggested by the ANOVA, the models did not significantly predict BO or CS.

As shown in Table 6, there was a statistically significant, medium negative relationship between ST and the five subscales of the VT-ORG with a range of  $r = .26-.38, p < .01$ , a strong, negative relationships between BO and the VT-ORG subscales (Range  $r = 0.50-0.58, p < .01$ ), and a significant large, positive relationship between CS and VT-ORG ( $r = .40 - .50; p < .01$ ).

## **Discussion**

In an assessment of FSPs working in crime laboratories and medical examiner offices, the current study assessed levels of ST, BO, and CS as well as measuring employee perceptions of their organization's efforts to mitigate stress and address the impact of trauma. The participants represented multiple forensic disciplines similar to the range of FSP disciplines described by

Holt et al. (29) except that the current study also included professionals in medical examiner offices. For the latter professionals, field-based work included both crime scenes and other death investigation scenes.

In the current study, FSPs working in both the laboratory and in the field as well as managers reported moderate levels of ST corresponding to the designation of “sometimes” on the ProQOL, reinforcing other findings of distress in FSPs (29). In addition, ProQOL ST scores for all three groups were higher than ProQOL ST scores reported in a sample of police officers working with victims of sexual assault (8) and in EMS, law enforcement, and victim services workers (35). This suggests that FSPs experience levels of stress that are at least comparable to those experienced by law enforcement and EMS. Future studies should focus on elucidating how these groups are similar and different in their exposure to stress and their coping responses.

Within the current sample, field-based FSPs emerged with higher ST scores compared to lab-based FSPs, congruent with existing literature indicating elevated levels of stress and ST in crime scene investigators (25,28) and extending it by the direct comparison between lab and field-based FSPs. In the written responses, participants explained that field exposure resulted in loss of sleep, anxiety, intrusive thoughts, and trouble forgetting horrendous aspects of the crimes, similar to responses by subjects in Holt et al. (29). Individuals not working directly with victims (e.g., lab-based scientists) reported they felt incapable of doing work with victims, and predicted this work would be highly stressful for them.

Prior studies have found specific types of field-based exposures predict greater ST such as homicides (27) or work involving child victims (23). To our knowledge, no studies have identified the types of exposures in the laboratory that may increase risk for ST. Although the current study did not aim to address this question, participants indicated in the written response

section that work in the laboratory with crime narratives, victims, or evidence personalizing the crime (e.g., clothing) was the most stressful. More study is needed to better characterize which stressors increase the risk for ST for FSPs in their specific roles in the field, laboratory, and as managers.

Mean levels of BO in the current sample were similar for field-based, lab-based, and managers/supervisor FSPs, with all groups reporting “some” amounts of BO, as measured by questions such as, “I feel worn out because of my cases.” This finding indicates that FSPs experience BO regardless of work responsibilities. Further, in the write-in responses, individuals reported stress related to excessive workload, quick turn-around times, and the pressure associated with frequent testifying. Both the quantitative and qualitative findings in the current study are consistent with prior studies which identified multiple stressors facing FSPs including high caseloads and pressures to produce error free work (18-20,29).

The current study also found moderate job satisfaction (CS) across all the participating FSPs, similar to reports of moderate to high job satisfaction in other surveys (29,33). Write-in responses revealed respondents believed their work was important, rewarding, and helped the victims, victim’s families, and overall community. Future research should seek to delineate specific factors for FSPs which increase job satisfaction.

The current study did not find that gender, overtime, or sworn v. unsworn status significantly predicted ST, BO, or CS, in contrast to other research which identified female gender and overtime as significant predictors of stress in FSPs (29) and for BO in general (15). This finding may have derived from the unequal sample sizes in the current study, (i.e., women (70.5%) unsworn (82.6%)), and a low percentage of professionals reporting more than 5 hours of overtime (21.7%). Work with victims and their families as well as testifying did emerge as

predictors of ST in the current study, albeit with small effects. More research is needed to distinguish which job activities are the most stressful and warrant devotion of scarce resources to reduce ST.

