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Relationship between Forensic Exposure and Forensic Knowledge

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RELATIONSHIP BETWEEN FORENSIC EXPOSURE AND FORENSIC KNOWLEDGE

by

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ABSTRACT

It has been shown that popular crime television series can have an impact in the behavior and perception of viewers. Forensic evidence, or evidence that is gathered through scientific methods, is often central to the plot of these shows. Exposure to forensic evidence in these shows has impacted the legal system by changing perceptions and opinions towards evidence presented in courtrooms, a consequence termed the CSI effect. A subset of the CSI effect named the Police Chief's Effect refers to the ability of criminals to learn about forensic evidence from these shows. Although understudied, the Police Chief's effect has the potential to increase the difficulty of criminal investigations if criminals are better able to plan their actions and conceal evidence.

The intent of this thesis is to explore a relationship between forensic techniques portrayed in television and the forensic knowledge an individual obtains from it. Previous studies have looked at the Police Chief's effect in the context of a non-violent crime, even though most of the television shows highlight crime of a violent nature. The present study evaluates the ability of participants to consider forensic evidence when planning a murder, taking into account their crime show viewing history. The results revealed that the overall number of crime shows, percentage of those episodes and involvement in the shows was not associated with forensic evidence. However, a moderate correlation was found between the number of crime shows watched and forensic evidence in female participants.

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INTRODUCTION

Throughout the years, crime television shows have had a significant impact on some of its viewers (i.e. Levine, Serota, & Shulman, 2010; Shrum, 1998). In January 2018, 71-year-old Alan Abrahamson was found dead and authorities initially ruled his death a homicide due to finding a bullet in his chest (May, 2018). A few months later, investigators discovered new evidence while researching his search history. Investigators found that Abrahamson had researched how to commit suicide with the use of a weather balloon, along with his purchase of a weather balloon the year before. The investigators also discovered a CSI Las Vegas episode from 2003 where a character from the show staged a homicide by tying a firearm to a balloon. The investigators came to the conclusion Abrahamson had staged his suicide as a homicide based off of the CSI episode. On November 2011, an engaged couple from South Africa, Chane Van Heerden and Maartens Van Der Merwe, dismembered and skinned a young man who was lured with a promise of a date (News24, 2011). The couple decapitated him, cut off his right arm, both legs, and buried his torso. Reports show they were drawn to crime novels and were frequent viewers of the famous crime television series, *Dexter*, whose character was known to cut up his victims.

Crime television series are extremely popular these days. 30% of the top 50 most-watched shows in 2017-2018 were crime shows (Rice, 2018). Most crime television series such as *CSI*, *Criminal Minds*, *How to Get Away with Murder*, etc. involve police officers, detectives, agents, or lawyers who seek out evidence that will either lead them to the suspect or prove that the suspect committed the crime. A majority of these shows depend

on gathering forensic evidence, or evidence that is admissible in court and is obtained by scientific methods such as fingerprints, hair fibers, ballistics, footprints, etc., from the crime scene Since forensic evidence is such a central theme in crime shows, exposure to these shows may affect the perception towards evidence and the opinion of agents in the legal system, such as lawyers, juries, and defendants (Cole & Dioso, 2005). Exploring potential effects to the legal system of consistent exposure to forensic evidence techniques and concepts may yield valuable information about potential underlying bias or change in behavior.

The CSI Effect

The CSI effect is a pop culture term that originated in the early 2000s and was used to describe the influence crime television has on the legal system (Cole & Dioso, 2005; Vicary & Zaikman, 2017). The name comes from the most popular crime television series, and for a time, the most popular television series in the world, *Crime Scene Investigation* (Dale, 2015). The show soon grew into a franchise that created *CSI: New York* and *CSI: Miami* (Dale, 2015). Even though there is no concrete definition for the CSI effect, it tends to explain the increase of unrealistic and high expectations for forensic evidence among the public and an increase in convictions based on forensic evidence (Cole & Dioso-Villa, 2009). Prosecutors have mentioned it is more difficult for them because not only do they have to find evidence to fit the previous legal standard, but also evidence that fits the new “Hollywood” standard (Mann, 2006). The CSI effect explains the idea that the high exposure to forensic evidence in television shows affects jury decision making (Cole & Dioso-Villa, 2009). Today, juries are more likely to wrongfully

convict a defendant if erroneous scientific evidence is presented and are more likely to acquit or get hung in cases if there is a lack of scientific evidence (Cole & Dioso-Villa, 2007). This happens because jurors expect scientific evidence to be present, believe it can never be wrong, and are uncomfortable with cases in which it is lacking.

