Received: 13 March 2023 | Revised: 26 April 2023 | Accepted: 1 May 2023

DOI: 10.1002/wfs2.1494

ADVANCED REVIEW

WIREs FORENSIC SCIENCE WILEY

Identifying the critical skillset of top crime scene examiners: Why this matters and why agencies should develop top performers

Sally F. Kelty[1] | **Olivier Ribaux**[2] | **James Robertson**[3]

[1]Discipline of Psychology, University of Canberra, Australia

[2]École des Sciences Criminelles, Université de Lausanne, Switzerland

[3]Faculty of Science and Technology, University of Canberra, Australia

Correspondence
Sally F. Kelty, Discipline of Psychology, University of Canberra, Building 12. 11 Kirinari Street, Bruce, Australian Capital Territory, 2617, Australia.
Email: sally.kelty@canberra.edu.au

Edited by: Olivier Delémont, Editor

Abstract

Processing a crime scene is complex. When scenes are processed well, higher quality specimens can be detected and collected. Inadequately managed scenes increase risk of ineffective investigations and poorer justice outcomes. Government reports from around the world have stated that some crime scene examiners outperform their peers. If processing a crime scene is vital for optimal outcomes, then who should we employ, and train, for this complex and challenging role? What skills do they need? In 2010, the seminal work into the technical and non-technical skills of top crime scene examiners commenced in Australia. This team used empirical techniques from occupational psychology and business management to identify a cluster of 7 key cognitive, social, leadership skills, and technical/scientific knowledge to develop a profile of top crime scene performers. This work was published in a series of papers between 2012 and 2017. In 2023, the original work was combined with current international empirical findings to build a robust, comprehensive, and more generalizable picture of the holistic skillset of top crime scene examiners. The rationale for developing a skillset is to assist forensic agencies to create targeted recruitment procedures and inform the content of early career training programs for their crime scene teams. With recruitment and training done well, organizations are better placed to attract, develop, and retain personnel with potential to excel in complex roles. When top examiners attend scenes, it is possible the risk of poorer justice outcomes arising from crime scene work could be reduced.

This article is categorized under:

Forensic Science in Action/Crime Scene Investigation > Crime Scene Examination

Forensic Science in Action/Crime Scene Investigation > Education and Formation

Forensic Science in Action/Crime Scene Investigation > From Traces to Intelligence and Evidence

KEYWORDS

competence, early career development, recruitment, skills profile, top preforming crime scene examiners

1 | INTRODUCTION

The crime scene is one of the most critical points in a criminal investigation where digital, chemical, and physical specimens are located, detected, and collected (Delémont et al., 2017). Crime scene investigations (CSI) and crime reconstruction is argued to be the most demanding, intellectually challenging, and often complex, activity within forensic science (De Forest, 2005; Morgan et al., 2019). Inadequately managed crime scenes or poorer analytical practices used at scenes can lead to lower likelihood of quality forensic specimens being collected, and lower quality opinion being relied upon by police in their decision-making (Julian & Kelty, 2015). Reliance on lower quality forensic evidence and opinion by lawyers, judges, and juries can result in miscarriages of justice with innocent people wrongfully convicted and imprisoned (Gould et al., 2013). In contrast, effective CSI results in the collection of specimens that have a high likelihood of helping crime scene examiners (CSEs), forensic scientists/analysts, and police piece together the events around the incident and reconstruct the crime scene. Effective CSI thus assists in answering questions around who was likely present, how and what occurred, and when and where the incident most likely occurred. Furthermore, with the increasing number of digital specimens now being collected at scenes, this digital information can shed light on why an incident occurred, that is, the motivations, intent, and planning taken by a suspect prior to/during the incident under investigation (Al Mutawa et al., 2019).

Although CSI is considered the critical first step in the forensic process (Fisher, 1992), it was not until 2007 and 2009 that two prominent reports highlighted serious concerns about the effectiveness and professionalism of CSEs. The UK's Scientific Work Improvement Model (British Home Office, 2007) report noted four critical time points in volume crime investigations where key inefficiencies undermined the effective use of forensic science. Two of these points related to CSE's performance, finding considerable differences in performance levels across England and Wales. The SWIM research found the top 25% of CSEs outperformed their peers by collecting far higher quality specimens, were more time efficient, and twice as fast at submitting their higher quality specimens for analysis (Adderley & Bond, 2008; British Home Office, 2007). Further, that the specimens collected by the top 25% (DNA and fingerprints), given their higher quality, resulted in more specimens being useful and analyzable, leading to more positive suspect identifications, thus impacting police investigations positively (Adderley & Bond, 2008). Two years later, in the National Academy of Sciences (NAS, 2009 report, researchers noted differences across the United States in the performance and reliability of CSEs. The NAS research team reported mistakes were often made at crime scenes in both specimen identification and collection. It was considered however that these mistakes were not necessarily malicious; rather they appeared to relate to a combination of too much haste at scenes and the lack of experience/knowledge and/or professional training of US CSEs. In 2012 and 2015 in Australia, similar results were observed in that omissions and oversights in police investigations and trials often emerged thorough the inexperience of first responders and CSEs called to scenes (Julian et al., 2012; Kelty et al., 2015). In addition, from the United Kingdom, United States, and Australia, several judicial and governmental enquiries into miscarriages of justice have linked poor CSI management and/or poor scene work as a significant contributor in ineffective investigations, wrongful convictions, and imprisonments (Dioso-Villa et al., 2018; Gould et al., 2013; Vincent, 2010), as was noted in the cases of Madeline McCann (Portugal), Todd Willingham (United States), Lindy Chamberlain (Australia), and Guy Morin (Canada) (Julian et al., 2012; Robertson, 2014).

As discussed, some CSEs appear to outperform their peers. What the SWIM, the NAS, and Judicial/Parliamentary Inquires did not provide was an evidence-based explanation for why some CSEs outperform their peers. This is a vital question when considering the potential for negative from poor-quality CSI work.

Sidebar: What the term CSE encompasses.

The term crime scene examiner (CSE) is used to encompass crime scene investigator, scenes of crime officers, forensic science officer, and covers both civilian personnel and police officers who carry out CSI.

2 | THE IMPACT OF TOP CSES ON FORENSIC SCIENTISTS AND DETECTIVES

Research has found that top CSEs create highly beneficial impacts for their peers and colleagues. In the research by Kelty et al. (2012, 2015, 2017), 74 men and women police officers or police civilian staff, such as senior homicide detectives, ballistics practitioners, laboratory forensic scientists and senior CSE supervisors, took part in in-depth semi-structured interviews lasting up to 3 h. These interviews used 360-degree qualitative methods to assess the impact that top performers compared with average performing CSEs had for the police, other forensic scientists, and for the supervisors who manage CSI teams. All 74 participants had extensive experience working with both top and average performing CSEs during serious crime investigations. The authors found three noteworthy impacts associated with top CSEs.

