

Investigating the General Public's Perceptions of Bias in Forensic Science

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In recent years, the place of forensic science in the courtroom has been reevaluated. Past research has shown that bias found in forensic science disciplines makes its way into the court system and that pre-judgement expectations influence individuals attending a court trial. Despite these results, relatively little has been done to understand public opinions on forensic bias. To begin investigating these perceptions, a survey was designed to gauge public perspective on bias in forensic science. Multiple choice, ranking, multiple answer, and free response questions sent to the public focused on evaluating a general understanding of forensic science, the existence of bias, root of bias, effect of bias, and future of bias. The results suggest that there is a knowledge barrier for the representative population when it comes to the fundamentals of forensic science and its place in the courtroom. With this apparent knowledge barrier and previous observations of bias entering the courtroom, there is a clear need for something to be done before the role of forensic science is impaired. As this study suggests, the public needs to be better informed on bias and forensic science. Further research will lend more insight into methods of securing the utility of forensic science in the courtroom and taking steps to reduce existing biases.

Introduction

Recently, the overall effectiveness of forensic science in the courtroom has been reevaluated. This reevaluation came about with the rise of several issues in the field, including cognitive bias and pre-trial expectations, which have caused some to question the place of forensic science in the legal system. Many professionals in the field have weighed in on the conversation, and although it is beneficial to hear these opinions, it is arguably more important to have the opinions of those who ultimately make the decisions in the courtroom: the jury, made up of a subset of the general public. Obtaining public perceptions of cognitive bias, the effectiveness of forensic science in the courtroom, and the issues surrounding this topic would provide a foundation for fixing the existing issues in the field.

To gauge public perceptions of bias in forensic science, previous research has involved holding mock trials or interviewing members in the field. In the current study, a

survey was shared with a random sample of participants to gauge the level of knowledge which the general public has on topics within bias and forensic science use. The methodology of this survey follows an evaluation of the history of forensic science, the existence of bias in forensic science, the prominent and most-supported side of the “CSI Effect” debate, and the current understanding of the public’s perceptions surrounding these topics.

With questions of forensic science use in the courtroom becoming ever more prominent, it becomes necessary to understand how the public perceives issues in the field so that progress can be made to solve them. After identifying gaps in understanding of topics surrounding bias and forensic science, these gaps can be addressed with specific educational programs.

History of Forensic Science

As defined by the National Commission on Forensic Science, forensic science is “the application of scientific or technical practices

to the recognition, collection, analysis, and interpretation of evidence for criminal and civil law or regulatory issues.”¹ The practice was first recognized in Ancient China, when businessmen used fingerprints to document their work². Since then, the field has grown and evolved into several subdisciplines, each with their own characteristic activities, required levels of education, and areas of expertise. The American Academy of Forensic Sciences recognizes eleven official subdisciplines: anthropology, criminalistics, digital and multimedia sciences, engineering and applied sciences, general, jurisprudence, odontology, pathology/biology, psychiatry and behavioral science, questioned documents, and toxicology³.

Bias in Forensic Science

Within each subdiscipline of forensic science, there are different scientific techniques and tests which are routinely performed. “Many forensic disciplines,” the National Academy of Science admits in a 2009 report, “are subjective and vulnerable to bias and other psychological influences.”⁴ Authors Saul Kassin, Itiel Dror, and Jeff Kukucka added in their journal article that this report critiqued the more subjective disciplines, including “toolmarks and firearms; hair and fiber analysis; impression evidence; blood spatter; fibers; hand-writing; and even fingerprints,” recounting that, due to the problems in standardization, reliability, and accuracy, contextual bias can be found⁵. Kassin and co-authors also describe Tversky and Kahneman’s conjecture that the bias found in forensic science makes its way into the court system, as well as other research which shows that so-called “pre-judgement expectations” influence all individuals attending a trial⁵.

Many studies and mock trials have previously been performed to investigate the existence of forensic bias in the courtroom. The first such study was conducted by Larry Miller in 1984. His study of 12 college students trained in handwriting forgery revealed that those “exposed to additional inculpatory evidence

formed a belief in the suspect’s guilt, which skewed their perceptions.”⁵ The success of this study led to further research on the topic of forensic bias.

A recent study by Kukucka and Kassin took a different approach by investigating the evaluation of a handwritten document with regards to a given confession. The experiment consisted of providing lay participants with a note written in a robbery case and then informing them that the suspect “confessed” and providing them with a sample of the suspect’s writing. After hearing that the suspect confessed, “participants perceived the handwriting samples as more similar and were more likely to conclude, erroneously, that they were authored by the same individual.”⁵

The two studies described above suggest that bias exists in both forensic science and in the courtroom. Whether it be expectation bias, as Miller’s study exposed, or contextual bias, as Kukucka and Kassin’s study revealed, or even the selection and confirmation bias which many other recent studies examine, it is evident that bias exists. This bias not only affects the credibility of forensic science, but also the jury and their important role in courtroom decision-making.

