

Article 10006. Encyclopedia of Forensic Sciences, Third Edition

Editor-in-Chief: Max Houck, vol 1. pp. 209-220

doi: [10.1016/b978-0-12-823677-2.00017-9](https://doi.org/10.1016/b978-0-12-823677-2.00017-9)

Accepted for publication 13th January 2022

TITLE: Assessment of Occupational Stress.

Dr. Sally Kelty ^{*1}, Mr Nathan Green ², Professor Olivier Ribaux ³, Professor Claude Roux ⁴, Professor James Robertson ⁵.

^{*1} **Corresponding Author.** Criminologist and Research Psychologist, Discipline of Psychology, University of Canberra, Australian Capital Territory, 2617.
Tel: (+061) 406 983397, Email: Sally.Kelty@canberra.edu.au.

² Coordinator Forensics Eastern Command, Operational Science and Technology, Australian Federal Police, Sydney, Australia. Email: Nathan.Green@afp.gov.au

³ Professor of Criminal Sciences, École des sciences criminelles, Université de Lausanne, Switzerland. Email: olivier.ribaux@unil.ch

⁴ Director Centre for Forensic Science, Centre for forensic Science, University of Technology Sydney, Sydney, Australia. Email: Claude.Roux@uts.edu.au

⁵ Emeritus Professor, National Centre for Forensic Studies (NCFS), Faculty of Science and Technology, University of Canberra, Australian Capital Territory, Australia. Email: James.Robertson@canberra.edu.au

Abstract

The forensic sciences are rewarding professions yet place practitioners at risk of occupational stress (OS). This article provides an overview of the three main stress risk domains (individual, interpersonal and organizational). We discuss four forms of OS (job strain, burnout, secondary traumatic stress, and compassion fatigue) and present a comprehensive guide for stress measurement. Early recognition of potential stress and effective intervention and stress management is essential to promote physical and mental wellbeing in forensic organizations. The responsibility of enhancing the wellbeing of practitioners is at all levels of an organization, including internal policy, senior management, supervisors and individuals. A focused organizational wide approach to stress management will allow practitioners to perform effectively over their career. A range of evidence-based programs are discussed.

Keywords

Occupational stress, job-stress, wellbeing, burnout, secondary traumatic stress, compassion fatigue and satisfaction, stress management, resilience.

Key Points

- Forensic practitioners through their work are at risk of developing occupational stress
- Enhancing positive physical and mental wellbeing is key for stress management
- Many sources of stress come from workplace culture, practices, and policies
- Reducing stress requires management promotion of talking workplace stress hazards
- Early recognition of stress and effective intervention is an optimal strategy

CRedit author statement

Sally Kelty.: Conceptualization, Investigation, Validation, Formal Analysis, Primary Writing - Original Draft Preparation,

Nathan Green.: Conceptualization, Validation, Writing- Review and Editing,

Olivier Ribaux.: Conceptualization, Writing- Review and Editing,

Claude Roux.: Writing - Review & Editing.

James Robertson.: Conceptualization, Writing- Review and Editing.

Introduction

The forensic sciences, like policing and medicine, is a high stress profession with practitioners routinely exposed to challenging incidents either face to face, or via secondary exposure to digital materials, case files, and forensic traces. Recent literature is finding forensic science practitioners, regardless of discipline, are at risk of developing occupational stress (OS) (Almazrouei et al., 2021; Burruss et al., 2018; Franqueira et al., 2018; Kelty et al., 2021; Levin et al., 2021; Slack, 2020).

In this article the implications of OS for the forensic sciences across several domains are reviewed: the personal, interpersonal, the organizational level, the justice level, and how forensic science is delivered. The forms of OS commonly seen in forensic sciences: job strain, burnout and secondary traumatic stress, and compassion fatigue are described. A battery of evidence-based assessment tools that can be used by forensic scientists themselves, their team leaders, Human Resources (HR), or in-house health services to measure OS and measure variables that buffer against stress are presented. Some of the strategies that can assist in promoting and enhancing positive well-being. The rationale for including assessment tools is twofold. First, recognizing sign of stress early represents a vital pathway for tackling this significant workplace hazard. Second, that measuring OS and promoting positive mental well-being on a routine basis within forensic sciences institutions will allow OS prevention to be better understood, recognized, and discussed as an issue that can arise due to this type of work, and managed early when it does. Presently, in forensic sciences institutions, although OS is known about it remains stigmatized, with practitioners saying they would rather keep silent about stress for fear of being considered weak, being thought of as not up to the job, or from fear they will let their team down (Kelty and Gordon, 2015; Lambert and Steinke, 2015). Given the forensic sciences are high stress professions there is no question that promoting positive mental health is essential.

What is Stress and OS, and Associated Implications for the Forensic Sciences

The primary organization reporting on the impacts of OS is the World Health Organization (WHO). World Health Organization (2020) notes that across all sectors, workplace incidents that lead to OS is

at global epidemic levels representing one of the most significant work hazards, and reducing OS requires a focused approach.

Stress is defined as the body's reaction to internal or external events which creates psychological or physiological changes within a person (Cohen et al., 2016; Violanti et al., 2017). OS is an umbrella term that specifically describes the forms of stress resulting from carrying out their profession, or factors within the workplace itself. OS is the harmful physical and emotional response to workplace demands, or workload pressures that do not match a person's current knowledge, skill level, or training (Fink, 2016). OS stress becomes chronic (i.e., ongoing) when high workplace demands eventually exceed a person's ability to manage or cope. Unmanageable workplace demands come from various sources, such as being assigned tasks that exceed a person's skill level, given a volume of tasks that cannot be completed in given timeframes, where a workplace has a negative culture or unsupportive management, or routine (and repetitive) exposure to confronting scenes or victim distress.

OS can be acute (short-term) or chronic (ongoing). The Centers for Disease Control and Prevention (Centres for Disease control and Prevention, 2014) stress that chronic OS should not be confused with acute stress relating to challenges at work that occur periodically, such as peaks in workload, or roll-out of new technology whether planned or unexpected. Short-term acute stress can challenge people both psychologically and physically and place demands that can be hard to meet initially. Short-term demands however can energise and motivate people and work teams, by providing opportunity to master new skills, gain knowledge, and can result in higher levels of job satisfaction (CDC, 2014).

The focus in this article is on chronic OS. Chronic OS rarely impacts just one area of a person's life, rather there are ripple effects for the person, their career, their homelife, their friendships, activities, work teams, their team leaders and the forensic organization (Chae and Boyle, 2013; Kelty et al., 2021).

Implications at the personal level

For the forensic scientist, chronic OS is associated with reductions in creative thinking and problem-solving, primarily due to increased cortisol levels (Echouffo-Tcheugui et al., 2018). Reductions in

mental ability and problem-solving ability created through stress has been noted as directly affecting higher-order cognitive tasks and verbal working memory (Regehr and LeBlanc, 2017). Specifically for the forensic sciences, stress related decline in cognitive abilities, such as problem-solving and abstract-thinking judgement, has the potential to increase the risk of errors in forensic data observation and perception, affect the type of testing strategies explored, and affects how practitioners interpret results, type of conclusions reached and how they are provided verbally or written into reports (Almazrouei et al., 2021; Dror, 2020; Gutshall et al., 2017).

Chronic OS is also related to decreases in attachment to work, lower job satisfaction, increases in cynicism, increases in workplace accidents, absenteeism, early retirement, and high intentions to quit (CDC, 2014; Spector, 2012). In some cases, the physiological impacts of heightened cortisol levels can lead to premature death and chronic disease (Brown and Campbell, 1990; Paton et al., 2009). Some practitioners within the forensic sciences, due to work-related stress, have taken their own life (Chae and Boyle, 2013; Loo, 2003).