2.1 | Top CSEs result in higher quality specimens/evidence from major crime scenes

Forensic scientists, detectives and CSE supervisors reported that top performing CSEs attending serious crime scenes collected higher quality specimens that were less likely to be rejected during analysis and with higher quality swabs more likely to lead to positive DNA matches. In contrast to the UK SWIM findings (Adderley & Bond, 2008), the top serious crime scene CSEs were not always quicker at processing scenes and often collected more samples than their peers. The top CSEs also selected what specimens to collect based on careful consideration, reasoned decisions and from detectives' perspective the specimens collected made sense from a probative value stance and an investigation viewpoint, being more likely to influence the direction of the investigation (Kelty et al., 2012; Kelty et al., 2017). Informed decision-making as a key cognitive ability of top CSEs (and forensic scientists in general) is also noted in recent research (Chang & Tsai, 2022; Dror, 2020).

2.2 | Top CSEs have beneficial impacts for detectives and the focus of police investigations

Police detectives who took part in research by Kelty et al. reported that highly proficient CSEs (compared with poorer CSEs) had a large impact upon resource allocation in the vital early stages of major crime investigations. Many senior detectives said that after working with good CSEs they knew who collected good specimens, could work with others in difficult conditions, wrote good reports and delivered understandable and high-quality evidence in court. These police said that poorer CSEs were less reliable, and the specimens collected were not always useful to detectives. Moreover, when CSEs known to be proficient arrive at serious scenes, police have the confidence to leave the crime scene and take on other time critical tasks, such as door knocks or debriefings (Kelty et al., 2012).

2.3 | Top CSEs provide wider beneficial impacts for others beyond CSI work

One key attribute noted by all detectives, forensic science colleagues and CSE supervisors, was that good CSEs were described as wanting to join the dots, persistent at solving problems, and with an inquiring and open mind to various possibilities. This mindset allowed them to be open to look for answers to anomalies in scenes they had not encountered before, rather than not worry about them. For example, they will not just accept that a homicide weapon is not present in the sealed scene; they were more likely to look outside the sealed scene. This meant for a top CSE the scene can be far wider than originally thought and this persistence is more likely to find solutions or specimens at serious crimes. This in turn can save manpower resources, such as not requiring broader searches later in time by emergency services or police officers with dogs, and so forth (Kelty, 2012).

3 | IS CSI ENOUGH OF A "SCIENTIFIC ENDEAVOR" FOR AGENCIES TO WORRY ABOUT WHO THEY RECUIT?

There is a longstanding debate about whether CSI is a scientific endeavor or a technical task, and given where you stand on this, should it be carried out by trained science practitioners or by sworn police officers/unsworn technicians

with limited science knowledge (Crispino, 2008; Robertson, 2012; Roux et al., 2022). The basis for viewing CSI as a technical role originates from the view that 'forensic science' only begins once crime scene specimens arrive at the laboratory for analysis (Crispino, 2008). Another view, looking more at resourcing, is that many crime scenes are 'not complex' enough to warrant sending highly skilled scientist practitioners (Harrison, 2006). However, as noted in the British Home Office (2007) and NAS (2009) reports, better overall results occur where good CSEs attend volume or major scenes, therefore regardless of complexity, top CSEs create more beneficial impacts for police investigations and laboratory analysis because of their higher quality CSI work. Further, regardless of scene complexity, if an aim is to link serial crime using forensic intelligence and crime mapping techniques, it is advisable to send scientifically trained CSEs who understand the aims and principles underpinning these techniques (Houck et al., 2018; Roux et al., 2022).

Hiring well can be a challenge for policing/forensic agencies (Bruenisholz et al., 2019), however given the arguments presented so far, it can be argued that investing time into recruiting people with the potential to develop into high caliber CSEs makes sense. Below we extend this discussion to include why aiming to recruit top CSEs also makes sense from an economic and legal perspective.

3.1 | Hiring well in forensic agencies: Limiting liability for negligence in recruitment practices

One aspect to hiring well is for agencies to aim to reduce legal liability for poor hiring practices Berger and Berger (2018). A trend starting in the early 2000s, especially in the US, has seen an increase in successful civil lawsuits against law enforcement agencies for "negligent hiring practices." For example, a failure to carry out adequate selection processes, lack of career development training and lack of in-depth criminal history checks (Hess et al., 2015).

Business management experts note one way to limit litigation is to ensure agencies utilize evidence-based hiring protocols. According to Berger and Berger (2018) and Spain et al. (2022) developing a talent inventory is one way this can be achieved. A talent inventory (e.g., a skills/attributes summary) provides recruiters with evidence-based knowledge of the types of skills top-performers in a certain field possess (McKenna, 2020). Further, the importance of this knowledge is that it can guide recruitment steps so that agencies are more likely to attract suitable people for the role who have the potential to excel at CSI (Kelty et al., 2017, also refer to Section 4 below).

Individuals who are thoroughly screened against carefully developed position and person specifications (e.g., through a talent inventory/skills summary) have been found to learn job tasks faster and are more productive sooner. Recruit turnover can also be minimized when job matching is carried out well, because the people employed are those who will enjoy the work will be more motivated and more likely to excel because they have the potential to develop/enhance the required skills. Greater job satisfaction is often reported because staff were not only appropriately matched to the job, but also appropriately matched to the team they work within (Nankervis et al., 2022). This last point also suggests that greater employment outcomes occur when existing team members are also involved in the recruitment process.

3.2 | Hiring well in forensic agencies: Impact of workplace stress on turnover and stress claims

The forensic sciences, like policing have long been regarded as high stress occupations, with some personnel reporting fatigue and burn-out that can lead to more serious psychological injury. For CSEs this can be due to their exposure to crime scenes or other workplace related stressors, including workplace culture and the impact from lesser performing CSEs (Almazrouei et al., 2020; Goldstein & Alesbury, 2021; Hess et al., 2015; Kelty et al., 2022; Sollie et al., 2017). Occupational stress (OS, also known as job or work stress) is also associated with increases in workplace accidents, absenteeism, early retirement, high intentions to quit and disillusionment with work tasks, which negatively impacts the cohesion of forensic teams (Kelty et al., 2021, 2022).