Cole and Dioso-Villa (2007) proposed a typology of six different versions of the CSI effect which include the Strong Prosecutor's Effect, Weak Prosecutor's Effect, Defendant's Effect, Producer's Effect, Professor's Effect, and the Police Chief's Effect. The Strong Prosecutor's Effect is the strongest version of the CSI effect and affects the jurors, who are wrongfully acquitting defendants solely based on the lack of forensic evidence. Had CSI not existed, the acquittal rates might be much lower. The Weak Prosecutor's Effect is more of an effect on the prosecution rather than the jurors; prosecutors are implementing counteractive measures to compensate for not having this forensic evidence. These measures tend to include questioning jurors, explaining the absences of forensic evidence in their opening and closing statements, and calling on experts to explain the lack of evidence (Eatley, Hueston, & Price, 2016). This is seen as a weaker tactic because lawyers, defensive about the lack of forensic evidence when making their case, are forced to change many aspects of their case.

The Defendant's Effect is due to the greater credibility given to forensic expert witnesses (Cole and Dioso-Villa, 2007). Since expert witnesses are highly recognized on crime shows, it helps enhance their credibility when they testify in reality. This is known as the opposite of the Prosecutor's Effect because it leads to more convictions due to the high stature jurors put on expert witnesses. The Producer's Effect proposes that these crime television shows are educational and juries actually know more about forensic

science that help them make more logical decisions in the courtroom. However, the veracity of the forensic science in crime shows is constantly being thrown into question as it often lacks scientific validity (Houck, 2006). The Professor's Version, also known as the Educator's Effect, explores the attraction of students to follow a career in forensic science (Cole and Dioso-Villa, 2007). There are reports that not only show increased student enrollment in forensic science but also a significant number of students who drop out because the subject isn't as intriguing as crime shows make it out to be (Jackson, 2009).

Various models, such as Signal Detection Theory (SDT; Green & Swets, 1966), can be used to explain the consequences of the CSI Effect since they evaluate how individuals make decisions under some uncertainty. In the courtroom, jurors are put into a situation where they must decide whether or not the defendant is guilty or innocent, a decision that must be made under varying degrees of uncertainty. Jurors typically have some criteria to base their decision off of which affects the likelihood of making a particular decision. If jurors are expecting more forensic evidence in a case and there is actual evidence presented, they are more likely to shift their criteria and convict based off of the presence of forensic evidence rather than what the forensic evidence is actually representing (Cole & Dioso-Villa, 2007). If forensic evidence is missing, they are more likely to acquit the defendant.

Additionally, humans employ heuristics or "rules of thumb" when making decisions under uncertainty (Tversky & Kahneman, 1974). Heuristics can also be used to explain consequences of the CSI Effect because they tend to lead individuals to overestimation. Exposure to forensic evidence in crime shows steers its viewers to have an elevated

expectation of forensic evidence in the courtroom (Cole & Dioso-Villa, 2007), so they overestimate the importance of this type of evidence and base their decisions off of whether this type of evidence is present or absent. Jurors may also overestimate the importance of forensic evidence in a case if they can easily recall seeing forensic evidence in a crime show, a concept that should be consistent with the availability heuristic (Tversky & Kahneman, 1974). Ultimately, if a juror easily recalls success of the forensic evidence learned from crime shows, they may overestimate the likelihood of a suspect's guilt due to the presence of forensic evidence.

