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Crime scene investigators (CSIs) are often members of law enforcement who collect, examine, analyze, and document evidence from crime scenes. Using a variety of methods and resources, they assist law enforcement agencies with investigating and solving crimes. Crime scene investigators work to figure out what occurred at the crime scene, how long ago the crime was committed, and what happened leading up to, during, and after the crime (Roberts, 2019). CSIs can be employed on the local, state, or federal level. They are oftentimes employed by law enforcement agencies, sheriff's departments, the state police, crime laboratories, or coroner's offices (Criminal Justice Degree Schools, 2020). According to the U.S. Bureau of Labor Statistics (2020), the largest employer for forensic science technicians are local governments, which account for 58 percent. Followed by state governments, which account for 29 percent, then medical and diagnostic labs at 4 percent, and testing labs at 2 percent. CSIs are not always referred to as crime scene investigators, and can also be referred to as a variety of different names. These names include crime scene specialists, crime scene technicians, forensic science technicians, and many more (Criminal Justice Degree Schools, 2020).

Crime scene investigator's main responsibilities are to identify and extract all physical evidence at the scene of the crime, as well as preserve and package it to be transferred to the laboratories (Criminal Justice Degree Schools, 2020). Some of the physical evidence could include biological fluids such as blood, semen, saliva, and urine. Other DNA samples found are skin, hair, and fingerprints, and those can be found in a variety of places at a crime scene. Residue from gunshots, tire and footprint tracks, ammunition, and many other things can also be considered physical evidence. CSIs may also lift and collect fingerprints and DNA samples, examine blood splatters, and look at any weapons that may have been involved in the crime

(Roberts, 2019). Once this evidence is sent to the lab, the lab technicians are usually the ones to analyze the samples given by the investigators, as CSIs don't always have training in those areas (Liaison International, 2017). CSIs are called to a crime scene once first responders have already arrived, and they often assist law enforcement in barricading the scene to ensure there is no outside contamination (Roberts, 2019). Weather conditions such as rain, wind, and the sun can be problematic for protecting the evidence so barriers may be put up to protect the evidence from those harsh conditions. Once the crime scene is secure, CSIs can work to identify and mark different areas of the scene and begin their investigations.

CSIs are also required to take thorough notes and precise measurements, which makes it essential for CSIs to be observant and meticulous. If every aspect of the scene isn't noted, that could eliminate useful information for the case. CSIs also take photographs, where they are required to include a scale in order to know the exact dimensions and size of the object in the photo. Writing extensive reports, and finding out as much information about the crime scene as possible are also requirements for a CSI (Liaison International, 2017). They are responsible for sharing all of their findings with the law enforcement agencies involved in the case. They may also be required to testify in court regarding the findings they uncovered in their investigations (Liaison International, 2017). In terms of working conditions, crime scene investigators must be prepared for anything, as you never know where or when a crime will be committed. There is often no specific schedule, as it may be required to work nights, weekends, and holidays. Travel could also be required, depending on where the crime was committed and how far the radius of the jurisdiction is (U.S. Labor of Statistics, 2020). Being a crime scene investigator can be hard work with long and demanding days. However, the work of investigating crimes and possibly bringing people to justice can be very rewarding.

Educational Requirements, Skills, Training, and Certifications

The educational requirements to become a crime scene investigator can vary depending on the specific position, as well as how much experience someone has. On average, to become a crime scene investigator at the federal level, it is usually required to possess an associate or bachelor's degree in criminal justice, crime scene investigation, forensic science, biology, and other related majors (CorrectionalOfficer.org, 2021). The educational requirements at the local and state level require at least a high school diploma or a GED certificate (CorrectionalOfficer.org, 2021). Although these are the average requirements, each position could have its own set of standards. However, the technology and skills used in crime scene investigation are always evolving, so continuous education and training are often required to keep up with the ever-changing advancements.

There are many important qualities that a crime scene investigator should possess in order to be successful in this career. Strong written and verbal communication skills are essential as there are many people involved in these cases, including law enforcement, specialists, and first responders. There will be a constant circulation of information regarding the case between those involved, so having the ability to communicate effectively as well as listen is crucial. While on the stand, CSIs must clearly explain their findings in a way that everyone, especially the judge and jury, can understand. As a result of this, CSIs should possess solid explanation skills that allow someone with no knowledge about the crime to be able to comprehend the meaning and significance of the evidence. Being detail-oriented and organized are two additional skills that a CSI should possess to be successful, as their job is to notice small details and take meticulous notes (United States Bureau of Labor Statistics, 2020). The more details that are included in their sketches and notes, the easier the investigation may be later on. Although many

skills are important to have, one of the most critical skills is to be able to handle high-stress situations. Oftentimes there can be a time crunch to solve these crimes, as well as working in conditions that may not be ideal (CorrectionalOfficer.org, 2021). If someone cracks under the pressure and is unable to handle demanding and difficult tasks, becoming a CSI may not be for them.