The experience of OS can result in high costs for forensic personnel, including CSEs, at an individual level (e.g., poor health outcomes) and financial (e.g., loss of/reduced income due to stress leave; Goldstein & Alesbury, 2021). There are also flow-on effects of OS that impact negatively on the productivity of CSE work teams, family, and social life. The financial cost for agencies due to compensation and stress claims is high. For example, in Australian

policing/forensic agencies, the cost of *each claim* per employee for OS related psychological injury is estimated at AUD $1.3 million (Kelty et al., 2021).

Of importance when understanding the negative impact of stress on CSI, is that ongoing OS is associated with impaired cognitive abilities. These declines are due to the rise in cortisol levels associated with prolonged stress (Echouffo-Tcheugui et al., 2018). This physiological response means people eventually are not able to engage in high-level problem-solving, lateral, or critical thinking. In CSI, a key skill for top performance is high-level cognitive function (Kelty et al., 2017).

3.3 | Hiring well in forensic agencies: Impacts of poor performers on top CSEs

Research has shown that poorer performing CSEs can become a significant workplace stressor that creates strain for top CSEs. When agencies recruit and retain CSEs that are poorer performing, this can have a direct and negative impact on the morale, job satisfaction and OS levels of top CSEs. Poor CSEs place greater demands on their higher performing colleagues because the work that needs to be done at scenes is not equally shared. For example, at major scenes where two or more CSEs attend, if the CSEs attending have different performance levels (even if they are the same pay or employment level), the responsibility is not even. The top CSEs often assume the management of the scene, and in some instances will need to supervise and oversee the work of the poorer CSE (Kelty et al., 2012). Of note, by poorer performers, we do not mean new recruits or CSEs in mentorship and early training. In this case, we refer to CSEs who do not progress their skills and after several years have lower reasoning and problem-solving skills, are less diligent and pay less attention to detail, have lower scientific knowledge, and sometimes are less emotionally grounded.

Where poorly selected employees continue in a job but are underperforming as compared to top performers, other team members may feel dissatisfied leading to reduced job satisfaction and ultimately seek work elsewhere (Berger & Berger, 2018; McKenna, 2020).

4 | SEMINAL RESEARCH IDENTIFYING THE KEY SKILLS OF TOP CSES

As noted in Section 1, the NAS and SWIM reports noted that not all CSEs perform equally. In the SWIM report it was noted that the top 25% of CSEs collected higher quality DNA and fingerprints, that resulted in more specimens being analyzable, leading to a higher rate of positive suspect identifications., Although these findings argue not all CSEs are equal, what the reports did not provide was an evidence-based explanation for why some CSEs outperform their peers. This was the focus of the seminal work of Kelty et al., (2012); Kelty et al., (2017), which identified the skills top CSEs have that allow them to excel. Kelty et al. used psychological and business management methods to profile top CSEs and develop a holistic skillset covering cognitive, social skills, leadership qualities, scientific education and training. These findings are shown in Section 4.1.

4.1 | The 360-degree process to identify the skill set of top CSEs across Australia

From 2010 and 2017, Kelty and colleagues developed the first talent inventory/skillset containing a set of 7-key critical skill/attributes that set top-performing CSEs apart from their peers. Prior to this work, no robust empirical knowledge could be located around the topic of who top performers are. To address this question, 360-degree business mapping techniques were used to identify top CSEs. First, CSE supervisors and managers nominated their top four performers using objective performance measures (including good annual reviews and the highest DNA and fingerprint identification rates). Second, major crime investigators/detectives took part in interviews to name the top CSEs they have worked with at major scenes in terms of impact on their investigations, effectiveness at crime scene management and quality of traces/samples collected. Third was a random sample of laboratory forensic scientists and/or CSE peers in seven Australian States to discuss what top CSI means to them in terms of knowledge and crime scene management/specimen recognition, recording and recovery.

Using the 360-degree data combined with peer nominated and objective performance measures, 19 CSEs were selected. All 19 top CSEs had very good supervisory records, high objective measures of their ability, were known to impact consistently and positively upon major crime investigations and were respected and known by their peers as

knowledgeable. The 360-degree peer nomination combined with interviews is used routinely in the selection and identification of top-performers in a wide of industries. The benefits of 360-degree interviews, while they are time consuming, is that a rich understanding of how top-performers impact the work of others can be obtained (Berger & Berger, 2018; Nankervis et al., 2022). The peer nomination method has also been shown to be a reliable and valid method for identifying high performers (Sonnentag, 2007).

4.2 | Development of the original 7-critical skill set

The 19 men and women identified as top CSEs were experienced in both volume and major crime scenes (from burglary and arson to homicide). All 19 CSEs took part in two in-depth interviews and paper and pencil or online psychometrics tests to provide a mixed methods psychological profile. Each CSE volunteered up to 8 h of their time. Data was collected in semi-structured interviews which covered areas such as how they saw their role, types of training undertaken, formal and informal education, aspects of their work and family, the types of thought processes involved in processing scenes, how they interact with colleagues and peers, the value they place on knowledge and education, their own mentorship, life experiences, stress management, workplace culture, and work/life balance and social supports.

The data collected in the 360-degree process outlined in Section 4.1 was then combined with the qualitative data collected in the CSEs interviews. This data set was analyzed using Smith's (2016) sequential content analysis approach which allows for the identification of unique themes (in this case to identify the critical skill set of top CSEs). Smith's method stipulates that each interview transcript is read in full, and themes running through the data are highlighted. This initial analysis identified a major set of 7 critical skill clusters describing the holistic cognitive, social, and leadership skills of top CSEs. As qualitative analysis can be open to bias, it is essential that themes identified be verified as meaningful by independent coders (Miles et al., 2019). In this research, two investigators assessed the critical-skill clusters (Kelty et al., 2012). Each coder had differing backgrounds in sociology, policing, and psychology/business management. The seven skill set clusters identified were: approach to life and stress resilience; cognitive abilities; communication and interpersonal skills; holistic knowledge base; life and work experience; professional demeanor; and work orientation.

Sidebar: Further details on the critical skill set research of top crime scene examiners
It is beyond the scope of this review to outline the findings by Kelty et al. on critical skill skills of top CSEs in full. All the results from the qualitative analysis and from the psychological testing, including an overview of the tests used in full are outlined in the articles by Kelty et al. (2012, 2015, 2017).