Police Chief's Effect

The Police Chief's Effect, another of Cole & Dioso-Villa (2007) proposed variants of the CSI Effect, states that shows are educational for criminals themselves. Criminals learn measures or techniques from these crime shows, such as removing DNA from a crime scene to avoid detection. There is an increasing trend in which burglars are using plastic gloves to avoid leaving their DNA at the scene (Hooper, 2005). In interviews with 26 convicted offenders, they found that several of them deemed DNA technology as extremely powerful (Prainsack & Kitzberger, 2009). The offenders believed they were very skilled in controlling the crime scene, but when DNA was mentioned they felt a lack of control. The show *CSI* is thoroughly watched in prisons and criminals may begin to piece together how they were caught and begin learning from their mistakes (Mirsky, 2005).

While some research argued that the Police Chief's Effect is primarily a concern for law enforcement investigations, and as a result, not a threat to the legal system, later

studies argued that it may truly be a significant concern (Cole & Dioso-Villa, 2007; 2009). The Police Chief's Effect merits further investigation as it may cause problems for law enforcement and criminal investigations. If criminals are able to educate themselves correctly about investigative procedures, they might successfully conceal or destroy evidence leading to an inconclusive investigation. An increase in inconclusive investigations can be criminogenic in itself, fostering further crime due to the growing confidence criminals may acquire because they believe they won't get caught.

Vicary and Zaikman (2017) investigated the police chief effect and its relationship to forensic evidence gleaned from watching criminal television shows. In their study, participants were asked to respond to a prompt that included a burglary scenario. The participants were to respond how they would commit the crime and what techniques they use to minimize detection. Upon completion, they were asked to list crime shows they had watched somewhat regularly in recent years and indicate the percentage of episodes they watched. Additionally, they rated their level of involvement with crime shows by answering questions such as whether they discussed it with friends or have looked up information afterwards. Forensic and non-forensic evidence was coded into their respective categories.

Results showed no relationship between the number of crime shows participants watched and forensic evidence in the responses, as well as no relationship between the percentage of episodes they watched and the amount of forensic evidence in their responses (Vicary and Zaikman, 2017). However, there was a correlation between the level of involvement in crime shows and forensic evidence in their responses. Participants who had higher involvement with crime shows were more likely to mention forensic

evidence in their responses. However, the researchers might not have taken into account the intensity of its criminal scenario prompt. If the study is meant to investigate whether crime television shows are unconsciously educating its viewers on how to better commit crimes, then the scenario the participants were given should have been closely related to the most popular theme in crime shows – murder. If a common theme in crime television shows is murder, then forensic evidence from murder cases are the types of evidence viewers are mainly being exposed to. Previous research showed that the CSI effect is strongest in regards to murder cases (Shelton, 2010).

The Present Study

The present study investigates whether a relationship exists between crime shows watched and forensic evidence in responses if the prompt participants are given is a murder prompt. Previous research on the Police Chief Effect failed to use a prompt that was commensurate with the type of criminal activities commonly featured in crime dramas (Vicary and Zaikman, 2017). The Police Chief Effect is likely to be stronger when the study prompt matches the scenarios presented in these shows (Shelton, 2010). Understanding how viewers might learn forensic evidence techniques from shows and whether this knowledge could lead a person to successfully conceal evidence is important, as the popularity of these shows may make future investigations more difficult for law enforcement officials. Television and online media are a large part of most people's day to day life (Matthews, et al., 2008). If watching crime shows is altering bias in the legal system and providing criminals with the education to be more effective, we must then explore which people are more susceptible to the effect and find ways to safeguard

against the shows unwanted side-effects. The present study examines how watching popular crime shows leads to obtainment of forensic knowledge and whether participants present application of this knowledge when planning a murder.

The study proposes the following hypotheses:

H1: If given a murder prompt, a positive correlation between the number of crime shows watched and the amount of forensic evidence in their responses will be found.

H2: If given a murder prompt, a positive correlation between the percentage of episodes watches and the amount of forensic evidence in their responses will be found.

H3: Compared to Vicary and Zaikman (2017), a stronger correlation will be found between the Crime Show Involvement Scale and forensic evidence if the prompt is related to murder because crime television shows reveal more forensic techniques for murder than they do for burglary.

METHODS

Participants

100 undergraduates from the University of Central Florida participated in the study. The sample was nearly equal in gender (49% male, 51% female). Participants were over the age of 18 and gave informed consent before taking part in the study. They were recruited through the university's research participation system SONA system (UCF, 2019) and were granted 1 SONA credit for their participation in this study. This credit is then traded for class credit.