US Research estimates that 25% of forensic science practitioners misuse alcohol, with 44% showing signs of chronic alcohol dependency. The researchers noted practitioners stated they used alcohol to unwind and manage the day and as coping strategy to deal with “the job” (Holt et al., 2012). Furthermore, Holt et al., found only 10% of forensic practitioners who reported experiencing OS sought psychological or wellbeing services to assist them in managing stress.

A further issue for forensic practitioners may result from unclear expectations around their role, or role positioning in an organization. Unclear expectations are associated with a range of OS factors, including a lack of role clarity which decreases personal motivation and job satisfaction and leads to higher intentions to quit (Fink, 2016). For example, in the case of digital forensics experts, there are ongoing debates centering on whether experts should be sworn or unsworn, and whether they should be located within police agencies, within forensic labs, or in private cybersecurity. Similar issues arise across many of the forensic sciences, including crime scene examiners, crash investigation and forensic medical practitioners (McKay-Davis et al., 2020). This has the potential to create instability

in work teams with experts having difficulty situating themselves, with differential employment status and unclear division of responsibilities in investigations depending on where the experts are based and whether they are sworn or civilian experts (Ludwig et al., 2012).

Implications at the interpersonal level

Many practitioners report that it can be difficult to switch off and not take 'work' home. Research by Kelty and Gordon (2015) found two protective factors assisted top-performing crime scene examiners to buffer the effects of OS. First, these practitioners created work-life balance. They purposefully ensured their out of work life was as meaningful to them as their work life by engaging in external hobbies, social/sporting club involvement, or creative activities. Being busy meant they had little time to think or dwell on work. Second, through this active separation they created a diversified self-identity of being a scientist/photographer, scientist/car restorer, scientist/writer, etc. Resilient practitioners stated of colleagues they saw burn out, one thing noticeable was less resilient practitioners appeared to have limited support or social lives out of work; all they had was 'forensic science'.

OS is linked to family conflict, higher divorce/separation rates, higher distress within the family, and higher incidents of family violence (Burke et al., 1984; Chae and Boyle, 2013). Harmonious home environments create social and emotional support for employees who work in challenging professions (Fink, 2016) especially law enforcement (Lambert et al., 2016).

Research has also found gender differences in the impact of OS. In households where women carry greater responsibility for home tasks and children, and when high job demands also occur with high out-of-work family demands, this creates or inflates the strain for women, especially in inflexible workplaces (Jeanguenat and Dror, 2018; McCarty and Skogan, 2013).

Implications at the organizational level

At the organizational/agency level, OS is associated with increases in workplace accidents, absenteeism, intentions to quit, and disillusionment with work (CDC, 2014). For forensic agencies, high attrition rates due to compensation or stress claims, early retirement, or quitting the department/agency,

has ripple effects due to the high level of organizational and job-specific knowledge and expertise that is lost. For example, in Australia, each new practitioner recruited into digital forensics can cost up to AUD\$100,000 in year one (excluding remuneration and other personnel costs) in training and fit-out. In other nations this could be higher. Additionally, the rapid growth requirement of digital forensics means demand has outstripped existing organizational supply, resulting in large numbers of new practitioners being brought into organizations. In many large and modern police forces a significant proportion of new digital forensic recruits are drawn directly from universities and other professional sources, as opposed to police recruits. Such professional recruits generally do not have the same training or exposure to stress-management strategies as sworn members and could be at greater risk of psychological injury due to exposure to explicit evidence. The constant increasing workload means new members may be exposed at a greater rate than previously, adding additional stress to individuals.

An unintended consequence of increasing demand for forensic evidence in investigations is the training burden placed on existing practitioners. While handling existing caseloads, practitioners are often required to train new staff and induct them into the forensic/policing environment. This adds an additional stressor to their workload, potentially increasing both intentions to quit, and actual resignations. This in turn can necessitate new recruitment (likely to be new professional staff) and thereby exacerbates this issue further. The cycle of “train/strain/lose” can result in rapid incapacitation of a previously functioning team, with little lead time between first noticing the signs of team stress and eventual team failure (from an operational output perspective).

Complexity and context of OS in the forensic sciences

OS is multifaceted and complex. Adding to the complexity underpinning OS is how forensic services are implemented where practitioners are exposed to different types of OS depending on the setting and practitioner’s positions relatively to the justice system. Significant differences may occur between settings (e.g., disaster victim identification, crime scenes, or laboratory analyses or medical examinations), distance from the justice system (e.g., university-based laboratory versus forensics within law enforcement versus hospital clinics), different sectors or statutory authorities (e.g., sports

and doping or match-fixing), non-government private setting (e.g., cybersecurity environment, privatized forensic laboratory, private medical practice). Current OS research in the forensic sciences has mostly been carried out in policing agencies, laboratories, or forensic medical facilities (Kelty et al., 2021). Less is known about the prevalence or trajectory of OS in private organizations, statutory bodies or university forensic research settings. Future research is warranted to explore if OS differs by agency, context or the environment forensic scientists work in.

Implications for justice outcomes (investigations and court trials)

OS is especially problematic in the forensic sciences due to the reduction in cognitive abilities that accompany its progression, from poor concentration, to diminishing problem-solving and abstract thinking and an inability to complete tasks. This decline in cognitive abilities places forensic scientists at risk of increased errors in data and trace collection, in analysis interpretation and in interim and final reports provided orally or in writing to the courts (Dror, 2020; Kelty and Gordon, 2015). Errors in the forensic sciences have been found to be associated with poorer justice outcomes and represent one of six factors related to miscarriages of justice, including wrongful executions and imprisonment (Gould et al., 2013). Presently, research to show what percentage of errors in forensic sciences leading to poor justice outcomes were created by declining cognitive abilities due to burnout, or other forms of OS could not be found in the peer-reviewed literature. However, by managing the risk of practitioner burnout or OS, it may be possible to reduce the risk that declining analytical thinking and problem-solving leads to poorer forensic science outcomes.

Holistic Understanding of the Sources of OS for the Forensic Sciences

For someone developing OS, the syndrome cannot be solely explained by how people cope with high workplace demands. Rather, it is better understood holistically as the interaction between three domains: the personal (factors and behavior related to the forensic practitioner), the interpersonal (factors relating to practitioners' social life/family/friends/activities), and the organization (which takes two distinct forms: job context and/or job content) (Kelty et al., 2021). The interactions between these

three domains can increase the risk of OS, or buffer OS by acting as a protective factor (Figley, 1995; Levin et al., 2021).

Job content factors relate to how the person carries out work tasks, managing and understanding expectations placed on their work and outputs, the equipment, skills, knowledge and training needed, and the level of recognition and autonomy required to carry out tasks. Content factors are elements that can form part of recruitment processes and/or be enhanced during career development programs (Kelty et al., 2017).

In contrast, job context refers to the working conditions provided by the organization including physical working conditions, workplace culture, physical and mental demands placed on employees, and supervision type (Wilson et al., 2017). Context elements are embedded in organizational culture and are beyond the control of a practitioner to amend change in these areas themselves. For example: promotion practices, supervision style, training provided, tolerance for bullying and discrimination,

Thus, job content and context refer to two distinct factors within organizations. These factors can occur singularly; however, it is more likely that both types co-occur. When looking at the source of OS for a practitioner, it is important to understand how job content and/or job context factors are influencing the onset and/or maintenance of OS.