4.3 | Quantitative assessment of the cognitive and leadership qualities of top CSEs

To ensure the robustness of the critical skills set identified through the qualitative analysis outlined in Section 4.2, Kelty and Gordon (2012, 2015) undertook further psychological testing to assess the cognitive and leadership in more depth and to compare the top CSEs with other scientific experts and leaders in other fields. The psychological testing was also carried out to compare these top 19 CSEs with a range of normative samples including senior managers, scientists, members of the general population and university students. The comparative analysis allowed the team to explore whether the CSEs had high-level cognitive abilities, high-level stress management and emotional relational skills above those normally found in the general population. The top 19 CSEs completed a set of seven tests by either paper and pencil or through an online platform.

The results, presented in Table 1 below, showed that for the aspect of professional demeanor measured, the top 19 CSEs had a significantly higher level of self-efficacy both than police recruits and the average member of the general population. Self-efficacy describes a person's belief in their own ability to produce results, meet goals and overcome challenges. People with high-self-efficacy, due to their belief in themselves and abilities to overcome challenges, have a positive and optimistic outlook about life (Kelty & Gordon, 2012, 2015).

Two measures were used to assess resilience and the ability to cope/bounce back from workplace and life stressors, and a measure of physiological symptoms of depression, anxiety levels. The results showed the CSEs were comparable to the general population in terms of coping with daily hassles and stressful life events, although they were significantly more resilient than a sample of individuals seeking psychological services for anxiety and depression. These results suggest the CSEs, despite their stressful occupation, did not show higher stress levels, further they were more able to cope with stress. In terms of physiological symptoms of depression, anxiety, and stress, the 19 CSEs reported significantly lower depression levels than the public, but they have similar levels to general duties police officers. The CSEs reported significantly lower anxiety compared to both the public and police officers, and their stress levels were comparable to both public and police officers.

Four measures were used to assess cognitive abilities. The 19 top CSEs demonstrated significantly higher-level cognition on all scales compared to university students, police officers and members of the public. In only one scale, critical thinking, they were the same as managerial level personnel in medical science and biotechnology. These results showed that top CSEs were more likely to be able to detach from distracting thoughts that interfere with tasks, more likely to focus on the task at hand, and have the behavioral capacity to initiate action, rather procrastinate. They also demonstrated a very high-level of critical thinking, observational and clear-thinking and advance problem-solving. When combined, these results showed that the top CSEs have high-level abstract reasoning. High-level abstract reasoning, as

TABLE 1 Means, standard deviations, and comparative differences between the 19 top CSEs and published normative comparison groups in the psychometric tests.

Test used and skill being measured	Current sample CSE ($n = 19$)		Comparison norm groups		t (d.f.) sig.
One measure of professional demeanor					
General self efficacy scale	**33.53**	**(4.02)**	**29.48**	**(5.13)**[1]	**t (1611) = 3.43, $p < 0.001$**
General self efficacy scale	**33.53**	**(4.02)**	**29.02**	**(4.14)**[2]	**t (117) = 4.37, $p < 0.001$**
Two measures of approach to work (*specifically measuring wellbeing, stress, and resilience*)					
1. Resiliency scale	**81.84**	**(7.73)**	**71.8**	**(18.4)**[4]	**t (156) = 2.35, $p < 0.05$**
2. Physiological signs of depression	**1.89**	**(2.94)**	**6.34**	**(6.97)**[5]	**t (2931) = 2.78, $p < 0.01$**
Physiological signs of depression	1.89	(2.94)	4.74	(6.04)[6]	t (60) = 1.95, $p = 0.06$
Physiological signs of anxiety	**1.68**	**(1.38)**	**4.70**	**(4.91)**[5]	**t (2931) = 2.68, $p < 0.05$**
Physiological signs of anxiety	**1.68**	**(1.38)**	**4.16**	**(4.61)**[6]	**t (60) = 2.29, $p < 0.05$**
Physiological sign of stress	8.21	(5.88)	10.11	(7.91)[5]	t (2931) = 1.05, $p = 0.30$
Physiological signs of stress	8.21	(5.88)	9.74	(7.95)[6]	t (60) = 0.75, $p = 0.46$
Four measures of cognitive abilities					
1. Detail, focus, results: Preoccupation	**8.05**	**(2.93)**	**2.28**	**(0.35)**[7]	**t (325) = 31.75, $p < 0.001$**
Detail, focus, results: Hesitation	**9.32**	**(2.08)**	**2.37**	**(0.42)**[7]	**t (325) = 46.13, $p < 0.001$**
Detail, focus, results: Volatility	**9.53**	**(2.34)**	**2.30**	**(0.38)**[7]	**t (325) = 46.13, $p < 0.001$**
2. Critical problem-solving appraisal	63.87	(7.75)	62.38	(8.00)[8]	t (256) = 0.70, $p = 0.48$
Critical problem-solving appraisal	**63.87**	**(7.75)**	**55.5**	**(9.10)**[9]	**t (201) = 3.46, $p < 0.001$**
3. Advanced lateral reasoning skills	**47.73**	**(5.80)**	**42.0**	**(8.50)**[10]	**t (806) = 2.60, $p < 0.05$**
4. Emotional intelligence total score	**110.06**	**(13.08)**	**99.4**	**(14.5)**[11]	**t (1264) = 3.01, $p < 0.01$**
Self-perception score	**109.19**	**(11.39)**	**99.2**	**(14.2)**[11]	**t (1264) = 2.93, $p < 0.01$**
Self-expression score	**109.94**	**(13.15)**	**98.8**	**(14.6)**[11]	**t (1264) = 3.04, $p < 0.01$**
Interpersonal skills score	101.38	(14.77)	99.5	(14.7)[11]	t (1264) = 0.51, $p = 0.61$
Emotional decision-making score	**114.38**	**(11.03)**	**99.1**	**(15.0)**[11]	**t (1264) = 4.06, $p < 0.001$**
Stress management score	**108.50**	**(14.52)**	**100.8**	**(14.4)**[11]	**t (1264) = 2.13, $p < 0.05$**

Note: Standard deviations in parentheses. Significant differences between the top CSEs and comparative normative samples are highlighted in bold.
[1]Community sample, $n = 1594$, [2]Police recruits, $n = 100$, [3]Community sample, $n = 577$, [4]Clinical outpatients, $n = 139$, [5]Community sample, $n = 2914$, [6]Police officers, $n = 43$, [7]University students, $n = 308$. [8]Managers in healthcare, pharmaceuticals and biotechnology (community sample), $n = 243$, [9]Police Officers, $n = 188$, [10]Community sample, $n = 793$, [11] Community sample, $n = 1250$.

defined in psychological terms, describes higher order cognitive abilities and more fluid intelligence providing people with the abilities to engage in clear thinking, to engage in high-level problem-solving, work though unfamiliar problems, and propose solutions using logical reasoning. Higher order abstract reasoning also provides people with the abilities to engage in lateral and flexible thinking thus providing the ability to problem solve and generate solutions beyond the most obvious (Sternberg, 2020; Brown, 2016). In terms of emotional intelligence abilities, the results showed the CSEs had significantly higher self-perception, self-expression, decision making and stress management skills than the average member of the community. These results mean that the current sample had a higher understanding of their own strengths and weaknesses, endeavor to improve themselves and can recognize and understand their emotions. They can express themselves verbally and non-verbally and can solve problems and make critical decisions and demonstrate the capacity to remain objective and resist impulses. They can adapt thoughts, emotions and behavior to a situation and are able to demonstrate stress tolerance in difficult situations (Kelty & Gordon, 2015).