Critical and analytic thinking skills are often valuable skills to have because surveying the scene and figuring out how each piece of evidence fits together is crucial in the investigation process. CSIs must be able to assess a situation objectively without allowing the pressure and nature of the environment to distract them from analyzing what needs to be collected. The crime scene is most likely going to be chaotic, and if the CSIs aren't quick on their feet to assess the situation, precious evidence and DNA could be lost. Having physical stamina is an important aspect of this field as there is a lot of movement involved with lifting evidence, bending to the ground, looking in small spaces, etc. (Roberts, 2019). In cases of crimes involving hazardous or unsafe items, CSIs may also be required to perform those movements with extensive gear on. Being a crime scene investigator requires someone to potentially witness gruesome and horrific events, and CSIs must be able to look past that and focus on the task at hand. They may be required to touch and get in close proximity of decaying bodies, large amounts of blood and other bodily fluids, as well as other emotionally draining sights. They may be required to inspect and take photographs of murder victims or those who are severely injured. With this, those interested in becoming a crime scene investigator should have a strong stomach and be able to handle such emotionally draining and difficult scenes (Roberts, 2019).

If the position is within a law enforcement agency, whether that is federal, state, or local, candidates are usually required to attend and graduate from the police academy

(CorrectionalOfficer.org, 2021). These academies differ from department to department, however, they all will train officers and teach them vital information regarding a law enforcement position (Roufa, 2019). According to Roufa (2019), these academies average as many as 800 hours of training and in-classroom learning before candidates are able to graduate. Weekly testing is often administered to track the progress of those at the academy, to ensure that they are keeping up with the material (Roufa, 2019). Firearms training, defense tactics, physical fitness, and operating a vehicle are other areas that one must be proficient in to complete the academy (Roufa, 2019). These academies can be exhausting and physically and mentally draining, but in the end, they prepare recruits for their future careers ahead. Although it is common for CSIs to be sworn police officers, that is not always the case. Many CSIs can be civilians who have scientific experience and expertise, with no law enforcement background at all (Liaison International, 2017).

In addition to the training required within the police academy, there are a variety of national training programs for crime scene investigators. Oftentimes these trainings are offered through the National Institute of Justice (NIJ) and the National Forensic Science Technology Center (Crime Scene Investigator EDU, 2017). The training under the NIJ includes Arriving at the Scene: Initial Response/Prioritization of Efforts, Preliminary Documentation and the Evaluation of the Scene, Processing the Scene and Completing and Recording the Crime Scene Investigation. Some training under the National Forensic Science Technology center includes Technical Working Group on Crime Scene Investigation, Intermediate Crime Scene Investigation, Essentials of Crime Scene Investigation, and DNA Biological Screening for Law Enforcement (Crime Scene Investigator EDU, 2017). Some, but not all, states require CSIs to be certified through the Crime Scene Certification committee. This ensures that all of the potential

candidates are able to meet the minimum requirements. The minimum requirements differ by state, some are extensive while others are not (Crime Scene Investigator EDU, 2017).

Although certifications and licenses are typically not required to enter the crime scene investigation field, there are various certifications that someone can earn to advance their career. The International Crime Scene Investigators Association (ICSIA) is a certification that a CSI can earn after only two years on the job with a law enforcement agency. Along with the experience, there are a few additional requirements, such as a written exam consisting of 100 questions, handling a mock crime scene, and providing proof of photography they have taken from crime scenes (Crime Scene Investigator EDU, 2017). The International Association for Identification (IAI) is the largest forensic association worldwide. It can certify CSIs in one of four different categories, a Certified Senior Crime Scene Analyst (CSCSA), Certified Crime Scene Reconstructionist (CCSR), a Certified Crime Scene Investigator (CCSI), or a Certified Crime Scene Analyst (CCSA) (Crime Scene Investigator EDU, 2017). All of these categories demand different requirements and levels of experience, along with a testing process that one must pass to be certified (Crime Scene Investigator EDU, 2017). Another certification program is The American College of Forensic Examiners Institute (ACFEI), which offers certifications to become a Certified Criminal Investigator (CCI), which requires similar demands as the other certifications (Crime Scene Investigator EDU, 2017).

Career and Future Job Prospects

The United States Bureau of Labor Statistics includes crime scene investigators under the category of forensic science technicians. According to the U.S. Bureau of Labor Statistics (2020), the median annual wage for a forensic science technician was $59,150 in May of 2019. The highest 10 percent of forensic science technicians earned more than $97,350, while the

lowest earned less than $35,620 (United States Bureau of Labor Statistics, 2020). On average, being employed by the state or local government tends to receive higher pay than those who are employed by laboratories (United States Bureau of Labor Statistics, 2020). In terms of benefits, most CSIs will receive health, dental, and life insurance, sick leave, holiday and vacation pay, as well as a retirement plan (Employment Development Department, 2021).