A key finding of the current study was the strong relationship between FSPs' perceptions of their organization's efforts to address stress and promote well-being, and their levels of ST, BO, and CS. Greater employee belief that their organizations were addressing these issues predicted lower levels of ST and BO and higher levels of CS. Although other studies have linked organizational support to reduced levels of ST and BO (37), the current study is believed to be the first to systematically assess this relationship in FSPs.

The moderate to strong correlations between the scales is also consistent with the report by the creators of the VT-ORG that the VT-ORG had convergent validity with the ProQOL (35). With this relationship in mind, Hallinan et al. (35) recommended that "...organizations can use the VT-ORG to justify improving their response to [ST] by highlighting the areas where they scored low as those that need improvement" (p. 10). In order to help law enforcement, EMS, fire services, and victim services become trauma-informed organizations, the Office for Victims of Crime developed the "Vicarious Trauma Toolkit" (47) to mitigate the potentially negative effects of trauma exposure. This toolkit includes the Vicarious Trauma- Organizational Readiness Guides (VT-ORG) and a "blueprint" on how to use the VT-ORG to help organizations assess their current capacity to address employees' work-related exposure to trauma, prioritize organizational needs, and develop an action plan. Forensic science agencies in partnership with behavioral researchers can benefit from continued validation and leveraging these tools developed for criminal justice system stakeholders.

With these considerations in mind, in the follow-up meetings with each organization we shared participant VT-ORG scores on the specific scales (Leadership & Mission, Employee Empowerment, etc.) to delineate areas of relative strengths and weaknesses. The scores proved to be consistent with management descriptions of the scope of their trauma readiness interventions, particularly in the area of Staff Health and Wellness. In written responses, some employees indicated their belief that management was not providing supports which were actually available to them. This observation may reflect poor internal marketing. Management was receptive to addressing areas of relative weakness such as increasing opportunities for stress-reducing programs such as yoga, peer support, and exercise, as well as better promoting existing services (e.g. Health and Wellness programming) to employees.

In addition to the positive impact of individual strategies such as mindfulness, relaxation, and reflection (20,36), organizational strategies such as flexible scheduling, improved communication with supervisors, and education to assist employees in recognizing and mitigating stress have been identified as important interventions (29). In this regard, the “Law Enforcement Mental Health and Wellness Act: Report to Congress” (7) highlighted the relative lack of mental health and wellness services available to unsworn compared to sworn professionals. Given that the majority of FSPs in the current assessment were unsworn, the Report’s recommendation for expanding services to unsworn professionals appears justified. Based on the current findings, organizations need to carefully monitor stress in field-based professionals and devote resources to increasing resiliency in this group. That said, all three groups in the current study reported moderate levels of ST and BO, emphasizing that organizations need to assess all FSPs and devote resources accordingly.

The present study has several limitations. First, a relatively low response rate to the questionnaires (31%) with a smaller number providing complete data for statistical analysis (25%), limited the generalizability of the findings. Unfortunately, this has been the pattern in other studies of FSPs where response rates have been even lower (33,39) or unspecified (29). Second, because participants were permitted to designate that they worked in multiple disciplines as identified in Table 3, we did not establish relationships between disciplines and ST, BO, and CS. Future studies should address this question. Attention should also be focused on unique dimensions of forensic professional activity in medical examiner and coroner offices compared to crime laboratories.

Beyond limitations in the current study's design and response rate, there were possible disincentives curtailing FSP participation in the study. Discussions with several of the facilities indicated that employees may fear negative consequences on their ability to testify or to be promoted if they acknowledged ST or BO, even with guarantees of confidentiality, much the way law enforcement officers are known to avoid seeking counseling for fear of an impact on their job status (7). Efforts to change these perceptions and address other elements in the forensic science culture are needed to better assess employee stress and design effective interventions, aligning with recommendations that have also been made for law enforcement (7).

In conclusion, future research is needed to understand the specific elements and job responsibilities of field-based, lab-based, and managers that predict ST, BO, and CS. In addition to these cross-sectional assessments, future work should include longitudinal designs to define the impact of employee support strategies in areas of leadership, supervision, training, empowerment and work environment, and health and wellness on ST and BO over time. Given that high levels of employee ST and BO are known to result in lower productivity, increased risk

of turnover, and impaired cognitive performance (14,15,30), the current findings support the need to devote scarce resources to address these issues.