5 | THE 2023 COMPREHENSIVE AND UPDATED SKILL SET OF TOP CSES

To ensure only robust and current knowledge was presented in this article, a critical review of the empirical literature published post the Kelty findings was carried out. To update the seminal work of Kelty et al. (2012, 2017) a 3-step critical thematic approach was used to assess the robustness of empirical findings on top CSEs from 2017 to 2023. Although not a full systematic review, to ensure scientific rigor the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines for article selection and inclusion was followed (refer to Moher et al., 2009).

5.1 | Three-step procedure used to assess the evidence-base for this advanced review

The first step in revising and updating the original work was to carry out a systematic search of the literature using electronic databases including PsycINFO, CINCH, Global Policing Database, Cochrane Library, JSTOR, PubMed, Web of Science, Google Scholar, ResearchGate and a search of online Masters/PhD thesis. The search inclusion keywords were, "crime scene management," "crime scene and/or/field forensic skills," "forensic scene management," "attributes of top forensic personnel," "recruit crime scene investigators and/or/examiners," "forensic personnel selection," "forensic and/or/crime scene leadership," "crime scene stress," "resilience," "retention."

In the second step, the located empirical peer-reviewed articles from step 1 were analyzed using a critical assessment of research design employed, appropriateness of the sample (had used a CSE sample), research methods used (observation, survey, interview, and type of psychological or other scales/survey instruments/observational data sheets), and study results. Only empirical studies were included. Reviews/commentaries without samples did not meet inclusion for this article.

In the last step, findings from selected papers were thematically analyzed following Smith's (2016) method to identify any new skills or skills clusters that set top CSEs apart from peers. Finally, we combined the results from our critical review of current literature with the original work of Kelty and colleagues, to ensure we presented an up-to-date skills summary of key skills of top CSEs.

5.2 | The results: The revised skills summary of top CSEs (2012–2023)

For ease of presentation, the results from the review are presented below in a talent inventory skills table. Although no new skill categories were identified, the studies reviewed supported the original work of Kelty et al. Several studies did however identify new skills that fitted across five of the skill clusters. In Table 2, the skills identified during the original research by Kelty et al. (2012, 2015, 2017) are shown in black. The new skills identified through research carried out between 2017 and 2023 are presented in the Table 2 in italics and referenced. The list of studies included in this revised skills table can be found in the table notes section. Although most of the studies did not identify new skills, they each add significantly to knowledge by robustly exploring specific skills in more depth, or importantly, they were able to replicate the Kelty original findings. This increases the robustness of the evidence-base for critical skills in CSE. Many of these studies were carried out around the world (United Kingdom, United States, Europe) which suggests the findings will apply to various countries, not just limited to within Australia where the original research was completed.

TABLE 2 The revised evidence-base skills summary by skill cluster for top-performing CSEs as of 2023.

Skill cluster[a]	Critical key skills identified from the original work (2012–2017) and revised evidence-base (to 2023)[b,c,d,e]
Approach to work, life and stress management and resilience	• Physical and mental health holistic orientation • Maintain a consistent and grounded approach to work and life • High-level understanding personal anxiety and stress levels • Low stress and anxiety levels • Resilient to workplace/life pressures • Clear work/life divide/balance and strong family and/or social network • Use of workplace humor as protective factors for stress (Vivona, 2014), but only if humor is used in certain settings and tactfully (Sollie et al., 2017) • Optimistic outlook on life and approach to problems (Craven et al., 2022)
Cognitive abilities	• High-level emotional intelligence • Good lateral and critical thinking • Good multi-tasking and short- and long-term planning skills • Advanced problem solving • Attention to detail, focus and low procrastination • Good decision-making • Advanced observation skills (Chang & Tsai, 2022) • High-level scientific reasoning skills (Illes et al., 2019)
Communication and interpersonal skills	• Active listeners, good negotiation skills • Strong conflict resolution abilities • High-level perspective taking abilities • High-level written language skills • High-level verbal abilities • Ability to convey complexity of CSI and specimens to a range of different people outside of science (Wyatt & Wilson-Kovacs, 2019)
Holistic knowledge base	• University degree (preferred) or diploma • Sound knowledge of scientific/forensic science principles • Legal system knowledge (crime scene to court, CSI, police investigations and criminal trials), and • Holistic interdisciplinary knowledge in forensic sciences, criminology/psychology • Crime scene examination accredited training (Wyatt & Wilson-Kovacs, 2019)
Life and work experience	• Prior policing or justice system experience or exposure), OR • Prior work experience in highly charged situations/organizations prior to CSI • Maturity gained through life experiences prior to commencing as CSE role
Professional demeanor	• Unassuming and modest • Strong potential for leadership with good mentoring potential • Maintains knowledge and keeps up to date (lifelong learner) • Earns respect from peers and colleagues • High personal mastery and high self-efficacy • Openness to accept and learn from mistakes with an open growth mindset • Strong internal locus of control (Craven et al., 2022) • High-level of self-reflection (Sollie et al., 2017)
Work orientation	• Good time-management • Genuine interest/dedication to role • Self-motivated, persistent, results driven

[a]Skill sets are listed alphabetically as they are all given equal weight in terms of importance.
[b]Original findings from Kelty et al. (2012, 2017) presented in black.
[c]New evidence-based skills required for top-performance in CSI are highlighted in italics and referenced.
[d]Current evidence in this table includes only empirical studies testing the skills and knowledge of CSEs.
[e]The empirical studies that met inclusion in this review are: Adderley & Bond, 2008; Almazrouei et al., 2020; Chang & Tsai, 2022; Chowdhury, 2021; Craven et al., 2022; de Gruijter et al., 2017; de Roo et al., 2022; Gardner et al., 2019; Illes et al., 2019; Kelty & Gordon, 2015; Kelty et al., 2012; Kruse, 2023; Mousseau et al., 2019; Mrevlje, 2015; Sievers, 2020; Sollie et al., 2017; Tehrani, 2023; Vivona, 2014; Wyatt & Wilson-Kovacs, 2019.