The “CSI Effect” and Juror Expectations

Along with the problems of bias which have arisen in the forensics field in the past 15 years, there has been a concurrent rise in juror expectations which has led to additional problems in the courtroom. A debate over the origin of these developed expectations revolves around the existence of the aptly named “CSI Effect.” The CSI Effect is the “perception... that, due to the apparent availability of forensic evidence on crime television shows such as CSI, jurors may be either unwilling to convict in the absence of such evidence or overly reliant on it when it is presented.”⁶ Many researchers, lawyers, police officers, judges, and members of the general public have taken public stances on whether or not this phenomenon actually exists, and whether it affects juror expectations or decision-making.

In their article, Ian Hawkins and Kyle Scherr connect the thought of pre-trial publicity to the idea of the CSI Effect, noting that “it seems likely that experience-taking while viewing crime dramas could have meaningful implications and moderate any CSI effect on jurors’ decision-making.”⁷ To test this idea, the authors presented a group of subjects with forensic and/or eyewitness evidence. They reported that “frequent crime drama viewers offered more confident not-guilty verdicts compared to infrequent viewers.”⁷ These results offer support for the existence of the CSI Effect.

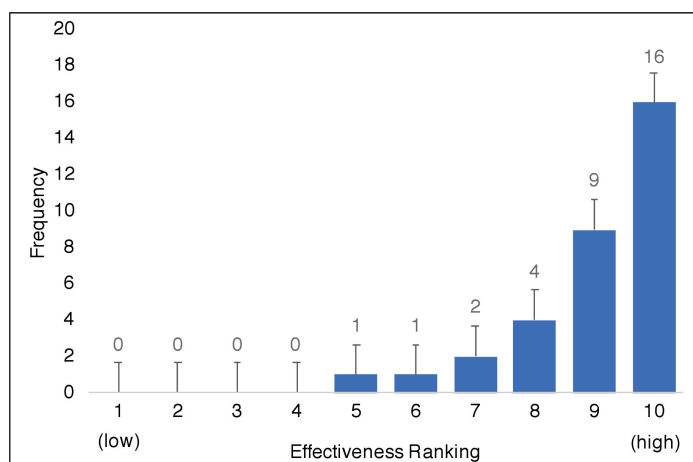


Figure 1. How do you view forensic science’s use in the courtroom? (33 responses)

Similar to Hawkins’ and Scherr’s suggestion that “experience-taking” causes a different perspective and therefore, evaluation of the evidence presented, Evelyn Maeder and Richard Corbett investigated the possibility of jurors acquitting with no forensic evidence or convicting with forensic evidence, no matter how flawed, in their recent article⁶. The results of their study appear concurrent with Hawkins and Scherr: “increased exposure to crime television resulted in an increase in expectations with respect to scientific evidence,” which affected the act of conviction without forensic evidence. However, the study also made the connection that “participants generally had high expectations with respect to scientific evidence... irrespective of CSI viewing frequency.”⁶ This shows that while their study supports the existence of the CSI Effect to an

extent, juror expectations are perhaps more nuanced.

Empirical research is currently being conducted to determine if popular crime dramas create unrealistic expectations which actually affect the court. However, the CSI Effect is a focus point of this study, and previous research supports the fact that jurors enter the courtroom with expectations which can affect their decision making, no matter where those expectations may have originated.

Knowledge of Public Perceptions

There is no question of the effectiveness of forensic science when one looks at the amount of success and aid it has offered to the legal system through its years of existence. However, with the discovery of bias in forensic science and the expectations with which jurors enter the courtroom, forensic science could be in danger of having its usefulness in the courtroom diminished.

The future of forensic science relies on the people. One survey recorded that, of the 89 judges surveyed, “61%... felt that CSI-type shows had led to unreasonable expectations surrounding forensic evidence,” and a separate interview of police officers revealed that they believed CSI-type shows to also diminish the police force’s dependability⁶. The results of these studies show that people in the legal system understand that there are issues which need to be resolved. Although these results help identify what those in the legal system believe, it is perhaps more important to understand what the people who make up the jury believe.