Materials and Procedures

The present study was done in its entirety online using Qualtrics research participation software (Qualtrics, 2019). Participants sat down in front of an Alienware R2 AW15R2-6161SLV 15.6" laptop computer and consented in the online software before continuing on to the questionnaires and measures below (presented in order; see Appendices for full samples of these surveys):

Demographics Scale. A background questionnaire that asks participants questions about a participant's biological sex, age, education, race, and whether they consider themselves religious or spiritual. These demographic factors were used as control variables.

Prompt. Participants were given 25 minutes to complete a criminal scenario prompt:

"Imagine you are walking down a street at night and you spot someone home alone that you have never met. You are now planning to murder this complete stranger in his/her home. Think for a

minute and type about how you would plan this event, how you would carry it out, and what you would do or techniques you would use afterward to avoid getting caught."

The participants were not allowed to move forward on the survey until the 25 minutes were complete. This was to ensure everyone was given enough time to complete the prompt. The prompt was evaluated by two independent raters who used the same criteria provided by a crime lab technician from the City of Doral Police Department in Florida. Inter-rater reliability, measured as a correlation between the data of each rater, was r = .95 overall, with good reliability in all evidence categories except for a general (non-categorized) forensic evidence category which had a reliability of r = .77. Whenever disagreement occurred between the raters, the raters would discuss their analyses in the context of the established criteria and come to an agreed to conclusion.

List of Shows and Percentage of Episodes Watched Scale. Participants were asked to list at most 10-crime television shows and 10 non-crime television shows they have watched somewhat regularly in the past five years. They were then asked to specify the percentage of episodes they believe they've watched per show by using a 4 point Likert scale where 1 is "at most 20%", 2 is "at most 50%", 3 is "at most 80%", and 4 is "at most 100%". This scale is similar to that used by Vicary and Zaikman (2017).

Crime Show Involvement Scale. Participants rated their level of involvement by answering the following four questions adapted from Levy and Windahl (1984; Vicary and Zaikman, 2017): "While watching this show, I try and guess what is going to happen at the end of the episode", "After watching the show, I think about what I have just seen and

heard", "I discuss with others what I have seen on the show", and "I have looked up information about what I have seen on the show". The level of involvement was measured by using a 4-point Likert scale ranging from 1 (Never) to 4 (Almost all the time).

RESULTS

Please refer to Table 1 for a descriptive summary of the characteristics for the study sample.

Table 1

Descriptive characteristics of the sample population (N=100).

Characteristic	Female (*n*=51)	Male (*n*=49)	Overall
Sex			
Female (%)			51 (51)
Male (%)			49 (49)
Mean age in years (*SD*)	19.22 (1.89)	21.16 (3.77)	20.17 (3.10)
Ethnicity/Race			
White (%)	38 (75)	34 (69)	7 (72)
Black or African American (%)	6 (11)	5 (10)	11 (11)
Asian (%)	2 (4)	7 (14)	9 (9)
Other (%)	5 (10)	3 (7)	7 (7)
Hispanic[a] (%)	20 (39)	22 (45)	42 (42)
Education			
High School (%)	33 (65)	19 (39)	52 (52)
Some College(%)	11 (22)	8 (16)	19 (19)
Associates Degree or Equivalent (%)	6 (11)	16 (34)	22 (22)
Bachelor's Degree (%)	1 (2)	5 (10)	6 (6)
Master's Degree (%)	0 (0)	1 (1)	1 (1)
Religious (%)	23 (45)	20 (41)	43 (43)

[a] Participants were asked if they were Hispanic or not independent of the Ethnicity/Race question.

Forensic and Non-forensic Evidence

Initial checks of possible confounds were carried out to explore potential variables that could be affecting the data in addition to the variables of interest. To verify that the amount of evidence considered was not a result of participants' participation time, a correlation was carried out between duration in minutes and total evidence ($r(98) = .10$, $p=.34$), forensic evidence ($r(98) = .06$, $p = .57$), and non-forensic evidence ($r(98) = .10$, $p = .33$). None of the variables had a significant correlation, indicating that time spent in the study was not related to the amount of evidence participants would write.