6 | MOVING FORWARD AND CONCLUSION: RECRUITING AND DEVELOPING TOP CSES

Processing a crime scene is one of the most critical, complex, and challenging aspects of effective criminal investigations. Crime scenes are where good forensic science begins and well managed scenes are where vital specimens are detected and collected. Poorer managed scenes are linked to increased risk of ineffective investigations and wrongful convictions (Gould et al., 2013; Kelty et al., 2015). If crime scenes are to be processed well, what is the caliber and skills of the CSEs you send? That question was the focus of this article. The research we reported presented a current evidenced-based picture of the skillset that sets top-performing CSEs apart from their peers. The skillset captures the type of technical, scientific, and job-related knowledge required, but it also describes a wider skills range in terms of higher-level cognitive abilities, leadership and social skills that typify a top performing CSE. This skillset provides an understanding of what is required to manage unexpected, difficult, or challenging scenes; to problem-solve and manage conflict; to be able to negotiate, liaise and build a two-way trust relationship with forensic science colleagues, with police of all levels, and with lawyers of both sides and levels. We also argue this is the caliber of personnel required to engage successfully in forensic intelligence and crime mapping.

In this article, we discussed the argument that CSI has been, and still is, often considered a simple task that does not need to be processed by highly trained scientific personnel. In contrast to this view, we have presented the growing body of literature that has shown how inadequately managed crime scenes, biased, narrow/siloed-thinking, and poor analytical practices lead to poor science being relied on by police and lawyers in their decision-making (Dror, 2020; Kelty et al., 2015). Poor science is one of the contributing factors in miscarriages of justice (Gould et al., 2013). If we wish to reduce the risk of reliance on poor science, or missing vital clues, then one way to reduce this risk is to invest in the caliber and professionalism of the personnel we employ to process crime scenes (Kelty et al., 2017).

The rationale underpinning research examining holistic skillset of top CSEs is that this knowledge can be used to create meaningful skills summaries/talent inventories (such as that presented in Section 5.2, Table 2). When evidence-based research underpins talent inventories, organizations can develop recruitment programs that attract the right people with the potential to excel (Berger & Berger, 2018). Recruitment programs must however be 'fit for purpose' and will require different methods at various stages of the recruitment process that can tap into whether applicants have potential to develop/enhance the skillset. For example, a range of objective observation tasks, reliable and appropriate psychometric test batteries (that can measure high-level abilities and not just baseline entry level skills), different types of 360-degree referee assessments, carefully selected interview questions, and skilled interview panel members who understand the talent inventory.

In conclusion, well developed recruitment procedures using evidence-based skillsets appear to be one of the best strategies for forensic science and policing agencies to attract and select high-caliber applicants. Well-developed recruitment programs can be expensive to develop and evaluate (Nankervis et al., 2022), but if we are serious about attracting high-caliber future CSEs then investing in high-caliber recruitment makes sense. However, because you recruit high-caliber personnel, this only means you recruit people with potential. If you want to turn high-caliber selected applicants into top-performing CSEs, recruitment methods need to be complemented by evidence-based and appropriate training that has been evaluated (Kelty et al., 2017). High-caliber new staff do not need less training and a well devised recruitment program does not imply that post-employment training is redundant (Kelty et al., 2017). On the contrary, there is a need for early career training to develop and enhance the skills these personnel showed at the employment stage. Although many CSEs receive training in technical skills, the research shows that top CSEs have a range of higher level cognitive, social and leadership skills that compliments technical training and scientific knowledge. These high-level cognitive, social and leadership skills are enhanced and developed through training (Kelty et al., 2017). Organizational psychology research has shown that organizations that support professional early career development are positively associated with employability (career potential), and where employees also see potential in their current organization and future success in their chosen career (Berger & Berger, 2018; McKenna, 2020).

AUTHOR CONTRIBUTIONS

Sally F. Kelty: Conceptualization (equal); data curation (lead); formal analysis (lead); investigation (lead); methodology (lead); project administration (lead); writing – original draft (lead); writing – review and editing (equal). **Olivier Ribaux:** Conceptualization (supporting); writing – review and editing (equal). **James Robertson:** Conceptualization (equal); investigation (supporting); methodology (supporting); supervision (equal); writing – review and editing (equal).

ACKNOWLEDGMENTS

We express our thanks to our research associate Phoebe Joshua for assisting with stage 1 and 2 of the critical thematic review presented in this article. We acknowledge Emeritus Professor Roberta Julian for her opinions and support with the original work on top CSEs between 2012 and 2017. We thank the two peer reviewers for their comments to enhance our work. We especially want to acknowledge the openness and support from all 93 participants who took part in the original work on top CSEs and whose enthusiasm for the CSE project made this work possible. Specifically, to the 19 top CSEs around Australia who gave up a minimum of 8 h of their time to undertake extensive interviews, full employment, social history, and psychological profiling—allowing us to develop the original skill set. We are grateful for the assistance and support from The National Institute of Forensic Science, and the CSEs and forensic personnel from Australian Federal Police, New South Wales Police, Queensland Police, South Australia Police, Tasmania Police, Victoria Police, and Western Australian Police. Open access publishing facilitated by University of Canberra, as part of the Wiley - University of Canberra agreement via the Council of Australian University Librarians.

FUNDING INFORMATION

This review is not associated with any funding sources.

CONFLICT OF INTEREST STATEMENT

The authors have declared no conflicts of interest for this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Sally F. Kelty https://orcid.org/0000-0001-9631-1740
Olivier Ribaux https://orcid.org/0000-0003-1814-5147
James Robertson https://orcid.org/0000-0003-3634-4318

RELATED WIREs ARTICLES

Crime reconstruction and the role of trace materials from crime scene to court
Communication, forensic science, and the law

FURTHER READING

Chowdhury, M. (2021). A broken system? Examining the perilous state of quality assurance in crime scene practice. *Science & Justice*, *61*(5), 564–572. https://doi.org/10.1016/j.scijus.2021.07.001

Horswell, J. (Ed.). (2004). Management of crime scene investigation. In *The practice of crime scene investigation* (pp. 83–95). CRC Press.