In Table 1 below the range of OS risk and proactive factors by domain is presented. This reflects a summary for the findings from the limited research carried out with forensic practitioners to date. This list is not exhaustive; rather it was specifically compiled and categorised by domain type for this article and represents the factors that have been consistently raised by forensic scientists and practitioners. As can be seen, the range of organizational job context and content factors is broad.

TABLE 1
Examples of OS risk and protective factors by domain in the forensic sciences

Domain	Risk or Protective Factors, presented in no set order ^a
Personal risk or protective factors	Resiliency, problem-focused stress coping styles; quality of sleep; substance use; individual stress, anxiety, depression; personality type; emotional intelligence; self-management of physical and mental health and exercise; creative and problem-solving cognitive skills; open to learning; pursuit of relaxing or creative hobbies; boundary setting of work and down time.
Interpersonal risk or protective factors	Strength and type of supportive relationships with family, friends, groups; degree of stable and harmonious home environment; equity in parenting and household chores; diversified self-identity (scientist/non-scientist) formed through establishing a meaningful busy out of work life.
Organizational risk or protective factors (i) Job Context Factors	Trauma-informed organizational practices; adversarial nature of the legal system; exposure to distressing images, recordings, case files; repetitive exposure to distressing situations; exposure to victims; tolerance for employee discrimination; low salary; poor advancement opportunities; micromanaging supervisors; collegiate teams; clear communication; effective leadership; promotion of work-life balance; technology upgrades without upskilling; appreciate debriefing spaces; effective training; invisible tasks in workload; mentoring/inducting new staff into law and/or policing.
Organizational risk or protective factors (ii) Job Content Factors	Expectation practitioner will be accurate in analysis; low tolerance for mistakes; expectation practitioner will be unaffected by work type; fluctuating task priorities; competing interests; unclear performance expectations; feeling unappreciated by agency or colleagues; unpredictable shift pattern changes; isolated work; pride in helping the community and job satisfaction.

Notes: ^a Risk or protective factors based on the work of Kelty & Gordon, 2015; Kelty et al., 2017, 2021; Almazrouei et al., 2021; Brady, 2017; Burns et al., 2008; Burruss et al., 2018; Chae and Boyle, 2013; Dempsey et al., 2019; Franqueira et al., 2018; Gayadeen and Phillips, 2016; Holt et al., 2012; Lambert et al., 2012; Levin et al., 2021; McCarty et al., 2007, 2013; Orchard, 2012; Sherwood et al., 2019; Slack, 2020.

Main Forms of OS Commonly Observed in the Forensic Sciences

As discussed above, OS refers to forms of stress related to work and workplaces. Within the forensic sciences, the most reported forms of OS are job strain, burnout, secondary traumatic stress, and compassion fatigue (Goldstein and Alesbury, 2021; Levin et al., 2021; Powell, Guadagno, and Cassematis, 2013; Stamm, 2021). Given this, the focus of this article is on these four forms. For

interested readers on other forms of OS, such as Post-Traumatic Stress Disorder (PTSD) please refer to Fink (2016) and Violanti et al., (2017).

Job strain

The term “job strain” was developed by Karasek (1989) who noted the negative impact on physical and mental health caused by OS did not occur from one single aspect of the workplace. Rather, it was due to the combination of the work situation or work demands combined with the person’s freedom and ability to decide how to deal with these demands. Job strain occurs when job demands are constantly higher and job decision freedom is lower. A central feature of professions is the exercise of professional autonomy or the freedom to exercise professional judgement. Australian Standard 5388.3-2013 states explicitly that forensic science requires professional judgement and that it is influenced by qualifications, training, and experience. (Anon, 2013). This Australian standard has been developed into the international standard ISO 21043. In contrast at an organizational level forensic science, in some jurisdictions, operate under a quality and accreditation framework that some would argue has become increasingly detailed, too rigid, ignoring personal judgement, and abdicating responsibility to the 'system' (Crispino and Roux, 2018; Doyle, 2019; Willis, 2014).

Although work-related stress is common and unavoidable in forensic professions (Jeanguenat and Dror, 2018), when under chronic levels of job demands, some practitioners are at risk of job strain developing into burnout (Maslach and Leiter, 2016; Spector, 2012). Job strain manifests in three ways which is associated with adverse outcomes often accompanied by ways of coping, as shown in Table 2 overleaf.

Table 2

Three categories of job strain and behavioral or coping examples

Job Strain Category	Outcomes or Coping Strategies
Psychological reactions to strain	Anger Anxiety Frustration Job dissatisfaction Tiredness
Physical reactions to strain	Sleep disturbance Dizziness Headache Heart pounding Illness Cancer Heart disease
Behavioral reactions to strain	Increased risk of accidents Diminished ability to complete tasks on time Smoking Increase in substance use High intentions to quit/potential turnover, Absenteeism and/or lengthened sick leave

Notes: Table based on the work of Spector, P.E., 2012. *Industrial and Organizational Psychology: Research and Practice*, sixth ed. John Wiley & Sons Inc and Kelty, S.F., McQueen, E., Pymont, C., Walker, I., 2020. *A Holistic Approach For Identifying Unique Organizational Stressors in Digital Forensics: An Evidence-Based Review and Future Directions Report*. ACT: University of Canberra.

Burnout

Burnout, also referred to as chronic stress, was first identified as a syndrome occurring in high stress medical environments, such as operating theaters, and emergency departments. Risk factors for burnout include long hours, lack of organizational support, and continual high demand for results (Bakker and Heuven, 2006; Maslach and Leiter, 2016; Mor Barak et al., 2001).

Burnout consists of three phases: exhaustion, depersonalization (cynicism and job detachment), and professional inefficacy. It occurs due to workplace factors that place chronic levels of pressure and demands upon employees they cannot manage in the long term. Burnout negatively impacts work quality which reduces further as burnout progresses. The syndrome affects the physical and psychological health of the person and has negative ramifications for everyone affected by that person, such as family and friends (Levin et al., 2021; Maslach and Leiter, 2016).

The first phase of burnout is exhaustion resulting from persistent workload demands, pressure from workplace culture and/or competing demands from colleagues, external clients. When demands are unrelenting our emotional and mental coping ability becomes depleted. Phase two is where a person

starts to depersonalize their work. Depersonalization often manifests as a cynical outlook of the workplace which is often vocalized, accompanied with the person becoming less involved and detached from colleagues. There are also signs of a lack of understanding and empathy towards clients and/or colleagues. Phase three is marked by signs of reduced professional efficacy where people say they get no sense of achievement from their work, are not able to make a difference, see themselves as ineffective and report little or no job satisfaction and are not able to produce quality work, or think creatively.

Research exploring creative decision-making under stress using different measurements, including cortisol levels, stress questionnaires, and MRI scans, demonstrated that chronic stress changes higher-order executive cognitive functions. When people are chronically stressed (such as via burnout), executive functioning declines. This impedes abstract reasoning leading to poorer decision-making that is less goal directed and considered. Chronically stressed men and women, when compared with unstressed adults, are more prone to making habitual and less reflective decisions. Of importance, what this research showed was that once the stressed men and women had a six to seven week break from their chronic stress, their higher order cognitive functions improved and their decision-making returned to a pre-stress level of functioning (Soares et al., 2012). This suggests that catching and intervening when burnout is at the early stages is vital.