NIJ stands committed to support research in these areas and to disseminate research findings to strengthen the forensic science workforce. In fiscal year 2019, NIJ made two grant awards under a new topic on understanding the impact and management of stress, burnout, and vicarious trauma to advance resiliency of the forensic science workforce through the NIJ solicitation: “Research and Evaluation in Safety, Health, and Wellness in the Criminal Justice System” (48). The first award to the University of New Hampshire is examining the impact of work-related exposure to child exploitation evidence on the stress, mental and physical health of digital forensic examiners (49). It is also examining the impact of agency-level practices and training that mitigate trauma and promote resilience among forensic examiners exposed to these types of materials, and develop a screening instrument to help agencies assess staff suitability for investigations requiring exposure to this type of evidence. The second award to the Research Triangle Institute (RTI) is examining work-related stress among medicolegal death investigators to inform interventions and preventative training to reduce and alleviate work-related stressors, and to improve organizational outcomes such as turnover, job performance, and improve personal well-being (50). Additionally, the NIJ Forensic Technology Center of Excellence (administered by RTI) has developed a series of webinars and podcasts that explore common strategies and resources derived from existing research and offers guidance to forensic science practitioners and the broader criminal justice community on how they can be leveraged. (51). We encourage the forensic science community to explore these and other related resources, including the VT-ORG for Forensic Professionals available in the Supplemental Materials and the

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groundbreaking OVC Vicarious Trauma Toolkit (47), to advance policy and practice in these areas.



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## **Tables**

**Table 1 – Demographics**

	<b>Lab-Based</b>	<b>Field-Based</b>	<b>Manager</b>	<b>Total</b>
	<i>N</i> = 351 (%)	<i>N</i> = 52 (%)	<i>N</i> = 116 (%)	<i>N</i> = 519 (%)
<i>Age</i>				
18-24	17 (4.8)	2 (3.8)	0 (0)	19 (3.7)
25-30	99 (28.2)	10 (19.2)	3 (2.6)	112 (21.6)
31-35	76 (21.7)	10 (19.2)	12 (10.3)	98 (18.9)
36-40	55 (15.7)	5 (9.6)	33 (28.4)	93 (17.9)
41-45	40 (11.4)	9 (17.3)	23 (19.8)	72 (13.9)
46-50	22 (6.3)	12 (23.1)	15 (12.9)	49 (9.4)
51-55	19 (5.4)	1 (1.9)	16 (13.8)	36 (6.9)
56 or Older	23 (6.3)	3 (5.8)	14 (12.1)	40 (7.7)
<i>Gender</i>				
Female	260 (74.1)	30 (57.7)	76 (65.5)	366 (70.5)
Male	84 (23.9)	22 (42.3)	40 (34.5)	146 (28.1)
Other	1 (0.3)	0 (0)	0 (0)	1 (0.2)
Prefer not to respond	6 (1.7)	0 (0)	0 (0)	6 (1.2)
<i>Race</i>				
AI or AN	3 (0.9)	0 (0)	0 (0)	3 (0.6)
Asian	23 (6.6)	2 (3.8)	4 (3.4)	29 (5.6)
Bi-Racial	7 (2.0)	1 (1.9)	2 (1.7)	10 (1.9)
Black or AA	27 (7.7)	17 (32.7)	10 (8.6)	54 (10.4)
Hispanic	24 (6.9)	4 (7.7)	8 (6.9)	36 (6.9)
NH or PI	1 (0.3)	0 (0)	0 (0)	1 (0.2)
White	251 (71.7)	26 (50.0)	86 (74.1)	372 (70.1)
Other	1 (0.3)	1 (1.9)	0 (0)	2 (0.4)
Prefer not to respond	13 (3.7)	1 (1.9)	6 (5.2)	20 (3.9)
Missing	1	0	0	0
<i>Marital Status</i>				
Divorced/Separated	17 (4.8)	7 (13.5)	9 (7.8)	33 (6.4)
Married/Common-Law	181 (51.6)	20 (38.5)	7 (6.4)	278 (53.6)
Single/Never Married	149 (42.5)	25 (48.1)	30 (25.9)	204 (39.3)
Widowed	4 (1.1)	0 (0)	0 (0)	4 (0.8)
<i>Education</i>				
HS Graduate or GED	3 (0.9)	0 (0)	1 (0.9)	4 (0.8)
Some College	6 (1.7)	7 (13.5)	5 (4.3)	18 (3.5)
Associate or 2 Yr. Degree	2 (0.6)	6 (11.5)	0 (0)	8 (1.5)
Bachelor's Degree	134 (38.2)	9 (17.3)	21 (18.1)	164 (31.6)
Some Graduate	30 (8.5)	8 (15.4)	13 (11.2)	51 (9.8)
Master's Degree	158 (45.0)	18 (34.6)	62 (53.4)	238 (45.9)
MD	6 (1.7)	1 (1.9)	3 (2.6)	10 (1.9)
PhD	11 (3.1)	2 (3.8)	9 (7.8)	22 (4.2)
Other	1 (0.3)	1 (1.9)	2 (1.7)	4 (0.8)