Similarly, it was important to explore the correlation between word count and amount of evidence presented. Word count was positively and moderately correlated to total evidence ($r(98) = .42$, $p < .001$), weakly to moderately correlated to forensic evidence ($r(98) = .30$, $p < .001$), and moderately correlated to non-forensic evidence ($r(98) = .37$, $p < .001$). Word count was also significantly and positively correlated to crime shows participants watched ($r(98) = .23$, $p = .02$), as well as non-crime shows ($r(98) = .23$, $p = .02$) and total shows ($r(98) = .28$, $p = .01$). However, it is not clear if participants that wrote more were more likely to discuss more evidence and shows than participants who wrote less, or if the additional words written are the result of the need to discuss additional evidence. Due to the lack of causality, it is not clear what this relationship entails.

To test whether the number of shows watched influenced the amount of forensic evidence mentioned, a Pearson's bivariate correlation was conducted and results show a significant weak and positive correlation for number of non-crime shows watched ($r(98) = .24$, $p = .01$) and total shows watched ($r(98) = .25$, $p = .01$) with forensic evidence (see Table 2 below). However, there was no significant correlation for the number of crime shows watched and forensic evidence ($r(98) = .17$, $p = .10$). Interestingly, a positive correlation was found for the number of crime shows watched with non-forensic evidence ($r(98) = .21$, $p = .04$). On average, participants considered 5.81 categories of total evidence ($SD = 2.30$, $Min = 1$, $Max = 12$), 3.37 categories of forensic evidence ($SD = 1.51$, $Min = 1$, $Max = 8$) and 2.44 categories of non-forensic evidence ($SD = 1.38$, $Min = 1$, $Max = 6$). Refer to *Figure 1* and *Figure 2* for distributions of the categories of forensic and non-forensic evidence mentioned by participants.

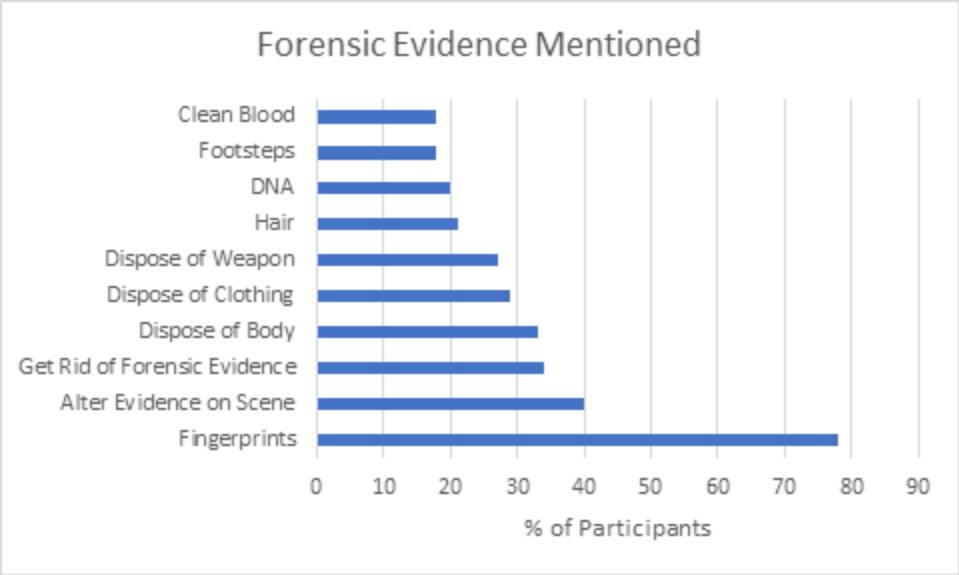


Figure 1. Frequency table of most common themes in forensic evidence mentioned by the participants in their responses. Percentage of participants who mentioned each topic at least once.