Two large longitudinal studies from the United States (US) and Poland showed employees working in first responder roles regularly exposed to traumatic events, either face to face, or by secondary exposure vivaciously (as are many forensic scientists) were at high risk of burnout due to their exposure (Shoji et al., 2015). Shoji et al analysed time lagged data finding that many practitioners with burnout at time 1, were likely to have Secondary Traumatic Stress at time 2 (six months later). In contrast, practitioners already with STS at time 1, did not show signs of burnout at time 2. This suggests for practitioners with primary and secondary exposure to work-related traumatic events, that although in some cases STS can develop alone, the evidence found burnout is a contributor to the development of STS. Preventing the escalation of burnout is important. The signs and symptoms of burnout are shown overleaf in Table 3.

Table 3
Signs and Symptoms of Burnout and STS

Burnout	Secondary Traumatic Stress
<p>Signs</p> <ul style="list-style-type: none"> Fatigued and exhausted Frustration Cynicism Detached from colleagues and clients Negative reactions towards others Poorer working relationships Lower job satisfaction Sleep disturbance Higher risk of analysis errors 	<p>Signs</p> <ul style="list-style-type: none"> Signs Sadness and grief Avoidance of working with people Reduced ability to feel empathy Frequent use of sick days Increased psychological arousal Addiction and drug misuse Sleep disturbance and nightmares Changes in beliefs
<p>Symptoms</p> <ul style="list-style-type: none"> Physical tension Fatigue Increased anger reactions Higher cortisol levels Decrease in abstract thinking, problem-solving 	<p>Symptoms</p> <ul style="list-style-type: none"> Headaches Digestive problems Muscle tension Fatigue Psychological distress
<p>Triggers</p> <ul style="list-style-type: none"> Personal characteristics High workload demands and competing priorities Unsupportive organisations Unsupportive supervisors Long work hours and shift work Limited personal agency in managing work 	<p>Triggers</p> <ul style="list-style-type: none"> Previous exposure to trauma Empathy and emotional energy Prolonged exposure to traumatic materials Personal response to stressor Work environment Work-related attitude shift

Notes: Table based on the work of Stamm, B., 2021. ProQOL: Professional Quality of Life. Retrieved from <https://proqol.org/> and Kely, S.F., McQueen, E., Pymont, C., Walker, I., 2020. A Holistic Approach For Identifying Unique Organisational Stressors in Digital Forensics: An Evidence-Based Review and Future Directions Report. ACT: University of Canberra.

Secondary traumatic stress

Secondary traumatic stress (STS) is an OS syndrome describing physiological and psychological responses following secondary exposure to challenging events or materials (Levin et al., 2021). Although many forensic practitioners attend crime, disaster, and incident scenes (known as primary stress exposure), much forensic work is classified as secondary exposure (e.g., viewing disturbing digital images, reading files/reports, medical examinations, interviewing offenders or witnesses, and traces). STS is argued to be a natural response to knowing about or hearing the traumatizing events experienced by others. It can result from helping or wanting to help people who are suffering or have suffered (Figley, 1995; Stamm, 2021).

Symptoms of STS often develop rapidly following a few selected events (Stamm, 2021). The symptoms mimic those of PTSD, although STS is a distinct stress syndrome (Levin et al., 2021). Symptoms can include feeling fearful or irritable, hypertension, thoughts of being helpless, difficulty sleeping and intrusive images of the event. The signs and symptoms of STS are shown above in Table 3.

STS emerged from the field of human services (Figley, 1995) although recent research has shown it extends beyond the field of human services to family members of trauma survivors (Lambert et al., 2012), digital forensic police investigators (Burruss et al., 2018), forensic medical partitioners (Levin et al., 2021), and forensic science practitioners (Goldstein and Alesbury, 2021).

Professional quality of life and compassion fatigue

The seminal work on the impact of OS in the form of compassion fatigue (CF) is the “Professional Quality of Life theory”, developed by Figley and Stamm (Figley, 1995; Stamm, 2021). This theory describes the impact of chronic OS in the helping and service professions. Chronic OS impacts professional quality of life across three OS quadrants: the two syndromes of STS and burnout (which are the two elements of CF), and compassion satisfaction. Burnout and STS are as described above.

CF is “the cost of helping others” (Stamm, 2021) and is the combination of two facets. Facet one is feelings of exhaustion, frustration, anger and depression typical of burnout (as described above in section “Burnout”). Facet two is STS (as described above in section “Secondary Traumatic Stress”).

The combination of levels of burnout and/or levels of STS manifest as the physical and mental exhaustion that can occur when helping others. This is common in professions such as law enforcement, health, and justice, who through their work are often exposed to trauma and distress and because of this can be particularly susceptible to developing CF (Cocker and Joss, 2016). CF can impact standards of patient or client care, relationships with colleagues, and lead to serious mental health conditions including PTSD or clinical levels of anxiety or depression (Stamm, 2021).

Compassion satisfaction (CS) is a primary protective factor against the negative impacts of CF (in the form of burnout and STS). CS describes the feelings of high job satisfaction and personal sense of achievement when people have confidence their work makes a difference, reduces the suffering of others, and contributes to the greater good. CS buffers against CF because it empowers people to understand the implications of their work and have pride in achievements. Enhancing CS is associated with higher self-efficacy, higher life satisfaction and internal happiness (Nas, 2021). Recent research has shown that higher levels of CS buffer against the impact of CF for police officers investigating sexual assault and child abuse (Losung et al., 2021). Obtaining CS is akin to the work of Seligman (2011) a founder of the positive psychology movement whose work concentrates on how people can learn to flourish and create positive well-being that counters mental distress.

Measuring the Sources and Types of OS

In this section, evidence-based measurement tools that can be used as an indicator of OS are presented. As discussed above, there are three main stress risk domains (individual, interpersonal and organizational) and four main types of OS observed in the forensic sciences (job strain, burnout, STS and CF). As OS sources and types occur over multiple domains there is no single biomarker or psychological measure. Given this, a range of psychometric measures have been selected that cover OS risk domains and types to provide an appropriate assessment battery.

Psychometric tests are validated psychological tasks (e.g., spatial puzzle or a questionnaire) given under standardized conditions. They measure specific variables, including syndromes (e.g., burnout or STS) and mental abilities and attitudes (e.g., decision-making, emotional intelligence, resiliency, anxiety) (Goldstein et al., 2019). These tests are available in two formats, either as free-to-use, or licensed.

The first format is free-to-use tests which are in the public domain (PD) and published in peer-reviewed journals or manuals following validation (in most cases by psychology research teams). As they are in the PD they can be printed out and administered by anyone. However, results obtained from PD tests are only reliable if tests are administered and scored according to the published guidelines. Further, the

interpretation of test scores should be carried out by a professional with expertise in psychometric assessment, such as an HR practitioner, a social scientist, or organizational or research psychologist (Goldstein et al., 2019).

The second format for a test is licensed. Licensed tests are purchased for fee. Many of the most widely used licensed tests can be completed by practitioners online and the test results and interpretation emailed back to the test taker, or to their HR department, for a small fee.

The tests presented by domain or OS type in Table 4 cover a selection of widely used tests that are either in the PD, free after registering with the test developer, or to be completed online for a small fee. Ideally all tests selected are useful, however if constraints prevent using the full battery, then one test from each section is still highly recommended. Underneath Table 4 are descriptions of each measure including what attributes are measure and why they are useful measures for the forensic sciences.