There are many opportunities for promotion and career advancement in the field of crime scene investigation. Along with the various certifications someone can get, there are many supervisory positions as well as other positions that can be filled. The titles and positions that can be earned and given vary by department, agency, and state. For example, a CSI can become a forensic specialist, where they can study a specialized area of forensic science. These specialized areas can be DNA analysis, blood splatter analysis, fingerprint collection, firearms, etc (Hall, 2018). Another example is the Illinois State Police Division of Forensic Science, where new hires start as trainees and can be promoted to Forensic Scientist I-III throughout their careers, as level III is for highly experienced individuals and supervisors (Williams, 2017). Another opportunity that a lot of CSIs pursue is becoming a professor and teaching at a college or university where they can use their experience and knowledge to educate others (Williams, 2017). They can also take that opportunity to conduct research and develop programs at their college or university to further advance the institution (Williams, 2017).

According to the U.S. Bureau of Labor Statistics (2020), the projected growth rate for a forensic science technician is up 14 percent from 2019 to 2029, which is significantly faster than the average for most other occupations. Even with this large projected growth, that will only result in around 2,400 new jobs over that period from 2019 to 2029 (United States Bureau of Labor Statistics, 2020). Looking at these statistics, the competition for a CSI job will be high,

and those who have more education or experience will most likely have the advantage to obtain a job in this field.

Hiring Process

The hiring process to become a crime scene investigator can be lengthy, as there are several steps to be taken before an applicant can be hired and out in the field. First, applicants must meet the minimum requirements that the job deems essential. To become a crime scene investigator at the federal level, you must be a United States citizen and possess a valid driver's license, must meet the educational requirements listed above, be at least 21 years of age, and must pass the examinations and assessments required (CorrectionalOfficer.org, 2021). Other requirements include being of good moral character, be willing to travel, as well as being physically and mentally capable of performing in this desired field (CorrectionalOfficer.org, 2021). The minimum requirements for the state and local level are similar, however, the education requirements are a high school diploma or GED and must pass a background check and have a clean record (CorrectionalOfficer.org, 2021). The second step to the hiring process is to obtain a degree or experience in the field, which can make an applicant more attractive and likely to be considered. The third step is the initial application with a completed resume and cover letter, although a cover letter is not always required (CorrectionalOfficer.org, 2021). After that, most applicants will be required to take and pass a written exam followed by an interview or a series of interviews (CorrectionalOfficer.org, 2021).

If the candidate applied to an agency that requires the police academy, they will be expected to attend and graduate from the academy of the agency's choice (CorrectionalOfficer.org, 2021). In addition to completing the police academy, some may choose to become a sworn officer within their agency. In this process, new hires are required to take a

written and oral vow in front of witnesses to their commitment to serve and remain loyal, dedicate themselves to the profession, as well as deliver justice effectively and efficiently (CorrectionalOfficer.org, 2021). Once the applicant has completed the entire hiring process and is hired, most new employees are required to receive on-the-job training. This often includes working under experienced investigators to learn the ropes before they are able to work independently (United States Bureau of Labor Statistics, 2020). Under this supervision, newly hired employees are taught ways to collect and document evidence, different techniques to analyze bodily fluids, photography skills, as well as effective note-taking (Criminal Justice Degree Schools, 2020). The probationary period usually lasts up to a year and ends with an evaluation of the work that the new hire has completed (CorrectionalOfficer.org, 2021).

Policy Issues and Challenges Faced by Crime Scene Investigators

Crime scene investigation can be a very rewarding career; however, it comes with a variety of challenges that one must face. Although there are constant developments with technology and education within this field, there are still problems that have been dealt with for many decades, and continue to be problems. These challenges are faced by all agencies and crime scene investigators, whether they work in rural or urban areas, are part of large or small departments, or from the United States or other countries. These challenges can be extremely frustrating for CSIs and most administrators and policymakers have failed to address these problems and create solutions.

Crime scene preservation is a key factor in ensuring the validity and accuracy of solving a crime, as well as making sure the evidence found is admissible in court. As essential as it is, it is one of the biggest challenges that CSIs face on a day-to-day basis. Starting off, the amount of

non-essential personnel at the scene is an ongoing issue. Defense attorneys oftentimes use the continuous flow of people at the crime scene in their arguments (Schiro, 2021). Too many people within the perimeter of the scene can result in tampered or disrupted evidence, which defense attorneys will use to their advantage. However, many of those personnel are first responders, EMTs, firefighters, law enforcement, who are always the first ones to the scene. Although they do not intentionally tamper with the crime scene, ensuring the safety of the scene and those involved can lead to the movement and contamination of evidence. Once the incident has been declared safe and stable, the crime scene perimeter should be secured and everyone should exit, including the first responders, until the CSIs can fully investigate (Schiro, 2021). The high amounts of people present on the scene can start conflict determining jurisdiction if it remains unclear. There may be miscommunication as to where the evidence is supposed to go, who is supposed to be in charge, and who will be collecting the evidence. Collaboration between everyone involved is essential to the success of the investigation, and the jurisdiction confusion should be handled immediately before future conflict arises.