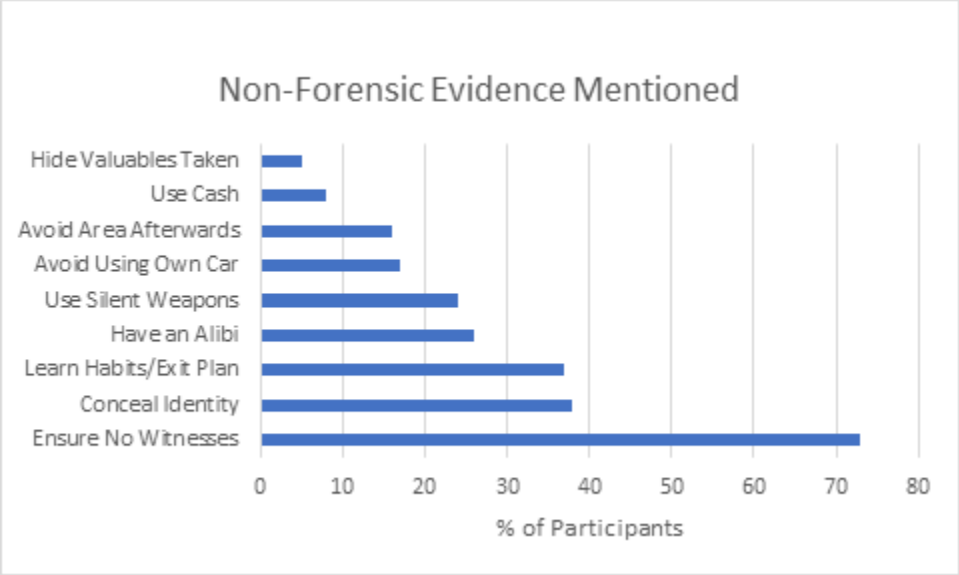


Figure 2. Frequency table of most common themes in non-forensic evidence mentioned by the participants in their responses. Percentage of participants who mentioned each topic at least once.

Crime and Non-Crime Show Viewing Patterns

On average, participants reported watching 3.92 crime shows (*SD*= 2.04, *Min* = 0, *Max* = 10), 6.12 non-crime shows (*SD*= 2.45, *Min* = 0, *Max* = 10), and 10.04 total shows (*SD*= 3.75, *Min* = 0, *Max* = 10). On average, participants reported watching 58.99% of the episodes in each crime show (*SD*= 25.52, *Min* = 0, *Max* = 100), 80.16% of the episodes in non-crime shows (*SD*= 20.27, *Min* = 0, *Max* = 100), and 73.99% of episodes in total shows (*SD*= 15.52, *Min* = 0, *Max* = 100).

Results also revealed that there is a significant positive correlation between age and number of crime shows watched ($r(98) = .35$, $p < .001$), as well as the number of total shows ($r(98) = .26$, $p < .001$). While this implies that older participants watched more crime shows and shows overall, it is important to note that the median age for our participant sample was 19 and therefore, these age effects are mostly happening within a relatively young population distribution.

Table 2

Summary of intercorrelations for Evidence Mentioned, Crime Show Viewing, and Involvement.

Measure	1	2	3	4	5	6	7
1. # Crime Shows Watched	-	**.27[1]**	**.38[3]**	.06	.08	.17	**.21[1]**
2. % Crime Episodes Watched		-	.13	.09	.15	.12	.01
3. # Non-Crime Shows Watched			-	**.25[1]**	.14	**.24[2]**	**.32[3]**
4. % Non-Crime Episodes Watched				-	-.06	.19	.12
5. Involvement					-	-.09	.18
6. Forensic Evidence						-	**.82[3]**
7. Non-Forensic Evidence							-

([1] p<.05; [2] p<.01; [3] p<.001)

Additionally, results show that nonreligious participants mentioned forensic evidence significantly more than religious participants ($t(98)= -2.31$, $p = .02$). While this effect is interesting, the reasons as to why it might be occurring are beyond the scope of this study.

Show Involvement

How much of a show (percentage of episodes) a participant watched and their involvement in crime shows, as measured using the Crime Show Involvement Scale, may lead to greater learning of forensic science by viewers and therefore affect the amount of forensic evidence and non-forensic evidence mentioned. Table 2 above displays a summary of intercorrelations for evidence mentioned, show viewing, and involvement in the shows. To test whether the percentage of episodes watched in crime shows influence the amount of forensic evidence mentioned, a bivariate correlation was conducted. Results show no significant relationship ($r(98) = .12$, $p = .23$) between the percentage of episodes and the forensic evidence. Additionally, no significant correlation was found ($r(98) = -.09$, $p = .36$) between involvement and forensic evidence. This finding contrasts with previous research (Vicary & Zaikman, 2017) finding a significant moderate correlation between level of involvement and mentioning of forensic evidence, which was interpreted to mean that participants who were more involved in crime shows were more likely to be aware of forensic evidence.