Table 4**Measuring OS by domain or type and assessment type**

Domain or OS type	Measurement name, availability either free to use (PD ^b) or licensed, administration method ^b
Personal factors	<p>Workplace PERMA Profiler (Free to use after registering) - multidimensional measure of workplace focused wellbeing and psychological flourishing (administration paper and pencil test)</p> <p>DASS 21 (initial fee to purchase manual, then free to use) - Self-report measure and indication of depression, symptoms of stress, and anxiety levels (administration paper and pencil test)</p> <p>GSE-R (PD^a, Free to use) – self-report measure of competence to deal effectively with stressful situations – compliment with the DASS 21 (administration paper and pencil test)</p> <p>EQ-I 2.0 (licensed, fee payable per test^c) - emotional intelligence measure (administration online completion)</p> <p>W-G III (licensed, fee payable per test^c) - critical thinking and inference measure (administration online completion)</p>
Interpersonal factors	<p>PERMA Profiler (Free to use after registering) - multidimensional measure of personal and interpersonal wellbeing and psychological flourishing (administration paper and pencil test)</p> <p>Work–family conflict and family–work conflict scales (PD^a, free to use) – measures home and family role tasks conflicts or supports (administration paper and pencil test)</p>
Organizational job Context Factors	<p>PSC-12 (PD^b, free to use) – measures four aspects of organizational climate responsive to a healthy workplace and OS informed practices, e.g., senior management commitment and communication to psychological wellbeing and OS hazard management (administration paper and pencil test)</p> <p>Job environment assessment (contact first author) - physical audit of onsite debriefing spaces (not a psychometric measure)</p>
Organizational job Content Factors	<p>JCQ1 (free to use with permission, or online for fee per test^c) - measures all elements of job strain factors from an individual and job content and context perspective (administration online or paper and pencil test)</p>
Job strain	<p>JCQ1 (free to use with permission, or online fee per test^c) - measures all elements of job strain factors from an individual and job content and context perspective. (Administration online or paper and pencil test)</p>
Burnout	<p>ProQOL 5 (PD^a, free to use) – measures elements of professional quality of life and provides indication of level of burnout, STS and the proactive factor of CS (administration paper and pencil test)</p> <p>MBI-HSS. (Licensed, fee payable per test^c) – measure developed for use with helping and service professions. Measures three aspects of burnout: Exhaustion, Depersonalization and Efficacy (administration paper and pencil or online completion options)</p> <p>MBI-HSS (MP). (Licensed, fee payable per test^c) – measure developed for use with medical professionals. Measures Exhaustion, Depersonalization and Efficacy (administration paper and pencil or online completion options)</p>
STS/CS	<p>ProQOL 5 (PD^b, free to use^b) – measures elements of professional quality of life and provides indication of level of burnout, STS and the proactive factor of CS (administration paper and pencil test)</p>

Notes: ^a Test published in the public domain and free to use. ^b Please contact the first author for any questions about locating the measures in this table. ^c Test completed online; each test taken incurs a fee. Fee will often cover the scoring and test interpretation and a short profile report emailed to the test taker or manager as requested.

Overview of the measurement tools presented in Table 4 in alphabetical order.

DASS-21. The Depression Anxiety Stress Scales (Lovibond & Lovibond, 1995) is a widely used self-report measure of psychological and physiological signs of depression, anxiety and stress. The DASS-21 is available for a one-off fee by purchasing the administration manual (Lovibond and Lovibond, 1995). Higher scores across the scales are indicative of symptoms of depression (unable to experience enjoyment), anxiety (apprehensive, worry), and stress (tense, irritable). This scale is especially useful to measure the physiological sign of stress, including difficulty in relaxing, nervous arousal, being easily agitated, and over-reactive. Either using the full DASS-21, or just the stress subscale would be useful for ongoing monitoring of stress.

EQ-I 2.0. The Emotional Quotient-Inventory (Multi-Health Systems Inc, 2011) is a widely used measure of Emotional Intelligence. The EQ-I 2.0 is a licensed test where a fee is payable for each test taken. It can be completed and scored online (Multi-Health Systems Inc, 2011). Emotional Intelligence (EI) describes a set of cognitive, emotional, and social skills that influence the way people view themselves, express themselves, manage stressful situations, develop social relationships and cope with challenges. Higher ability to cope with stress is related to successfully managing and being able to focus during challenging incidents. Measuring EI and enhancing it in training would be useful in the forensic sciences.

GSE-R. General Self-Efficacy Scale Revised (Schwarzer & Jerusalem, 1995) is the most widely used self-report measure assessing a stable sense of personal competence and mastery to deal effectively with stressful situations. The GSE-R is published in the public domain and is free to use (Schwarzer & Jerusalem, 1995). High scores on the GSE indicate a higher perceived ability to cope with daily annoyances and to adapt after experiencing stressful life events. This scale performed well in previous research exploring stress management in forensic scientists (Kelty and Gordon, 2015).

JCQ1. Job Content Questionnaire (Karasek, 1985) is a widely used measure of job strain and risk factors associated with strain at the job content and context domains. The JCQ1 is available free to use after registering and requesting permission to use (Karasek, 1985). The JCQ1 measures a variety of

employee job characteristic areas including decision latitude (ability to make decisions), psychological job demands, level of job insecurity, level of supervisor and co-worker support. This tool is useful for identifying the types of OS risk factors for practitioners and once recognised they can be addressed.

MBI-HSS. Maslach Burnout Inventory (Maslach et al., 1996) was developed to measure burnout in professionals in the human services, it is appropriate for use with practitioners in social work, health aides, nurses, counsellors, therapists, police and correctional officers. The MBI-HSS is a licensed test, and a fee is payable for each test taken (Maslach et al, 1996). The MBI-HSS measures the three facets of burnout: 1) exhaustion and feelings of being emotionally overextended and exhausted by work, 2) depersonalization measures cynicism and disconnection from work and clients, and 3) personal accomplishment feelings of being able to successfully achieve in one's work. Although MBI-HSS was not specifically developed for forensic scientists it would be useful for measuring burnout in forensic practitioners.

MBI-HSS (MP) is an adaptation of the MBI-HSS measuring the same facets as MBI-HSS although adapted for use with medical practitioners. The MBI-HSS (MP) is a licensed test, and a fee is payable for each test taken (Maslach et al, 1996). This would be the most appropriate measure of burnout for forensic medical practitioners including pathologists, physicians, nurses, dentists and technicians due to the content of the questions being tailored specifically for medical practitioners making the test easier to understand and questions will be more meaningful.

PERMA Profiler (Butler and Kern, 2016) is a multi-dimensional questionnaire based on Seligman's (2011) seminal work on wellbeing, resiliency and flourishing. The PERMA Profiler is available free to use after registering and requesting permission to use (Butler and Kern, 2016). The five areas of PERMA are: P-positive emotions (hope, interest, joy, love, amusement, and gratitude); E-engagement (absorption in activities, living in the present, and focus on tasks); R-relationships (encompasses the various interactions individuals have with partners, friends, family members, colleagues, bosses/mentors/supervisors, and their community at large); M-meaning (sense of worth, purpose in life whether through work, causes, and pursuits); A-accomplishments (achievement, mastery, pride, and

competence). PERMA also has related resiliency and flourishing training courses develop for law enforcement and military, this may be useful for the forensic sciences (refer <https://ppc.sas.upenn.edu/services/penn-resilience-training>).

PERMA Workplace Profiler (Kern, 2016) is a revision of the PERMA profiler. The same five areas of wellbeing and flourishing are measured (see above under the PERMA profiler) although the focus of the questions relate directly to wellbeing and flourishing within the workplace. The PERMA Workplace Profiler is available free to use after registering and requesting permission to use (Kern, 2016).