*Note.* AA = African American; AI = American Indian; AN = Alaska Native; NI = Native Hawaiian; PI = Pacific Islander

**Table 2 – Job Responsibilities**

	<b>Lab-Based</b>	<b>Field-Based</b>	<b>Manager</b>	<b>Total</b>
	<i>N</i> = 351(%)	<i>N</i> = 52(%)	<i>N</i> = 116(%)	<i>N</i> = 519(%)
<i>Testifying</i>				
None	178 (50.7)	37 (71.2)	71 (61.2)	286 (55.1)
1 to 5	129 (26.8)	10 (19.2)	39 (33.6)	178 (34.3)
6 to 10	29 (8.3)	2 (3.8)	6 (5.2)	37 (7.1)
11 to 15	9 (2.6)	2 (3.8)	0 (0)	11 (2.1)
16 to 20	3 (0.9)	0 (0)	0 (0)	3 (0.6)
21 to 25	1 (0.3)	0 (0)	0 (0)	1 (0.2)
26 to 30	1 (0.3)	0 (0)	0 (0)	1 (0.2)
31 - 35	0 (0)	0 (0)	0 (0)	0 (0)
36 to 40	0 (0)	1 (1.9)	0 (0)	1 (0.2)
More than 40	1 (0.3)	0 (0)	0 (0)	1 (0.2)
<i>Status</i>				
Sworn	58 (16.5)	11 (21.2)	14 (12.1)	83 (15.9)
Unsworn	291 (82.9)	41 (78.8)	102 (87.9)	434 (82.6)
Missing	2 (0.6)	0 (0)	0 (0)	2 (0.5)
<i>Over Time</i>				
None	135 (38.5)	10 (19.2)	48 (41.4)	193 (37.2)
1 - 5 hrs.	156 (44.4)	24 (46.2)	38 (32.8)	218 (42)
6 - 10 hrs.	50 (14.2)	9 (17.3)	26 (22.4)	85 (16.4)
11 - 15 hrs.	8 (2.3)	4 (7.7)	3 (2.6)	15 (2.9)
< 15 hrs.	2 (0.6)	5 (9.6)	1 (0.9)	8 (1.5)
<i>Victims</i>				
Yes	27 (7.7)	42 (80.8)	25 (21.6)	94 (18.1)
No	324 (92.3)	10 (19.2)	91 (78.4)	425 (81.9)
<i>Victims Families</i>				
Yes	11 (3.1)	30 (57.7)	19 (16.4)	60 (11.6)
No	340 (96.9)	22 (42.3)	97 (83.6)	459 (88.4)
<i>Victim Services</i>				
Yes	7 (2.0)	15 (28.8)	10 (8.6)	32 (6.2)
No	344 (98.0)	37 (71.2)	106 (91.4)	487 (93.8)