Forums or blogs represent one way to gauge public opinion on a topic. In the comment section of one such blog, “Biases in Forensic Science,” John Jenkin posted his belief that “the chief problem is that forensic science [is not] science at all, but just a way that prosecutors try to snow judges and juries with pseudo-scientific nonsense (see, e.g., bite analysis, fiber analysis, blood typing ‘evidence’).” John also believes that “the closest thing they have to real science is DNA, and the[y] consistently misrepresent that.” A

forensic chemist with username Trey posted on the same blog that “a great deal of the problem lies in the fact that most crime laboratories are managed by law enforcement.”⁸ Both of these statements give an indication of what the people are saying and thinking. However, it is important to note that these commenters may have background in the field and most likely have their own biases.

What this study attempts to do is take these issues directly to the general public, especially those with no connection or provided information on the subject of bias and forensic science. Although some people will be more informed than others on these topics, a survey allows for a good representation of what people believe through their own experiences. Once it becomes known what people think of bias in forensic science, we will be one step closer to devising a solution to address the problems associated with bias and expectations, especially considering that the manner in which the public views these problems can be an issue in and of itself.

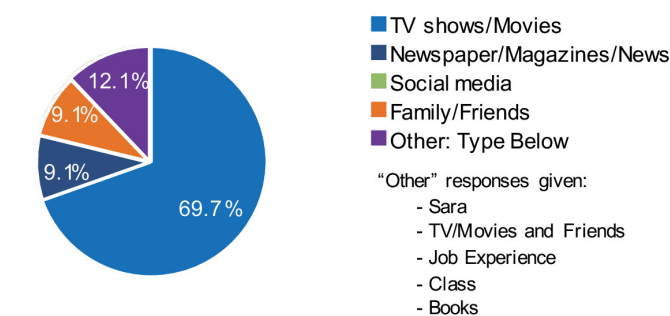


Figure 2. Where does your knowledge of forensic science come from? (33 responses) (multiple choice). Note: "social media" had zero responses

Methods

In order to gauge public perspective on bias in forensic science, a survey was created and sent directly to the public. The survey was generated on Google Forms with multiple choice, ranking, multiple answer, and free response questions. The questions were created

with the intent of discovering the knowledge and perception of people in society. They probed a general understanding of forensic science, as well as the existence, root, effect, and future of bias (**Supplementary table**).

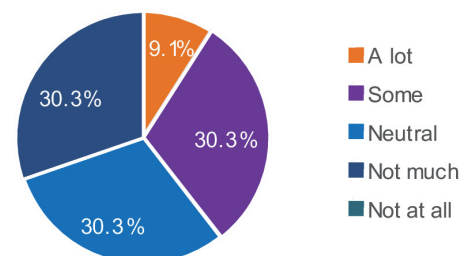


Figure 3. How much bias do you believe exists in forensic science? (33 responses) (multiple choice). Note: "Not at all" option received zero responses

Participants (n=33, mean age=26) were enlisted on a volunteer basis through direct messaging after advertising on social media. For one week, the survey was promoted on two social media platforms: Instagram and Snapchat. When someone indicated their interest in the survey, they were sent a link to the form. The study called for a minimum age of 17 to participate. In addition to providing their age, participants were asked to provide their major and class standing (level of education) at their discretion. Respondents were made aware of the rules and obligations of the study in an introductory paragraph at the beginning of the survey which stated the reason for the research, the need for honest answers, the anonymity of responses, and their relinquished rights to use of the responses.

Results

After accepting responses for a week, the survey results were analyzed. When asked to rank the usefulness of forensic science in the courtroom, 48.5% of respondents reported a 10 (“Extremely Useful/Effective”), while 51.5% ranked usefulness above a '5' (**Figure 1**).

The second question gauged where participants had gained their knowledge from.

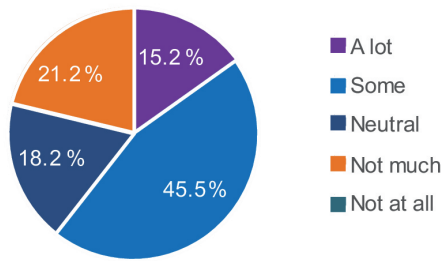


Figure 4. If you believe there is bias in forensic science, do you believe it affects the courtroom and/or jurors? (33 responses) (multiple choice). Note: “Not at all” option received zero responses

69.7% of participants reported that their knowledge of forensic science came from TV or movies. Both “Newspapers/Magazines/News” and “Family/Friends” received 9.1% of total responses, while the last 12.1% of participants selected “Other” (Figure 2). For the third survey question, 90.9% of responses were equally split between “Some,” “Neutral,” and “Not much” bias existing in forensic science. Meanwhile, 9.1% of participants stated that they believed “A lot” of bias exists in forensic science (Figure 3).