Lack of communication between everyone involved at the scene is another challenge for crime scene preservation. It is essential for anyone who arrives before the CSIs to observe and report everything that everyone did before they arrived. This includes all the first responders, the victim(s), any suspects, and any bystanders that may have been present. Being aware and attempting to keep the victims and suspects under control is crucial in protecting the scene, as any additional movements can interfere with the investigation. If this isn’t communicated properly, CSIs and detectives may make false assumptions and conclusions based on the information that they have and information they weren’t provided with (Schiro, 2021). This could lead to a domino effect of flawed conclusions as CSIs report their findings to law

enforcement, court personnel, medical examiners, etc. Another highly consequential part of communication is if someone at the scene was to make a mistake or accidentally move evidence, and not inform others about it or attempt to put it back where they thought it was originally found (Schiro, 2018). It is crucial for honesty and transparency amongst everyone, to ensure the most accurate investigation. Overall, all members of the investigation must be in constant communication with one another so all information is shared accurately and nothing is left out.

In order to prevent some of these common challenges, the crime scene needs to be protected and preserved at all costs. Once the crime scene has been deemed safe and stable, it is crucial to immediately start the process of securing the scene. Starting with establishing a perimeter around the scene to ensure that no outside individuals are able to enter, whether that is on purpose or by accident (Government of Canada, 2013). Protecting the crime scene from the weather is another critical step, as the elements, especially harsh ones, can be detrimental to the collection of evidence and fingerprints. The next step is to clear the scene from anyone who isn't essential to be there, which should be anyone but the CSIs and detectives once the first responders have made sure it is safe and everyone is out of harm's way (Government of Canada, 2013). Keeping track of who comes and goes from the scene and the times they were therefrom can be helpful, as this can give a detailed record for court purposes (Government of Canada, 2013). Anything that can be recorded and written down should be, as that increases the likelihood of anything found at the scene being admissible in court. It is imperative to keep control of the crime scene in order to prevent any damage done, even a small mistake could lead to a wide variety of problems for detectives and CSIs.

Similar to the scene itself, the evidence needs to be protected as quickly and effectively as possible. When first responders first arrive on the scene, they should do their best to not move

anything unless it is crucial to help an individual who may have been injured during the incident (Government of Canada, 2013). Any deceased individuals or anything not requiring immediate medical attention should be left alone and remain untouched. If it is absolutely necessary to disrupt the scene in order to do their job properly, first responders should take mental notes of what the scene looked like and where evidence was placed before items were moved. Anyone within the perimeter of the crime scene should also be aware of where they are walking, as new footprints can cover up any footprints that may have been there prior. If parts of the scene are disrupted, it should be noted and communicated what was moved and when. This is to ensure that there is no miscommunication as to what objects are in their original location and what is not. It should also be noted where individuals were walking and if anything was touched without protective gloves on. Next, photographs, sketches, and videos should be taken immediately before anything is removed from the scene, and all evidence should be recorded and identified thoroughly (Government of Canada, 2013).

When evidence is being collected, gloves and other protective equipment should be worn to avoid any possible contamination. In addition to preventative equipment, everything collected should be packaged and labeled separately, to avoid cross-contamination. All evidence should be placed in new paper bags or envelopes, and plastic bags should be avoided, as they can retain moisture (National Institute of Justice, 1999). Any bags containing evidence should be kept at room temperature and kept dry at all costs, as moisture can be damaging to DNA (National Institute of Justice, 1999). Once all the proper care steps are taken, the bags should be sealed, labeled, and transported. The information on the label should include the description of the item, case number, tracking number, storage location, suspect name if applicable, and the location of the crime (Alex, 2021). It is important for the evidence to be properly identified as well as the

chain of custody followed. The chain of custody refers to the way that the evidence is handled during the investigation, making sure that it was handled properly and the chain remains unbroken. Every aspect of the transportation of the evidence should be documented, this includes who was in possession of the evidence, the times they had possession, and if anyone else came in contact with it before it was handed over to law enforcement (National Institute of Justice, 1999). There must be no discrepancies or inaccurate information for it to be admissible in court. If the chain of custody is broken in the slightest, the evidence will not be used in court or shown to any jury members.

Along with the protection of the evidence, witnesses of the crime should be separated. It is important that they do not correspond with one another before their statements are given. If witnesses are collaborating on what they observed, their stories may change to fit what others saw and didn't see. Every witness must give their own side of the story, to make sure that no imperative details are left out or missed. Although eyewitness testimonies are not always the most reliable or used in court, ensuring that each side of the story is told is critical. There are a lot of moving parts to crime scenes and they can often be hectic, so it is often difficult for every aspect of an investigation to run smoothly with no obstacles. However, with continued proper education and training, there is hope to minimize the mistakes made at crime scenes, as well as increase communication and transparency. As a result of this, more evidence will be admissible in court and more crimes will be able to be solved accurately.