**Table 3 – Discipline by Job Category**

	<b>Lab-Based</b>	<b>Field-Based</b>	<b>Manager</b>	<b>Total</b>
Anthropology	2	2	2	6
Autopsy Technician	1	6	5	12
DNA	106	4	39	149
Blood Pattern Analysis	0	3	0	3
Case Manager	25	4	28	57
Crime/Death Science Investigator	11	24	17	52
Controlled Substance	51	5	10	66
Decedent Identification	11	7	7	25
Digital/Multimedia Evidence	12	6	5	23
Evidence Technician	26	7	7	40
Explosives	5	2	3	10
Fatality Team	5	4	3	12
Firearms	23	1	5	29
Fire debris / Arson Analysis	4	2	5	11
Hazardous Materials	10	8	7	25
Histologists	0	2	0	2
Impression Evidence	9	2	2	13
Intelligence Analysts	1	3	2	6
Administration	40	5	50	95
Latent Print Analysis	31	1	4	36
Medicolegal Death Investigator	2	8	5	15
Pathology / Autopsy	3	4	6	13
Photographer	16	14	5	35
Quality Assurance	31	3	12	46
Questioned Documents	9	2	3	14
Tool Marks	9	1	4	14
Trace Evidence	25	2	5	32
Toxicology	18	2	4	24

**Table 4 – Means (SD) on PROQOL by Job Category**

PROQOL	Job Role		
	Lab	Field	Manager
ST	49.01 (9.53)	54.09 (11.26)*	51.06 (10.48)
BO	49.82 (9.64)	50.43 (12.22)	50.36 (9.47)
CS	50.12 (9.63)	50.42 (10.34)	49.91 (10.46)

BO = Burnout; CS = Compassion Satisfaction; ST = Secondary Traumatic Stress. \* $p = .007$  (Field v. Lab)

**Table 5 – Means (SD) on VT-ORG by Job Category**

<b>VTT-ORG</b>	<b>Job Role</b>		
	Lab	Field	Manager
LM	3.44 (.93)	3.44 (.98)	3.41 (.84)
MS	3.24 (.92)	3.08 (.99)	3.10 (.82)
EE	3.16 (.79)	3.18 (.98)	3.17 (.79)
TPD	3.26 (.79)	3.40 (.92)	3.42 (.65)
SH	3.10 (.91)	3.26 (1.08)	2.98 (.88)

*Note.* LM = Leadership and Mission; MS = Management and Supervision; EE = Employment Empowerment and Work Environment; TPD = Training and Professional Development; SH = Employment Health and Wellness. No significant differences between groups.

**Table 6 – Correlation**

<b>VTT-ORG</b>	<b>PROQOL</b>		
	<b>ST</b>	<b>BO</b>	<b>CS</b>
LM	-0.33	-0.50	0.40
MS	-0.38	-0.52	0.43
EE	-0.31	-0.57	0.51
TPD	-0.26	-0.58	0.51
SH	-0.31	-0.51	0.43

*Note.* All values significant at  $p < .01$ ; Two-tailed; Listwise  $N = 394$   
LM = Leadership and Mission; MS = Management and Supervision;  
EE = Employment Empowerment and Work Environment; TPD =  
Training and Professional Development; SH = Staff Health and  
Wellness; BO = Burnout; CS = Compassion Satisfaction; ST =  
Secondary Traumatic Stress

## **Supplemental Material**

### **Appendix - VT-ORG**

#### ***Vicarious Trauma-Organizational Readiness Guide (VT-ORG) for Forensic Professionals***

##### **A. In answering the following questions, consider the past 6 months in your facility.**

**1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always or N/A**

1. Leadership demonstrates a clear and decisive vision that supports and articulates the mission of the organization.
2. Leadership models, values, and promotes open and respectful communication among staff (contractors).
3. Leadership communicates clear and specific information on decision making throughout the facility (e.g., resource allocation, scheduling, deadlines, implementation of policies and procedures).
4. Leadership proactively addresses vicarious trauma in the facility's long-term vision and strategy.
5. Leadership recognizes and values my role within the organization.
6. Leaders model a healthy work/life balance.
7. Leadership communicates and enforces a no-tolerance policy concerning—
  - a. sexual harassment;
  - b. workplace violence, including bullying/hazing;
  - c. intimate partner violence within or outside of the workplace;



d. discrimination based on age, gender, gender identity, sexual orientation, race, religion, ability, etc.