45.5% of survey participants reported that bias present in forensic science “somewhat” affects jurors, while 18.2% stayed neutral, 21.2% said it does not affect jurors that much, and 15.2% believed that jurors are affected “A lot” (Figure 4).

Additionally, 35.5% of respondents believed that bias is most prevalent in the process of obtaining and verifying data, 12.9% believed that it is most prevalent within individual fields of forensic science, and 51.6% believed both statements (Figure 5).

The individual field of forensic science with the greatest potential for bias (as perceived by respondents) is handwriting analysis, chosen by 80% of respondents. This is followed by the subfields of facial recognition (64%), tool mark comparison (44%), DNA analysis (36%), hair analysis (28%), fingerprint comparison and identification (20%), digital forensics (16%), and odontology (tooth) analysis (12%) (Figure 6).

The final multiple choice question showed that, despite the issues it might have, all survey respondents believed that forensic science still has a place in the courtroom (data not shown). Responses to the two questions asking for opinions on how to eliminate bias and how to change public perception surrounding bias and forensic science are available upon reasonable request.

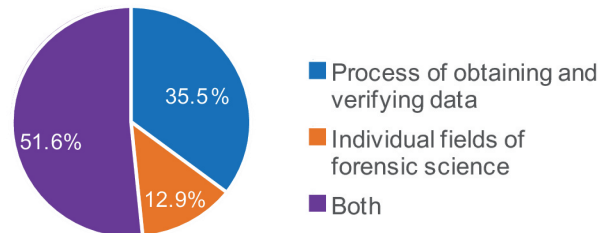


Figure 5. Where do you believe bias is most prevalent? (31 responses) (multiple choice)

Discussion

This study attempted to provide an understanding of perceptions surrounding bias in forensic science. Survey results suggest that the population of participants is, as a whole, highly uninformed about these topics. If the respondents are taken to be representative of those in the public who make up a jury, it gives the impression that most people in the public are uninformed about bias and forensic science, which could potentially negatively affect the courtroom decision-making process. For instance, the result that 69.7% of participants reported their source of knowledge as TV or movies is concerning when compared to the result that 100% of people ranked the usefulness of forensic science above a 5 and that 100% said it should be used in the courtroom (Figures 1 and 2). The reason for concern circles back to the discussion of the CSI Effect: if the general public is basing its opinion of forensic science on oftentimes exaggerated forensic science shown on television or movies,

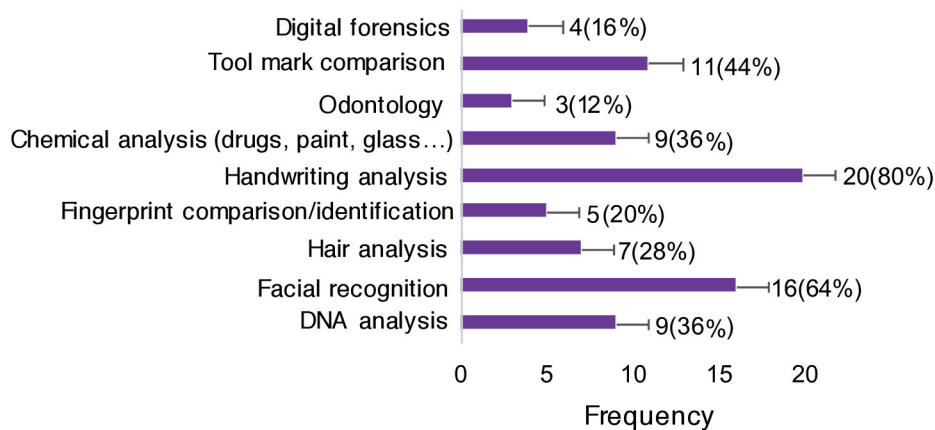


Figure 6. If you believe individual fields of forensic science have the opportunity to lead to the most bias, please select which fields? (25 responses) (multiple answer)

it begs the question of whether jury members actually know enough about forensic science to make decisions for the court.

Other respondent beliefs—including there being anywhere from “not much” to “some” bias in forensic science and that existing bias does not have much of an effect on the courtroom and/or jurors—makes public knowledge about bias and forensic science more questionable. When asked to select the subfields in which they believed bias to exist, respondent answers were widely distributed. Interestingly, the subfields reported by the National Academy of Science as being suggestible did not closely match what the respondents considered to be suggestible. A total of 46 responses were recorded for fields matching the Academy’s depiction of suggestible fields; however, 38 responses identified subfields not typically recognized as suggestible.