There are two types of evidence, testimonial, and physical (Byrd, 2021). Testimonial evidence is any account of the situation that is made under oath, typically at court, while physical evidence is any objects or materials that are present at the crime scene (Byrd, 2021). According to Lee and Ladd (2001), many courts will rule eyewitness evidence to be unreliable, so

oftentimes physical evidence is the only way to help law enforcement and investigators get leads about a case. These leads could include proving or disproving alibis of certain suspects, finding links to the offender and victim and their identities, and possibly exonerating those who are innocent but have been wrongfully convicted (Lee & Ladd, 2001). Preserving the physical evidence at a crime scene can be the most pivotal aspect to a successful investigation, as there can often be many issues once the case reaches court (Lee & Ladd, 2001). The initial determination of which pieces of evidence will require further analysis is essential in the first steps of an investigation. Once that is determined, CSIs should move thoroughly and effectively through the crime scene to document and collect the evidence before it is contaminated. According to Lee and Ladd (2001), when physical evidence has prolonged exposure to different elements such as weather, the DNA can become unsuitable for DNA analysis, which could have detrimental effects on the investigation. The way that the evidence is documented, collected, packaged, and preserved is extremely influential on whether it will be admissible in court or not, which could make or break a case (Lee & Ladd, 2001).

In order to successfully preserve the crime scene and avoid mistakes, everyone involved should be setting an example for those who are working under them. This includes the CSIs, detectives, first responders, anyone who is present at the scene prior to the CSIs collecting their evidence. Anyone within the perimeters of the crime scene should be aware of possible contamination and be consistently careful of what they are doing while at the site. If those who are in charge are following protocol, those under them will hopefully follow suit. All officers and other first responders should be educated on the importance of evidence preservation and trained on how to follow the protocol. Not only is this education protecting the evidence and helping the investigators, but it is also keeping the first responders safe. Many crime scenes contain bodily

fluids, and if anyone touches these fluids without gloves, they could contract a variety of diseases such as hepatitis B or human immunodeficiency virus (HIV). The safety and well-being of all the first responders are crucial, and everyone should be aware of these consequences if the protocol is not followed. Any newly hired personnel should also be educated and trained on these formalities. All of the practices regarding crime scene preservation should be addressed and understood before the individual is allowed near any crime scenes.

A written formal policy is another essential solution to the challenge of crime scene preservation. These policies are often written by police administrators because the police are usually the first people to arrive at the scene. If the protocol is strictly enforced by those who arrive at the scene first, there is a much higher chance that these mistakes will be avoided. This policy should emphasize the importance of protecting the crime scene and everything within it. This includes securing a perimeter, creating an entry log, ensuring nobody tampers with any evidence, and ensuring that no unauthorized personnel are admitted to the scene (Garrison, 2015). There should also be mention of open communication and transparency to make sure that it's clear that if anyone has made a mistake or accidentally tampered with something, that they tell someone. Police administrators should stress the importance of this policy, and make sure that it is strictly followed just like any other department rule.

Crime scenes are not always the most ideal places to work, as they can be emotionally draining and can involve tedious and time-consuming work. No one can predict when or where a crime or accident is going to occur, so where the incident takes place, the CSIs must go. Some of these areas could be unsafe and unsanitary, which makes being a CSI a relatively risky career. CSIs are often required to work on nights, weekends, and holidays, as well as in harsh weather conditions such as extreme heat, hail, snow, and wind. While working in potentially hazardous

conditions, CSIs are required to wear protective clothing, eyewear, gloves, and other safety equipment, which can be physically taxing (Liaison International, 2017). However, if the scene is deemed safe, most CSIs will wear polos, tactical pants, belts, and heavy boots to crime scenes. There can also be a lot of added pressure from a variety of people, such as the police, the media, the families of the victims, etc. Especially if the case is high profile with media coverage, people will want answers that the CSIs may not have and will need time to uncover. With constant pressure, CSIs may feel rushed in their investigations, and they must make sure that this will not affect their ability to do their work error-free. This pressure can certainly be a challenge for CSIs, and their ability to handle that stress is essential to someone's success as a CSI. CSIs can witness very distressing and horrendous sights, as many crime scenes can involve murders, rapes, and bad car accidents. A strong stomach is critical in CSIs because many of these crimes can come with unpleasant smells, as some may involve bodies that are at various stages of decomposition (Liaison International, 2017). This can be both mentally and emotionally taxing on someone and can lead to long-lasting effects on someone’s mental health. However, CSIs don’t spend all their time at gruesome sites, oftentimes they are in the lab analyzing the evidence they found and writing the reports to give to law enforcement. The lab is often a much more relaxed environment, which can give CSIs a break from the stressful crime scenes. They may also find themselves on the stand in court or attending an autopsy at the coroner's office, as every day as a crime scene investigator is different.