ProQOL 5. The Professional Quality of Life Questionnaire, version 5 (Stamm, 2021) is a self-report measure of CS, STS and burnout. The ProQOL 5 is published in the public domain and is free to use (Stamm, 2021). Scores from the three subscales within the ProQOL 5 provide an indication of the level of STS and burnout, together becoming the construct of CF. The third subscale measures the protective factor of CS. The ProQOL 5 is a useful measure for the forensic sciences due to the measurement of CS together with burnout and STS. It has been shown to be highly reliable and valid when used with police officers (Losung et al., 2021).

PSC-12. Psychosocial Safety Climate Scale (Hall et al., 2010) is a measure of organizational job context OS risk factors. The PSC-12 is published in the public domain and is free to use (Hall et al, 2010). Four aspects of organizational climate relating to a psychologically healthy workplace are measured. These are: senior management commitment and involvement in stress prevention, employee perceptions of how management values health and safety, organizational communication on health and wellbeing, and organizational consultation regarding health and safety issues with employees' unions and Health providers. Stress is noted by WHO (2020) as being one of the most significant workplace hazards to reduce. This tool can be useful in assisting organizations to look at aspects of their culture that require enhancing when tackling OS hazard reduction.

W-G III. The Watson-Glaser III Critical Thinking Appraisal (Watson and Glaser, 2019). The W-G III is a licensed test and can be completed and scored online for a fee for each test taken (Watson and

Glaser, 2019). This revised version of the W-G measures cognitive ability and decision-making in three ways: recognition of assumptions made in ideas and strategies, evaluating arguments or information presented, and drawing conclusions from available evidence. This is a useful measure because research shows that critical thinking is negatively impacted by chronic stress and that critical thinking and decision-making improves once chronic stressors are removed. This could be especially useful when matched with burnout measures.

Work-family conflict and family-work conflict scales (Netemeyer et al., 1996). The Work-family conflict and family-work conflict scales is published in the public domain and is free to use (Netemeyer et al, 1996). It is a widely used measure for how much work impacts upon a family and home life and upon family roles and tasks. Work-family conflict has been shown to exacerbate burnout, whereas harmony within the home is a protective factor against OS and burnout. This is a useful measure as a barometer of the level of family support practitioners have.

Strategies to Manage OS

The purpose of this article was to present a holistic understanding of OS, the implications of OS and how OS can be assessed within organizations. It is however also important to end by highlighting strategies for stress management. It is beyond the scope of this article to cover stress management in detail, however, below is a brief discussion of projects being undertaken with links for further reading.

Practitioner stress management and wellbeing

Many contemporary approaches to stress management are underpinned by positive psychology philosophies by Seligman (2011) and his team at University of Pennsylvania. Seligman's work is akin to the construct of compassion satisfaction (CS), with research showing that enhancing CS reduces risk of burnout (refer section "Professional quality of Life and compassion Fatigue"). Programs that enhance wellbeing aim to reframe a person's outlook and worldview. This occurs by increasing hope and amusement, exploring gratitude, living in the present, engaging in pleasurable pastimes, increasing harmony with partners and friends, and enhancing a sense of satisfaction with the self and reframing

purpose in life (Reivich, 2021). Recent research has shown that resilience training programs, based on enhancing wellbeing and recognizing stress early is effective for police officers (Hesketh et al., 2019).

Organizational level stress management strategies

Two strategies for organizational change underpinned by championing stress management, hazard reduction and wellbeing promotion have been developed by the WHO and the CDC. The most comprehensive approach is from WHO. This is the best practice framework for psychosocial risk management at the workplace, called PRIMA-EF. PRIMA-AF was developed by a UK research team and the Collaborating Centers in Occupational Health of the WHO¹. The CDC (2014) have also provided guidelines for an approach to stress management². For recent research looking at three strategies that forensic agencies can take to reduce organizational job content and context risk factors for stress refer Kelty al., (2021).

Conclusion and Summary

The forensic sciences, regardless of discipline, are rewarding professions that have revolutionised police investigations, court trial and justice outcomes. Yet simultaneousness the work carried out in forensic professions place practitioners at risk of developing job-related occupational stress (OS). Not all forensic practitioners will develop chronic OS. However, for those who do, OS can be debilitating, leading to problems with memory and reducing high-level decision-making ability, and overall poor mental and physical health outcomes, and enhanced risk of early death. OS is also associated with high intentions to quit and actual resignations. This article provides an overview of the implications of OS for forensic Practitioners themselves, their families/friends, for forensic organizations and for justice outcomes. The most common forms of OS observed in the forensic sciences were discussed (job strain, burnout, secondary traumatic stress, and compassion fatigue) and a comprehensive guide for measuring forms of OS was presented. We conclude with three key points: (1) reducing OS can be achieved by

¹ The documents and reports on the PRIMA-EF project outputs can be found here, <http://www.prima-ef.org/>

² The approach for stress management from the CDC (2014) can be found here, <https://www.cdc.gov/niosh/docs/99-101/default.html#Preventing%20Stress%20at%20Work:%20A%20Comprehensive%20Approach>

committed promotion of wellbeing and stress management and where active promotion occurs at the organization policy and senior management level, at the supervisory level and at the Individual practitioner level; (2) aim to catch stress early because the effects of OS can be reversed if caught early and managed; and (3) there are a range of evidence-based programs emerging that show promise in teaching police practitioners how to manage stress by enhancing their overall mental and physical wellbeing.

References

- Almazrouei, M. A., Morgan, R. M., & Dror, I. E. (2021). Stress and support in the workplace: The perspective of forensic examiners. *Forensic Science International: Mind and Law*, 2. <https://doi.org/10.1016/j.fsimpl.2021.100059>
- Anon. 2013. Australian Standard. *Forensic Analysis. Part 3: Interpretation. AS 5388.3:2013*. Pub, SAI Global, Sydney.
- Bakker, A. B., & Heuven, E. (2006). Emotional dissonance, burnout, and in-role performance among nurses and police officers. *International Journal of Stress Management*, 13(4), 423-440. <https://doi.org/10.1037/1072-5245.13.4.423>
- Brady, P. Q. (2017). Crimes against caring: Exploring the risk of secondary traumatic stress, burnout, and compassion satisfaction among child exploitation investigators. *Journal of Police and Criminal Psychology*, 32(4), 305-318. <https://doi.org/10.1007/s11896-016-9223-8>
- Brown, J. M., & Campbell, E. A. (1990). Sources of occupational stress in the police. *Work & Stress*, 4(4), 305-318.
- Burke, R. J., Shearer, J., & Deszca, E. (1984). Correlates of burnout phases among police officers. *Group & Organization Studies*, 9(4), 451-466.
- Burns, C. M., Morley, J., Bradshaw, R., & Domene, J. (2008). The emotional impact on and coping strategies employed by police teams investigating internet child exploitation. *Traumatology*, 14(2), 20-31. <https://doi.org/10.1177/1534765608319082>
- Burruss, G. W., Holt, T. J., & Wall-Parker, A. (2018). The hazards of investigating internet crimes against children: Digital evidence handlers' experiences with vicarious trauma and coping behaviors. *American Journal of Criminal Justice: AJCJ*, 43(3), 433-447. <https://doi.org/10.1007/s12103-017-9417-3>
- Butler, J., & Kern, M. L. (2016). The PERMA-Profil: A brief multidimensional measure of flourishing. *International Journal of Wellbeing*, 6(3), 1-48. <https://doi.org/10.5502/ijw.v6i3.1>
- Centers for Disease Control & Prevention (2014). The National Institute for Occupational Safety and Health (NIOSH). *Stress...At Work. Publication No. 99-101*. Retrieved from <https://www.cdc.gov/niosh/docs/99-101/default.html>
- Chae, M., & Boyle, D. (2013). Police suicide: Prevalence, risk, and protective factors. *Policing An International Journal of Police Strategies and Management*, 36, 91-118. <https://doi.org/10.1108/13639511311302498>
- Cocker, F., & Joss, N. (2016). Compassion fatigue among healthcare, emergency and community service workers: A systematic review. *International Journal of Environmental Research and Public Health*, 13, 1-18. <https://doi.org/10.3390/ijerph13060618>
- Cohen, S., Gianaros, P., & Manuck, S. (2016). A stage model of stress and disease. *Perspectives on Psychological Science*, 11(4), 456-463.
- Crispino, F., & Roux, C. (2018). Forensic-led regulation strategies: Are they fit for security problem-solving purposes? In *The Routledge International Handbook of Forensic Intelligence and Criminology* (pp. 65-76). USA: Taylor and Francis. <https://doi.org/10.4324/9781315541945>
- Dempsey, J. S., Forst, L. S., & Carter, S. B. (2019). *An Introduction to Policing, 9th Ed.*, Boston, MA: Cengage Learning.
- Doyle, S. (2019). *Quality Management in Forensic Science*. Academic Press: London.
- Dror, I. E. (2020). Cognitive and human factors in expert decision making: Six fallacies and the eight sources of bias. *Analytical Chemistry*, 92(12), 7998-8004.