All survey responses suggest a knowledge barrier for the general public when it comes to the principles of forensic science and its place in the courtroom. Importantly, if those in the courtroom believe jurors to not have pre-trial expectations, this survey suggests that such a belief is misplaced. Importantly, even if jurors had no true prior knowledge, they may still have expectations.

However, in addition to providing insight on public knowledge, the survey results also

suggest a solution. If lack of knowledge is an issue, then the obvious solution is to find a way to inform the public of potential biases and the truth about forensic science. This notion is also evident in the results of the survey; when asked for opinions on public perspective, most participants suggested (to some extent) the simple act of informing the public, whether it be about television shows, the purpose of forensic science, or the potential for bias.

Since this survey was conducted on a volunteer basis through advertisement on social media, possible limitations are that those without a social media account (or in different social circles) would have been excluded from the survey. In addition, there were 76 responses to the original survey, but only 33 were recorded due to technical issues. These limitations do not affect the sample responses which were collected and analyzed, but may reduce the representativeness of this study. If this study were to be performed again, a larger sample group with a wider and more diverse age range of participants would seek to confirm the results presented here.

Conclusion

In recent times, forensic science and its impact in the courtroom has been put on trial. Due to bias in the field and expectations which jurors enter the courtroom with, the need for

change has been uncovered. However, before anything can be done about these issues, it is first necessary to understand how the public perceives the issues of forensic science, as well as forensic science in general. This study contributes to this goal by revealing evidence that the general public is largely uninformed about bias and forensic science. As this study suggests, the public needs to be informed about bias in forensic science. Whether it be to inform the public as a whole, give lessons to jurors of potential issues in forensic science, or change the way in which forensic science is presented on television, future research will aid in finding the best way to inform the public on issues of bias and forensic science. Although this survey provided thoughtful insight into the issues being questioned, it is not the end of the line; there is still a long way to go before the future of forensic science is recognized—at the very least, there is a path towards it.

Competing Interests

The author declares no competing interests.

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About the Author:

Sarah Riley grew up in a small village (yes, village!) in western Ohio. For her, moving to a different state was the most exciting thing that had ever happened to her. Instead of drowning in the sea of people in Morgantown, she found a home, not just a place to study. She is now in her third year at West Virginia University, where she is studying to be a Forensic Examiner so that she can help bring justice to those wronged through crime scene investigation. She has considered continuing her schooling after graduation, and is not ruling anything out. Sarah loves thinking of new topics to research and is ready to explore new opportunities. She is looking forward to the future of her schooling and her career.

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Question	Answer Options
How do you view forensic science's use in the courtroom?	Rank from 1 (completely useless/ineffective) to 10 (extremely useful/effective)
Where does your knowledge of forensic science come from?	<ul style="list-style-type: none"> <input type="radio"/> TV shows/movies (i.e. CSI, Bones, Forensic Files, etc.) <input type="radio"/> Newspaper/magazines/news (New York Times, Discover, Fox News) <input type="radio"/> Social media <input type="radio"/> Family/friends <input type="radio"/> Other (type below)
If "other" was chosen in previous question, please list your answer below.	Free response
How much bias do you believe exists in forensic science?	<ul style="list-style-type: none"> <input type="radio"/> A lot <input type="radio"/> Not much <input type="radio"/> Some <input type="radio"/> Not at all <input type="radio"/> Neutral
If you believe there is bias in forensic science, do you believe it affects the courtroom and/or jurors?	<ul style="list-style-type: none"> <input type="radio"/> A lot <input type="radio"/> Not much <input type="radio"/> Some <input type="radio"/> Not at all <input type="radio"/> Neutral
Where do you believe bias is the most prevalent?	<ul style="list-style-type: none"> <input type="radio"/> Process of obtaining and verifying data (analysis, comparison, evaluation, verification) <input type="radio"/> Individual fields of forensic science <input type="radio"/> Both
If you believe individual fields of forensic science have the opportunity to lead to the most bias, please select which fields?	<ul style="list-style-type: none"> <input type="radio"/> DNA analysis <input type="radio"/> Facial recognition <input type="radio"/> Hair analysis <input type="radio"/> Handwriting analysis <input type="radio"/> Fingerprint comparison/identification <input type="radio"/> Chemical analysis (drugs, paint, glass...) <input type="radio"/> Odontology (tooth analysis) <input type="radio"/> Tool mark comparison <input type="radio"/> Digital forensics
Do you believe that forensic science is beneficial and should be used in the courtroom?	Yes/No
How can we eliminate bias in forensic science?	Free response
What are your opinions on how to change the public's perspective of forensic science?	Free response

Supplementary table. Survey questions sent to participants