New Technologies in Crime Scene Investigation

Technology within the field of crime scene investigation and forensic science is constantly evolving and changing. With the new developments and advancements in this technology, it is becoming increasingly harder for suspects to get away with crimes and easier

for investigators and law enforcement to solve them. Many of these new technologies save everyone in the criminological field a lot of time, money, and energy. The accuracy and reliability of investigations are also improving, which hopefully will lead to a reduction of wrongful convictions and ensure that the actual offender is getting punished for their crimes.

Three-dimensional (3D) imaging for crime scene reconstruction is an up-and-coming technology that will be critical to CSIs and the court system. With this imaging technology, an entire crime scene can be mapped out and reconstructed accurately with details down to the millimeter (Raneri, 2018). Different analyses, such as bullet trajectories and blood splatter are able to be viewed within the 3D images, which gives a completely different perspective to CSIs than any other technology to date (Raneri, 2018). These images are very useful as evidence in court and can be viewed and understood by most people, even if they have no prior knowledge on the topic (Raneri, 2018). 3D imaging can be especially helpful for individuals who are visual learners, and this technology can help them visualize the scene and what may have occurred there. The use of this technology isn't perfect and the images are not always admissible in court. However, with improvements, they will be an essential forensic tool to crime scene investigators. The guidelines and regulations regarding 3D imaging for crime scene reconstruction are being developed internationally and across the United States in hopes to be able to use this technology universally (Raneri, 2018).

Rapid DNA tests are another example of the latest technology in the field of crime scene investigation. These DNA tests entail a fully automated process of taking a cheek swab and turning it into a complete DNA profile with no human intervention whatsoever (Federal Bureau of Investigations, 2016). The tested DNA can belong to both a deceased or alive victim or suspect, and the profile can be completed within 75 to 90 minutes (Campbellsville, 2019). The

almost instantaneous results of these tests are vital because it gives police enough time to get the results back before the suspect has been released. The FBI started testing Rapid DNA tests in 2019 and 2020 for high-profile crimes on the federal, state, and local levels (Federal Bureau of Investigations, 2016). This new rapid test is also being used by the Department of Homeland Security to verify kinship, where they are attempting to reduce human trafficking, identify victims, and reunite people with their families (Campbellsville, 2019). The introduction of Rapid DNA testing is critical for law enforcement agencies and CSIs, as it saves them months of waiting on results and money spent on that long process.

With the increased urgency for the results of DNA tests, many crime labs cannot keep up with the growing demand for these tests. Therefore, this puts an even bigger emphasis on the importance and need for Rapid DNA testing. According to the National Institute of Justice, a backlogged DNA test is one that has not been tested for approximately 30 days once it was submitted to a crime laboratory (U.S. Department of Justice, 2011). The amount of DNA samples being submitted on a daily basis is significantly higher than the reports containing the results going back out (U.S. Department of Justice, 2011). This can cause significant delays in the investigation process as well as possibly releasing a criminal back to the streets while the tests are awaiting results.

There are two types of DNA backlogs, the first is casework backlogs, which consist of the evidence collected at crime scenes. This process is lengthy because determining whether there is a sufficient amount of DNA within a sample takes time. Another reason is that oftentimes there isn’t enough DNA in the evidence to complete a sample, or there is DNA from multiple individuals (U.S. Department of Justice, 2011). In this case, either a new sample needs to be taken or the sample may not be useful for the investigation. The second backlog is the

analysis of the DNA that gets collected from arrested suspects and offenders for specific crimes. The results of these analyses get uploaded into the Combined DNA Index System (CODIS). CODIS is a national database of DNA samples taken from convicted offenders, victims, crime scenes, as well as from unidentified human remains (GovTrack, 2018). This database is run and operated by the Federal Bureau of Investigation (FBI) (U.S. Department of Justice, 2011).

Elimination samples could be another contributing factor towards the backlog of DNA testing. Elimination samples are DNA samples from other people involved at the scene to help compare and rule out any DNA that isn't a suspect (National Institute of Justice, 1999). For example, if a glass of water is found at a home where a crime was committed, it is essential to gather that DNA from the glass. Once that DNA is collected, anyone else who may live in the household should be asked to give a sample so lab technicians can compare the DNA to that found on the glass (National Institute of Justice, 1999). This is also useful for victims of rape, as any consensual partners should be asked to provide a sample to rule out their DNA if it is found on the victim (National Institute of Justice, 1999). As a result of this ongoing problem regarding DNA backlog, there have been millions of dollars-worth of funding towards laboratories responsible for this type of testing, in hopes that the backlog will start to decrease. This funding is used for hiring more lab technicians, improving software, as well as utilizing robotic stations to efficiently test samples (U.S. Department of Justice, 2011).