- Echouffo-Tcheugui, J. B., Conner, S. C., Himali, J. J., Maillard, P., DeCarli, C. S., Beiser, A., & Seshadri, S. (2018). Circulating cortisol and cognitive and structural brain measures: The Framingham heart study. *Neurology*, *21*, e1961-e1970.
- Figley, C. R. (1995). Compassion fatigue: Toward a new understanding of the costs of caring. In B. H. Stamm (Ed.), *Secondary Traumatic Stress: Self-Care Issues for Clinicians, Researchers, and Educators* (pp. 3–28): The Sidran Press.
- Fink, G. (2016). *Stress: Concepts, Cognition, Emotion, and Behavior: Handbook of Stress, Series (Vol. 1)*: Cambridge, MA: Academic Press.
- Franqueira, V. N., Bryce, J., Al Mutawa, N., & Marrington, A. (2018). Investigation of indecent images of children cases: Challenges and suggestions collected from the trenches. *Digital Investigation*, *24*, 95-105. <https://doi.org/10.1016/j.diin.2017.11.002>
- Gayadeen, S. M., & Phillips, S. W. (2016). Donut time: the use of humor across the police work environment. *Journal of Organizational Ethnography*, *5*(1), 44-59. <https://doi.org/10.1108/joe-06-2015-0016>
- Goldstein, G., Allen, D. N., & DeLuca, J. (Eds.). (2019). *Handbook of Psychological, fourth ed.* London: Elsevier Academic Press.
- Goldstein, J., & Alesbury, H. (2021). Self-reported levels of occupational stress and wellness in forensic practitioners: Implications for the education and training of the forensic workforce. *Journal of Forensic Sciences*, *66*(4), 1307-1315. <https://doi.org/10.1111/1556-4029.14699>
- Gould, J.B., Carrano, J., Leo, R., Young, J., 2013. Predicting Erroneous Convictions: A Social Science Approach to Miscarriages of Justice. US Department of Justice; 2012. Available from <http://nij.gov/topics/courts/sentencing/wrongful-convictions/predicting-preventing.htm>.
- Gutshall, C. L., Hampton Jr., D., P, Sebetan, I. M., Stein, P. C., & Broxtermann, T. J. (2017). The effects of occupational stress on cognitive performance in police officers. *Police Practice and Research*, *18*, 463–477. <https://doi.org/10.1080/15614263.2017.1288120>
- Hall, G. B., Dollard, M. F., Tuckey, M. R., Winefield, A. H., & Thompson, B. M. (2010). Job demands, work-family conflict, and emotional exhaustion in police officers: A longitudinal test of competing theories. *Journal of Occupational & Organizational Psychology*, *83*(1), 237-250.
- Hall, G., Dollard, M., & Coward, J. (2010). Psychosocial Safety Climate: Development of the PSC-12. *International Journal of Stress Management*, *17*, 353-383.
- Hesketh, I., Cooper, C., & Ivy, J. (2019). Leading the asset: Resilience training efficacy in UK policing. *The Police Journal*, *92*(1), 56–71. <https://doi.org/10.1177/0032258X18763101>
- Holt, T., Blevins, K., & Burruss, G. (2012). Examining the stress, satisfaction, and experiences of computer crime examiners. *Journal of Crime and Justice*, *35*(1), 35-52. <https://doi.org/10.1080/0735648X.2011.631401>
- Jeanguenat, A. M., & Dror, I. E. (2018). Human factors effecting forensic decision making: Workplace stress and well-being. *Journal of Forensic Sciences*, *63*(1), 258-261. <https://doi.org/10.1111/1556-4029.13533>
- Karasek, R. (1985) Job Content Questionnaire and user's guide. Lowell: University of Massachusetts, Department of Work Environment. Retrieved from <https://www.jcqccenter.com/questionnaires-jcq-jcq2/>
- Karasek, R. (1989). Control in the workplace and its health-related aspects. In S. T. Sauter, J. J. Hurrell, & C. L. Cooper (Eds.), *Job Control and Worker Health* (pp. 129-159). New York: Wiley.

- Kelty, S.F., & Gordon, H. (2015). No burnout at this coalface: Managing occupational Stress in forensic personnel and the implications for forensic and criminal justice agencies. *Psychiatry, Psychology and Law*, 22(2), 273-290. doi.org/10.1080/13218719.2014.941092
- Kelty, S.F., McQueen, E., Pymont, C., & Green, N. (2021). Avoiding burnout at the digital forensics coalface: Targeted strategies for forensic agencies in the management of job-related stress. *Forensic Science International: Digital Investigation*, 38, 1-8. <https://doi.org/10.1016/j.fsidi.2021.301127>
- Kelty, S.F., McQueen, E., Pymont, C., & Walker, I. (2020). *A Holistic Approach for Identifying Unique Organisational Stressors in Digital Forensics: An Evidence-Based Review and Future Directions*. Report, University of Canberra, ACT, Australia.
- Kelty, S.F., Robertson, J., & Julian, R. (2017). Training to professionalism in crime scene examination: Enhancing cognitive, leadership, and social abilities in career development programs. *Forensic Science Policy & Management: An International Journal*, 8(3-4), 65-78. <https://doi.org/10.1080/19409044.2017.1370039>
- Kern, M.L. (2016). The Workplace PERMA-Profiler. Manuscript. University of Pennsylvania, United States. Retrieved from https://www.peggykern.org/uploads/5/6/6/7/56678211/workplace_perma_profiler_102014.pdf
- Lambert, A. D., & Steinke, C. M. (2015). Negative perceptions of asking for support in law enforcement: Potential impact on benefit avoidance. *International Journal of Police Science & Management*, 17(2), 134–144. <https://doi.org/10.1177/1461355715583004>
- Lambert, E. G., Qureshi, H., & Frank, J. (2016). Spilling over: An exploratory study of the correlates of strain-based work–family conflict among police officers in India. *International Journal of Police Science & Management*, 18(2), 87–103. <https://doi.org/10.1177/1461355716641972>
- Lambert, J., Engh, R., Hasbun, A., & Holzer, J. (2012). Impact of posttraumatic stress disorder on the relationship quality and psychological distress of intimate partners: A meta-analytic review. *Journal of Family Psychology*, 26(5), 729-737
- Levin, A. P., Putney, H., Crimmins, D., & McGrath, J. G. (2021). Secondary traumatic stress, burnout, compassion satisfaction, and perceived organizational trauma readiness in forensic science professionals. *Journal of Forensic Sciences*, 66, 1758-1769. <https://doi.org/10.1111/1556-4029.14747>
- Loo, R. (2003). A meta-analysis of police suicide rates: Findings and issues. *Suicide and Life-Threatening Behavior*, 33(3), 313-325.
- Losung, R.K., De Paoli, T., Kebell, M., & Bond A. (2021). The role of empathy in professional quality of life: A study on Australian police officers working in sexual assault and child abuse investigation. *Journal of Police and Criminal Psychology*, 36, 616–626. <https://doi.org/10.1007/s11896-021-09468-5>
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychological Foundation.
- Ludwig, A., Fraser, J., & Williams, R. (2012). Crime scene examiners and volume crime investigations: An empirical study of perception and practice. *Forensic Science Policy & Management: An International Journal*, 3, 53-61.
- Maslach C, Jackson S.E, Leiter P. (1996) *MBI-HSS Toolkit: for Human Services workers and MBI-HSS for Medical Personnel*. Retrieved from <https://www.mindgarden.com/maslach-burnout-inventory/685-mbi-manual.html>
- Maslach, C., & Leiter, M. P. (2016). Burnout. In G. Fink (Ed.), *Stress: Concepts, cognition, emotion, and behavior* (pp. 351–357). Cambridge, MA: Elsevier Academic Press.