**B. To fulfill their obligation to lessen the impact of vicarious trauma, managers and supervisors in vicarious trauma-informed organizations foster supportive relationships based on inclusivity, mutual respect, and trust; promote policies and practices that lessen the negative impact of the work; seek out and support staff following critical or acute incidents; and conduct performance evaluations that include discussions of vicarious trauma. In answering the following questions, consider the past 6 months in your facility.**

**1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always or N/A**

1. My facility uses a protocol to address staff (contractors) affected by:
  - a. crime/death scenes;
  - b. traumatic materials;
  - c. contact with victims/decedents and/or victims' families;
  - d. organizational/administrative stress;
  - e. specific concerning behaviors (e.g., low morale, substance abuse, absenteeism).
2. My managers are readily accessible to support staff (contractors) members following a critical or acute incident.
  - a. My facility utilizes a critical incident stress management team.
3. I meet individually with my manager/supervisor.
4. Meetings with my manager/supervisor provide a forum for addressing exposure to trauma.
5. My manager/supervisor reviews my job responsibilities and workload balance (e.g., variety of tasks, number of high-impact cases, call volume).
6. I am able to discuss concerns about the facility or my job with my manager/supervisor without fear of negative consequences.
7. My manager/supervisor encourages and responds to my ideas and input.
8. Staff (contractors) meetings are highly valued as a mode of team communication and collaboration.
9. Staff (contractors) meetings are an opportunity to address topics related to vicarious trauma and stress management.
10. My manager/supervisor takes steps to ensure that staff have access to adequate resources to perform their jobs.

11. Staff members (contractors) are provided adequate and equitable salary and benefits.
12. My manager/supervisor ensures policies and/or procedures are in place to address staff (contractors) grievances.
13. My manager/supervisor uses a formal performance evaluation process.
  - a. My performance evaluation includes a discussion of organizational and individual strategies to minimize risk for vicarious traumatization.
  - b. My performance evaluation includes a discussion of staff (contractor) contributions to a positive work environment.

**C. To promote and maintain a healthy work environment, vicarious trauma-informed organizations foster teamwork; encourage collaboration both within and outside the organization; create formal and informal opportunities for staff to connect with one another; and offer opportunities to diversify job tasks. In answering the following questions, consider the past 6 months in your facility.**

**1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always or N/A**

1. My organization provides opportunities for all staff members (contractors) to provide input into the:
  - a. development of programs, practices, and policies;
  - b. evaluation of programs, practices, and policies.
2. My organization shows appreciation for staff (contractor) efforts in meaningful ways (e.g., public recognition, note in personnel file, promotions).
3. My organization evaluates staff (contractors) satisfaction, including job duties, facility policies, etc.
4. When needed, my facility uses a written procedure that provides guidance for quick, effective, and confidential resolution of staff (contractors) conflict.
5. My organization shows that respect for each person is highly valued.
6. Diversity is welcomed, respected, and valued.
7. Disparaging comments and other demonstrations of disrespect are not tolerated
8. I experience a genuine sense of positive teamwork in my organization.
9. My organization provides formal and informal opportunities for building a sense of community and teamwork among staff (contractors).
10. When needed, my organization uses effective methods to address staff (contractors) who are not able to contribute to a positive atmosphere or act as team players.

11. Staff (contractors) feel safe coming forward to discuss issues of workplace discrimination based on age, gender, gender identity, sexual orientation, race, religion, ability, etc.
12. My organization encourages use of time off.
13. My organization provides staff (contractors) with a private, comfortable, and safe workspace.
14. My organization provides opportunities for me to diversify my work tasks.