In 1994, the Violent Crime Control and Law Enforcement Act was passed, which among many other items, allowed the FBI to develop CODIS (National Institute of Justice, 1999). However, there was a misinterpretation of what the bill allowed the FBI to do. The FBI took this bill as only permitting them to create the national index, not take additional DNA samples from future offenders and suspects (GovTrack, 2018). As a result of this misinterpretation, a request

was made by the FBI for Congress to authorize them to take DNA samples from those who committed federal crimes and add those samples to the database (GovTrack, 2018). In response to the FBI's request, Congress passed the DNA Analysis Backlog Elimination Act of 2000, also known as the "DNA Act" (GovTrack, 2018). The DNA Analysis Backlog Elimination Act of 2000 allows each US state to collect and analyze DNA samples and use them in the FBI's Combined DNA Index System (GovTrack, 2018). This allows for all the DNA samples of those convicted of federal crimes to be all in one index system, making it significantly easier to identify individuals if they are in the system from previous arrests.

Automated Fingerprint and Facial Identification are two more advancements that have continuously improved over the past several years. Although the Automated Fingerprint Identification System (AFIS) is not new, the swift and efficient way it works has improved drastically over the past few decades. The improvements to these systems have made the analyses more reliable, as well as the process overall more efficient (Campbellsville, 2019). One reason for the successfulness of automated fingerprint recognition is the large databases of fingerprints that are accessible to these systems that allow the computers to compare the patterns over time (Campbellsville, 2019). Facial identification has also evolved in the past few decades with the growing access to cameras and the ability to take photographs and videos. Using this tool, facial features are compared to a database containing 117 million identified faces and this allows law enforcement to identify someone from a photo or video that is taken (Western Governors University, 2019). This technology is also used on social media sites, on your smartphone, at airports, and in various other places that most people wouldn't think of. Although facial recognition isn't always as accurate as fingerprints, it can place an individual at a scene where fingerprints may not have been or may have been tampered with (Campbellsville, 2019).

It can also be used as an additional resource to identify a victim or suspect if the fingerprint analysis isn't as conclusive as needed. Overall, the advancements of fingerprint and facial recognition will continue to improve with time, which will assist CSIs with their future work.

The use of facial recognition has been a widely controversial topic since it was first introduced. Starting with the concern of privacy, many people don't give their consent for their identity to be used with this type of technology. While many are unaware that they are a part of these databases. For example, social media sites such as Facebook use facial recognition without consent from their users, as there is little to no regulation regarding this new advancement (Western Governors University, 2019). Another concern regarding facial recognition is that it has also been known to disproportionately target those of color, which could lead to an increase in wrongful arrests and convictions. Hacking is another major issue regarding privacy, where this technology can contain personal information, along with a photo of your face. This information could include your address, license plate number, driver's license number, and much more. Hacking these databases could get extremely dangerous if the wrong people got a hold of that information for millions of people (Western Governors University, 2019).

As a result of these issues, various cities across the country have started to ban the use of facial recognition. These cities include, San Francisco, California, Boston, Massachusetts, Portland, Oregon, as well as many others. Many cities and towns in the state of Massachusetts have started to follow the ban, resulting in a rise since the start of 2020. However, in December of 2020, Massachusetts passed a police reform bill called "An Act Relative to Justice, Equity and Accountability in Law Enforcement in the Commonwealth", and a major concern of the bill was the use of facial recognition technology and other police-related issues (Commonwealth of Massachusetts, 2020). As a result of this bill in the Commonwealth of Massachusetts, law

enforcement agencies will be able to access facial recognition technology, but they must obtain a court order first (Commonwealth of Massachusetts, 2020). In cases of emergency situations, law enforcement agencies will still be able to have full access to these resources without the need for a court order or any form of permission. In order for the situation to be considered an 'emergency', a person or a group must be faced with a significant risk of harm. This allows the use of this helpful resource for law enforcement but ensures that it is being used appropriately.

Portable police labs are slowly starting to get introduced in the field of forensics. These labs will reduce the number of samples that need to be sent to labs and the results will be instantaneous (Pullman, 2017). Handheld electronic sniffers and flashlight detectors will be included in the portable lab. These tools could take the place of canine units, field sobriety tests and breathalyzers for cases of driving while under the influence (Pullman, 2017). Fingerprint analysis and facial recognition software could also be utilized and may be able to connect to the government databases containing the information to identify suspects (Pullman, 2017). These portable labs have surfaced in many areas around the country, including use by the FBI. Another game-changing development will allow CSIs to determine whether a powder or substance is explosive or not, taking the place of bleach. This will not only be a safer solution, but it will preserve the evidence that could be destroyed when the bleach was utilized to take care of the substance in question (Pullman, 2017).