Sternberg, R. (2000). *Handbook of intelligence*. Cambridge University Press. https://doi.org/10.1017/CBO9780511807947

Developing recruitment program for selecting top CSEs

Kelty, S. F. (2011). Professionalism in crime scene examination: Recruitment strategies using the seven key attributes of top crime scene examiners. *Forensic Science Policy & Management: An International Journal*, *2*(4), 198–204. https://doi.org/10.1080/19409044.2012.706689

Professionalization of CSI

Robertson, J., White, R., Kelty, S., & Julian, R. (2014). Professionalization and crime scene examination. *Forensic Science Policy Management*, *5*(3–4), 99–111. https://doi.org/10.1080/19409044.2014.981348

REFERENCES

Adderley, R., & Bond, J. W. (2008). The effects of deprivation on the time spent examining crime scenes and the recovery of DNA and fingerprints. *Journal of Forensic Sciences*, *53*(1), 178–182. https://doi.org/10.1111/j.1556-4029.2007.00634.x

Al Mutawa, N., Bryce, J., Franqueira, V. N. L., Marrington, A., & Read, J. C. (2019). Behavioural digital forensics model: Embedding behavioural evidence analysis into the investigation of digital crimes. *Digital Investigation*, *28*, 70–82. https://doi.org/10.1016/j.diin.2018.12.003

Almazrouei, A. M., Dror, I. E., & Morgan, R. M. (2020). Organizational and human factors affecting forensic decision-making: Workplace stress and feedback. *Journal of Forensic Sciences*, *65*(6), 1968–1977. https://doi.org/10.1111/1556-4029.14542

Berger, L. A., & Berger, D. (2018). *The talent management handbook: Making culture a competitive advantage by acquiring, identifying, developing, and promoting the best people* (3rd ed.). McGraw Hill.

British Home Office. (2007). *Summary report of the scientific work improvement (SWIM) package*. British Home Office.

Brown, R. E. (2016). Hebb and Cattell: The genesis of the theory of fluid and crystallized intelligence. *Frontiers in Human Neuroscience*, *10*, 1–11. https://doi.org/10.3389/fnhum.2016.00606

Bruenisholz, E., Vandenberg, N., Brown, C., & Wilson-Wilde, L. (2019). Benchmarking forensic volume crime performance in Australia between 2011 and 2015. *Forensic Science International: Synergy*, *1*, 86–94. https://doi.org/10.1016/j.fsisyn.2019.05.001

Chang, R.-C., & Tsai, M.-J. (2022). Visual behavior patterns of successful decision makers in crime scene photo investigation: An eye tracking analysis. *Journal of Forensic Sciences*, *67*, 1072–1083. https://doi.org/10.1111/1556-4029.14970

Chowdhury, M. (2021). Beyond bagging and tagging—An empirical investigation into the roles, designations and responsibilities of crime scene practitioners. *Science & Justice*, *61*(3), 271–279. https://doi.org/10.1016/j.scijus.2021.01.002

Craven, H. P., Hallmark, M., Holland, F., & Maratos, F. A. (2022). Factors influencing successful coping among crime scene investigation (CSI) personnel: Recruiting for resilience – A mixed methods study. *Journal of Police and Criminal Psychology*, *37*, 549–568. https://doi.org/10.1007/s11896-022-09521-x

Crispino, F. (2008). Nature and place of crime scene management within forensic sciences. *Science & Justice*, *48*(1), 24–28. https://doi.org/10.1016/j.scijus.2007.09.009

De Forest, P. R. (2005). Crime scene investigation. In L. E. Sullivan, S. M. Rosen, S. M. Schulz, & M. R. Haberfeld (Eds.), *Encyclopaedia of law enforcement* (pp. 112–116). Sage Publications.

de Gruijter, M., Nee, C., & de Poot, C. J. (2017). Rapid identification information and its influence on the perceived clues at a crime scene: An experimental study. *Science & Justice*, *57*(6), 421–430. https://doi.org/10.1016/j.scijus.2017.05.009

de Roo, H. D., de Gruijter, M., de Poot, C. J., Limborgh, J. C. M., & van den Hoven, P. (2022). The added value of behavioural information in crime scene investigations. *Forensic Science International: Synergy*, *5*, 100290. https://doi.org/10.1016/j.fsisyn.2022.100290

Delémont, O., Bitzer, S., Jendly, M., & Ribaux, O. (2017). The practice of crime scene examination in an intelligence-based perspective. In Q. Rossy, D. Décary-Hétu, O. Delémont, & M. Mulone (Eds.), *The Routledge international handbook of forensic intelligence and criminology* (pp. 86–101). Routledge.

Dioso-Villa, R., Julian, R., Kebbell, M., Weathered, L., & Westera, N. (2018). Investigation to exoneration: A systemic review of wrongful conviction in Australia. *Current Issues in Criminal Justice*, *28*(2), 157–172. https://doi.org/10.1080/10345329.2016.12036066

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. https://doi.org/10.1021/acs.analchem.0c00704

Echouffo-Tcheugui, J. B., Conner, S. C., Himali, J. J., Maillard, P., DeCarli, C. S., Beiser, A. S., Vasan, R. S., & Seshadri, S. (2018). Circulating cortisol and cognitive and structural brain measures: The Framingham heart study. *Neurology*, *91*(21), e1961–e1970. https://doi.org/10.1212/WNL.0000000000006549

Fisher, B. A. J. (1992). *Techniques of crime scene investigation*. Elsevier.

Gardner, B. O., Kelley, S., Murrie, D. C., & Dror, I. E. (2019). What do forensic analysts consider relevant to their decision making? *Science & Justice*, *59*(5), 516–523. https://doi.org/10.1016/j.scijus.2019.04.005

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., Carrano, J., Leo, R. A., & Young, J. K. (2013). *Predicting erroneous convictions: A social science approach to miscarriages of justice*. University of San Francisco Law Research.

Harrison, K. (2006). Is crime scene examination science, and does it matter anyway? *Science & Justice*, *46*(2), 65–68. https://doi.org/10.1016/S1355-0306(06)71576-3

Hess, K. M., Hess Orthmann, C., & LaDue, S. E. (2015). *Management and supervision in law enforcement*. Cengage Learning.

Houck, M. M., Crispino, F., & McAdam, T. (2018). *The science of crime scenes* (2nd ed.). Academic Press.