**D. To strive for professional competency, capacity, and staff retention, vicarious trauma-informed organizations promote continuing education, professional development, and networking opportunities; provide thorough orientation and ongoing training; enable access to resources; and support staff participation in on- and offsite learning opportunities. In answering the following questions, consider the past 6 months in your facility.**

**1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always or N/A**

1. My organization orients new staff (contractors) to their job role and tasks.
2. My organization provides training and education to all staff (contractors) on:
  - a. work-related vicarious trauma and its impact on work performance;
  - b. strategies on how to address work-related stress and vicarious traumatization.
3. My organization provides onsite opportunities for training and professional development.
4. My organization supports attendance at outside meetings and trainings.
5. I am prepared to cover for coworkers who are absent.
6. My organization informs its members) about expectations, opportunities, and steps necessary for advancement, including additional training and/or certification requirements:
  - a. I feel adequately trained for my work;
  - b. I feel adequately trained to testify.
7. I am encouraged to network and collaborate with coworkers and other facilities.

**E. To maintain the health and wellness of their staff, vicarious trauma-informed organizations recognize links between health/wellness and staff satisfaction and productivity; devote time and resources to promoting staff well-being; encourage and provide health and wellness activities; and incorporate wellness into policies and practices. In answering the following questions, consider the past 6 months in your facility.**

**1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always or N/A**

1. During the hiring and orientation of new staff (contractors), managers/supervisors demonstrate their understanding of the risk for vicarious trauma and the importance of both individual and organizational strategies to address it by:
  - a. asking final job applicants to articulate their own coping strategies;
  - b. making final applicants aware of the facility's strategies to reduce the negative impact of the work.
2. My organization offers services that support individual staff members (contractors) (e.g., employee assistance program, chaplain services, and mental health providers).
3. My organization provides opportunities for peers to support one another –
  - a. my organization has a peer support program;
  - b. my organization has dedicated time for peers to interact
4. My organization conducts exit interviews that include questions related to vicarious trauma and the organization's response.
5. Differentiation between work and non-work hours is recognized and respected.
6. My organization's policies:
  - a. support mental health and wellness;
  - b. support physical health and wellness.
7. My organization provides wellness activities (e.g., fitness program, mindfulness/meditation, yoga, gym access).
8. My organization encourages wellness activities (e.g., fitness program, mindfulness/meditation, yoga, gym access).
9. My organization sponsors debriefing and/or support sessions after major traumatic events.
10. My organization policies and/or practices support family members of staff.

## **Appendix - ProQOL**

MANUSCRIPT AS SUBMITTED // JANUARY 2021

### **Professional Quality of Life-5 (ProQOL)**

Below are some questions about your experiences, both positive and negative, as a forensic science practitioner. Please consider each of the following questions about you and your current work situation. Select the number that honestly reflects how frequently you experienced these things in the *last 30 days*.

**1=Never    2=Rarely    3=Sometimes    4=Often    5=Very Often**

1. I am happy.
2. I am preoccupied with more than one case I worked on.
3. I get satisfaction from being able to work on cases.
4. I feel connected to others.
5. I jump or am startled by unexpected sounds.
6. I feel invigorated after working on my cases.
7. I find it difficult to separate my personal life from my life working on cases.
8. I am not as productive at work because I am losing sleep over the traumatic experiences of a case(s) I worked on.
9. I think that I might have been affected by the traumatic stress of the cases I have worked on.
10. I feel trapped by my current position.
11. Because of my job working on cases, I have felt "on edge" about various things.
12. I like my work in my current position.
13. I feel depressed because of the traumatic experiences of the cases I have worked on.
14. I feel as though I am experiencing the trauma of a case I have worked on.
15. I have beliefs that sustain me.
16. I am pleased with how I am able to keep up with the techniques and protocols that allow me to work on cases.
17. I am the person I always wanted to be.
18. My work makes me feel satisfied.
19. I feel worn out because of work with my cases.
20. I have happy thoughts and feelings about the work I have done.

21. I feel overwhelmed because my caseload seems endless.
22. I believe I can make a difference through my work.
23. I avoid certain activities or situations because they remind me of frightening experiences of the cases I have worked on.
24. I am proud of what I can do in my current position.
25. As a result of work on my cases, I have intrusive, frightening thoughts.
26. I feel "bogged down" by the system.
27. I have thoughts that I am a "success" in my current position.
28. I can't recall important parts of my work with trauma cases.
29. I am a very caring person.
30. I am happy that I chose to do this work.