Future Projection for CSIs

Although there seems to be a growing demand for crime scene investigators, that does not mean that there will be an influx of jobs available in this field. The projected growth rate is rising, but will only produce around 2,400 jobs throughout the United States (United States Bureau of Labor Statistics, 2020). With the increased popularity of television shows about crime

scene investigation such as CSI, NCIS, Criminal Minds, etc., the popularity of the field is rapidly growing. That being said, it will continue to be a competitive field to get involved with. This will make it essential to receive higher education and gain experience to increase one's job prospects. Looking at this knowledge regarding the current state of this field, it is important to start preparing for this career early. Being involved with anything that could stand out to an employer will be a key factor in securing employment as a crime scene investigator in the near future. After extensively researching this career path, I recognize how difficult it may be to pursue a career as a crime scene investigator. I believe that I have the ability and qualifications to become a CSI, it is just whether there are any openings available to be filled. There are also a large numbers of individuals who are applying for these jobs, and each individual could bring something new to the field of forensics. Educating myself on every aspect of this field, both the good and the bad has increased my interest in pursuing a career as a crime scene investigator. I want to be able to be a part of the new generation of CSIs who utilize cutting-edge technology and find resolutions to the obstacles that have been faced decade after decade.

The future for CSIs is promising, as the advancements with technology can make their jobs easier and the results more accurate. Techniques and methods in the field of forensics have drastically changed over the years, resulting in exonerations of innocent people and more cold cases being solved. Fingerprint analysis, for example, is a technique that is continuously being improved for increased reliability. When using this technology, false positives can be common, and that can result in wrongful convictions. This technology has been around for many years and there are always more improvements to be made. However, it is important to recognize that this technique is still highly useful in this field, but it should be noted to jurors in a court setting of the limitations it may have (Tinnesand, 2020). Along with the development of old technologies,

brand new cutting-edge technologies will be introduced into the field. Each new technology that is implemented will change the direction of the future of CSIs, and the field will be continuously changing.

The COVID-19 pandemic has changed almost every aspect of the world as we once knew it. Between stay-at-home orders, the introduction of constant mask-wearing, as well as the deadly impact it has had on the world in the past year, nothing is the same. The pandemic is certainly going to change the future direction of crime scene investigators, as it has with everything else. Accessing personal protective equipment (PPE) was a struggle for many CSIs over the past year. Most available PPE was given to frontline workers, whether that was first responders, healthcare workers, or any other essential workers. PPE is a crucial part of a CSIs job, as it is needed to ensure the protection of themselves as well as the evidence that they handle on a daily basis. During the pandemic, CSI's jobs have not slowed down, requiring them to desperately need PPE, when none was available. As a result of this, similar to frontline workers, they were forced to reuse PPE, which could've been detrimental to the preservation of the evidence (Wilson, 2020).

In response to the pandemic, most public places have required face coverings, as well as significantly increased their sanitization protocols. Many people have also started wearing plastic gloves, in order to protect themselves from this deadly virus. This new 'normal' that the world has adapted to over the past year has made the jobs of crime scene investigators and law enforcement increasingly difficult. It is no longer considered suspicious if someone is walking around with half their face covered and their identity hidden, or someone entering a public place wearing plastic gloves. If more people are wearing gloves and there is continuous sanitization of surfaces, that means there are fewer fingerprints and DNA evidence that gets left behind at a crime scene (Wilson, 2020). The ability to track down a suspect using security camera footage is

also becoming more difficult. It is hard to identify a suspect who is now able to walk into any public setting wearing a face mask, as most identifiable aspects of a person are covered with a mask. This can complicate things for both CSIs and law enforcement, and everyone within the field will have to continuously adapt to the new normal of the world. New advancements and ways to solve and investigate crimes will have to be discovered as the COVID-19 pandemic continues.

Conclusion

Crime scene investigators as a whole have an extremely rewarding job. Assisting in the investigation of crimes can bring someone to justice and bring possible peace to the victim or their families. Accurately solving a crime keeps criminals off the streets and can protect victims and others from future harm. However, there can also be many challenges and difficulties in this line of work. The ability to handle those challenges is vital to the success of one's career in this field. With many unpleasant sights and smells, a strong stomach and the ability to cope with those images can make or break a career as a CSI. Although there are challenges within this field, there are numerous ways to help solve these issues as well as improve the career as a whole. Whether that is policy changes within police departments regarding crime scene preservation or increased education and training for everyone. There are many ways to adapt to this ever-changing field. The COVID-19 pandemic has put a strain on society as a whole, and impacted crime scene investigators, in particular. Since the start of the pandemic, CSIs have adapted to the new environment and adjusted accordingly to the new normal in society. There are various opportunities for promotions and advancements in the field, which can lead to a lifelong career with benefits for those who are interested. Overall, the future of crime scene investigation and forensics is constantly growing, and new technologies will continuously be developed. This

provides a bright future for CSIs and the field of forensics is moving forward in the right direction.

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