Illes, M., Wilson, P., & Bruce, C. (2019). Forensic epistemology: Testing the reasoning skills of crime scene experts. *Canadian Society of Forensic Science Journal*, *52*(4), 151–173. https://doi.org/10.1080/00085030.2019.1664260

Julian, R., & Kelty, S. F. (2015). Forensic science as "risky business": Identifying key risk factors in the forensic process from crime scene to court room. *Journal of Criminological Research, Policy and Practice*, *1*(4), 195–206. https://doi.org/10.1108/JCRPP-09-2015-0044

Julian, R., Kelty, S. F., & Robertson, J. (2012). "Get it right the first time": Critical issues at the crime scene. *Current Issues in Criminal Justice*, *24*(1), 25–37. https://doi.org/10.1080/10345329.2012.12035942

Kelty, S. F., & Gordon, H. (2015). No burnout at this coal-face: Managing occupational stress in forensic personnel and the implications for forensic and criminal justice agencies. *Psychiatry, Psychology and Law*, *22*(2), 273–290. https://doi.org/10.1080/13218719.2014.941092

Kelty, S. F., & Gordon, R. D. (2012). Professionalism in crime scene examination: Recruitment strategies, part 2: Using a psychometric profile of top crime scene examiners in selection decision-making. *Forensic Science Policy and Management: An International Journal*, *3*(4), 189–199. https://doi.org/10.1080/19409044.2013.858799

Kelty, S. F., Green, N., Ribaux, O., Roux, C., & Robertson, J. (2022). Assessment of occupational stress. In *Encyclopedia of forensic sciences* (3rd ed.). Sage Publications.

Kelty, S. F., Julian, R., & Hayes, R. (2015). The impact of forensic evidence on criminal justice: Evidence from case processing studies. In M. Hickman & K. Strom (Eds.), *Forensic science and the administration of justice* (pp. 101–120). Sage Publications.

Kelty, S. F., Julian, R., & Robertson, J. (2012). Professionalism in crime scene investigation: The 7 key attributes of top crime scene examiners. *Forensic Science, Policy and Management*, *2*(4), 175–186. https://doi.org/10.1080/19409044.2012.693572

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*, 301127. https://doi.org/10.1016/j.fsidi.2021.301127

Kelty, S. F., Robertson, J., & Julian, R. (2017). Beyond technical 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), 65–78. https://doi.org/10.1080/19409044.2017.1370039

Kruse, C. (2023). Swabbing dogs and chauffeuring pizza boxes: Crime scene alignment work and crime scene Technicians' professional identity. *Science & Technology Studies*, *36*(3), 1–18. https://doi.org/10.23987/sts.112067

McKenna, E. (2020). *Business psychology and organizational behaviour*. Taylor & Francis.

Miles, M. B., Huberman, A. M., & Saldana, J. (2019). *Qualitative data analysis. A methods sourcebook* (4th ed.). Sage Publications.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, *6*(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097

Morgan, R. M., Meakin, G. E., French, J. C., & Nakhaeizadeh, S. (2019). Crime reconstructions and the role of trace materials from crime scene to court. *Wiley Interdisciplinary Reviews: Forensic Science*, *2*(1), 1–18. https://doi.org/10.1002/wfs2.1364

Mousseau, V., Baechler, S., & Crispino, F. (2019). Management of crime scene units by Quebec police senior managers: Insight on forensic knowledge and understanding of key stakeholders. *Science & Justice*, *59*(5), 524–532. https://doi.org/10.1016/j.scijus.2019.04.004

Mrevlje, T. P. (2015). Coping with work-related traumatic situations among crime scene technicians. *Stress & Health*, *32*(4), 374–382. https://doi.org/10.1002/smi.2631

Nankervis, A., Baird, M., Coffey, J., & Shields, S. (2022). *Human resource management; strategy and practice* (11th ed.). Cengage.

National Academy of Sciences. (2009). *Strengthening forensic science in the United States: A path forward*. National Academies Press.

Robertson, J. (2012). Forensic science, an enabler or dis-enabler for criminal investigation? *Australian Journal of Forensic Sciences*, *44*(1), 83–91. https://doi.org/10.1080/00450618.2011.595736

Robertson, J. (2014). Push for Royal Commission into forensic procedures. *Australian Journal of Forensic Sciences*, *46*(4), 365–367. https://doi.org/10.1080/00450618.2014.937457

Roux, C., Bucht, R., Crispino, F., De Forest, P., Lennard, C., Margot, C., Miranda, M. D., NicDaeid, N., Ribaux, O., Ross, A., & Willis, S. (2022). The Sydney declaration—Revisiting the essence of forensic science through its fundamental principles. *Forensic Science International*, *332*, 111182. https://doi.org/10.1016/j.forsciint.2022.111182

Sievers, H. M. (2020). Aspects of homicide/attempted homicide investigations and forensic investigator stress. *ProQuest Dissertations & Theses A&I.*, *2449825500,* 1–240. Retrieved from https://ezproxy.canberra.edu.au/login?url=https://www.proquest.com/dissertations-theses/aspects-homicide-attempted-investigations/docview/2449825500/se-2

Smith, B. (2016). Narrative analysis. In E. Lyons & A. Coyle (Eds.), *Analysing qualitative data in psychology* (2nd ed., pp. 202–221). Sage Publications.

Sollie, H., Kop, N., & Euwema, M. C. (2017). Mental resilience of crime scene investigators: How police officers perceive and cope with the impact of demanding work situations. *Criminal Justice and Behavior*, *44*, 1580–1603. https://doi.org/10.1177/0093854817716959

Sonnentag, S. (2007). Excellent software professionals: Experience, work activities, and perception by peers. *Behaviour & Information Technology*, *15*(12), 289–299. https://doi.org/10.1080/01449299508914648

Spain, R. D., Hedge, J. W., Ohse, D., & White, A. (2022). The need for research-based tools for personnel selection and assessment in the forensic sciences. *Forensic Science International: Synergy*, *4*, 100213. https://doi.org/10.1016/j.fsisyn.2021.100213

Tehrani, N. (2023). The role of psychological surveillance in reducing harm and building resilience in police forensic investigators. *The Police Journal*, *0*, 1–12. https://doi.org/10.1177/0032258X231151996

Vincent, F. H. R. (2010). *Inquiry into the circumstances that led to the conviction of Mr. Farah Abdulkadir Jama*. State of Victoria Government.

Vivona, B. D. (2014). Humor functions within crime scene investigations: Group dynamics, stress, and the negotiation of emotions. *Police Quarterly*, *17*(2), 127–149. https://doi.org/10.1177/1098611114531418

Wyatt, D., & Wilson-Kovacs, D. (2019). Understanding crime scene examination through an ethnographic lens. *Wiley Interdisciplinary Reviews. Forensic Science*, *1*(6), e1357. https://doi.org/10.1002/wfs2.1357

How to cite this article: Kelty, S. F., Ribaux, O., & Robertson, J. (2023). Identifying the critical skillset of top crime scene examiners: Why this matters and why agencies should develop top performers. *WIREs Forensic Science*, e1494. https://doi.org/10.1002/wfs2.1494