- McCarty, W. P., & Skogan, W. G. (2013). Job-related burnout among civilian and sworn police personnel. *Police Quarterly*, *16*(1), 66-84. <https://doi.org/10.1177/1098611112457357>
- McCarty, W. P., Solomon, Z. J., and Garland, B. E. (2007) Occupational stress and burnout between male and female police officers. *Policing: An International Journal of Police Strategies & Management* *30* (4): 672–691. <https://doi.org/10.1108/13639510710833938>
- McKay-Davis, S., Robinson, T., Sebetan, I., & Stein, P. (2020). Civilian forensic technician and sworn police officer job-related stress. *Journal of Forensic Sciences*, *65*. <https://doi.org/10.1111/1556-4029.14543>
- Mor Barak, M. E., Nissly, J. A., & Levin, A. (2001). Antecedents to retention and turnover among child welfare, social work, and other human service employees: What can we learn from past research? A review and metanalysis. *Social Service Review*, *75*(4), 625-661. <https://doi.org/10.1086/323166>
- Multi-Health Systems, Inc. (2011). EQ-I 2.0. Emotional Quotient-Inventry 2.0. Retrieved from <https://storefront.mhs.com/collections/eq-i-2-0>.
- Nas, E. (2021). A current concept in positive psychology: Compassion Satisfaction. *Current Approaches in Psychiatry*, *13*(4), 668-684. <http://10.18863/pgy.852636>
- Netemeyer, R. G., Boles, J. S., & McMurrian, R. (1996). Development and validation of work–family conflict and family–work conflict scales. *Journal of Applied Psychology*, *81*(4), 400-410.
- Orchard, E. (2012). *The evolution of psychological support programs for Forensic Technical Officers*. Paper presented at the 21st International Symposium on the Forensic Sciences, Hobart, Tasmania
- Paton, D., Violanti, J., Burke, K., & Gehrke, A. (2009). *Traumatic Stress in Police Officers: A career-Length Assessment from Recruitment to Retirement*. Springfield, Illinois, USA: Charles C Thomas Publisher INC.
- Powell, M., Guadagno, B., & Cassematis, P. (2013). Workplace stressors for investigative interviewers of child-abuse victims. *Policing: An International Journal of Police Strategies & Management*, *36*(3), 1-24. <https://doi.org/10.1108/PIJPSM-05-2012-0039/full/html>
- Regehr, C., & LeBlanc, V. R. (2017). PTSD, acute stress, performance and decision-making in emergency service workers. *Journal of American Academy of Psychiatry and Law*, *45*(2), 184-192.
- Reivich, K. (2021). Penn Resilience Program and PERMA™ Workshops. University of Pennsylvania. Retrieved from <https://ppc.sas.upenn.edu/services/penn-resilience-training>
- Schwarzer, R., & Jerusalem, M. (1995). *Generalized Self-Efficacy scale*. In J. Weinman, S. Wright, & M. Johnston, Measures in health psychology: A user's portfolio. Causal and control beliefs (pp. 35-37). Windsor, UK: NFER-NELSON. Retrieved from <http://userpage.fu-berlin.de/~health/engscal.htm>
- Seligman, M.E.P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. New York. Free Press.
- Sherwood, L, Hegarty, S, Vallières, F, Hyland, P, Murphy, J, Fitzgerald, G, and Reid, T (2019) Identifying the Key Risk Factors for Adverse Psychological Outcomes Among Police Officers A Systematic Literature Review.. *Journal of Traumatic Stress* *32* (5): 688–700. <https://doi.org/10.1002/jts.22431>
- Shoji, K., Lesnierowska, M., Smoktunowicz, E., Bock, J., Luszczynska, A., Benight, C. C., & Cieslak, R. (2015). What comes first, job burnout or secondary traumatic stress?

- Findings from two longitudinal studies from the U.S. and Poland. *Plos One*, 10(8), e0136730. <https://doi.org/10.1371/journal.pone.0136730>
- Slack, D. P. (2020). Trauma and coping mechanisms exhibited by forensic science practitioners: A literature review. *Forensic Science International: Synergy*, 2, 310-316. <https://doi.org/10.1016/j.fsisyn.2020.10.001>
- Soares, J., Sampaio, A., Ferreira, L., Santos, N., Marques, F., Palha, J., & Sousa, N. (2012). Stress-induced changes in human decision-making are reversible. *Translational Psychiatry*, 2(e131), 1-7. <https://doi.org/10.1038/tp.2012.59>
- Spector, P. E. (2012). *Industrial and Organizational Psychology: Research and Practice* (6 ed.): John Wiley & Sons Inc.
- Stamm, B. (2021). *ProQOL: Professional Quality of Life*. Retrieved from <https://proqol.org/>
- Violanti, J. M., Charles, L., McCanlies, E., Hartley, T. A., Baughman, P., Andrew, M. E., & Burchfiel, C. M. (2017). Police stressors and health: a state-of-the-art review. *Policing*, 40(4), 642-656. <https://doi.org/10.1108/PIJPSM-06-2016-0097>
- Watson, G., & Glaser, E. M. (2019). *Watson-Glaser Critical Thinking Appraisal: Online*. New York; Sydney: Pearson Talentlens. Retrieved from <https://www.talentlens.com.au/tests/watson-glaser-critical-thinking-test-III>
- Willis, S. 2014. Accreditation - straight jacket or life belt? *Science and Justice*, 54, 505-507.
- Wilson, M. A., Bennett, W., Gibson, S. G., & Alliger, G. M. (2017). *The handbook of work analysis: Methods, systems, applications and science of work measurement in organizations* (Revised Ed.). New York: Routledge.
- World Health Organization. (2020). *Occupational Health: Stress at the Workplace*. Retrieved from <https://www.who.int/news-room/questions-and-answers/item/ccupational-health-stress-at-the-workplace>

Relevant Websites

Penn Resilience Program and PERMA TM Workshops
<https://ppc.sas.upenn.edu/services/penn-resilience-training>