Prediction of Forensic and Non-Forensic Evidence

Backwards linear regression was used to see which variables predicted forensic evidence and non-forensic evidence (see Table 3 below). The variables entered into the model were the amount of crime shows watched, percentage of episodes watched on

average for the crime shows, and the Crime Show Involvement Scale total score. Additionally, to test if any moderating effects were present between the number of shows watched and percentage of episodes watched or the involvement score, interactions between number of shows watched and percentage of episodes watched, as well as number of shows watched and involvement, were entered into the model.

The model predicting forensic evidence was not significant ($F(5,94)= 1.46$, $p = .21$, $R^2 = .07$). Conversely, the model for predicting non-forensic evidence was significant ($F(5,94)= 2.50$, $p = .04$, $R^2 = .12$). However, of all the variables entered, only the regression coefficient for the number of crime shows watched was significant ($p = .03$).

Table 3

Linear regression (all variables entered) using number of crime shows, percentage crime shows watched, the total involvement scale score, and interactions between number of shows watched, percentage watched, and involvement as predictor variables to predict the amount of evidence expected.

	Type of Evidence					
	Forensic Evidence			**Non-forensic Evidence**		
Variable	β	***t***	**95% CI *B***	β	***t***	**95% CI *B***
Number of Crime Shows Watched	0.18	1.728	[-0.02, 0.29]	**0.24**	**2.28[1]**	**[0.21, 0.30]**
Percentage Crime Shows Watched	0.10	0.88	[-0.01, 0.02]	0.02	0.18	[-0.01, 0.01]
Involvement	-0.15	-1.43	[-0.20, 0.03]	0.19	1.90	[-0.01, 0.20]
Number × Percentage Watched	-0.09	-0.76	[-0.01, 0.004]	0.12	1.11	[-0.002, 0.01]
Number × Involvement	0.14	1.32	[-0.02, 0.08]	0.19	1.82	[-0.004, 0.08]
R²		.07			.12	
F		1.46			**2.50[1]**	

([1]$p < .05$)

Sex Differences in Show to Evidence Relationships

To explore if there are any differences in the data due to sex differences, data for each biological sex was looked at independently. When exploring the relationship between shows and forensic evidence mentioned in male participants, the number of crime shows ($r(98)= .02$, $p =.88$), percentage of episodes watched in crime shows ($r(98)= .23$, $p =.11$), number of non-crime shows ($r(98)= .20$, $p =.17$) and percentage of episodes watched in non-crime shows ($r(98)= .09$, $p =.58$) were not significantly correlated to forensic evidence. However, when exploring this relationship in female participants, the number of crime shows ($r(98) = .32$, $p =.02$) and non-crime shows ($r(98)= .32$, $p =.01$) were significantly and positively correlated to the amount forensic evidence mentioned. However, the percentage of episodes in both crime shows ($r(98)= .03$, $p =.85$) and non-crime shows ($r(98)= .27$, $p =.051$) were not significantly correlated with forensic evidence. Of interest, the change in significance between the data for men and women when it comes to the relationship between crime shows and forensic evidence indicates a potential presence of an effect related to sex differences. This is explored further below.

When exploring the relationship between shows and non-forensic evidence in male participants, the number of crime shows ($r(98)= .24$, $p =.09$), percentage of episodes watched in crime shows ($r(98)= .08$, $p = .60$) and percentage of episodes in non-crime shows ($r(98)= .02$, $p =.87$) were not significantly correlated with non-forensic evidence. However, the number of non-crime shows watched was moderately and positively correlated to how much non-forensic evidence was mentioned ($r(98)= .41$, $p =.003$). When exploring this relationship in female participants, however, the number of crime shows ($r(98)= .17$, $p =.23$) and non-crime shows ($r(98)= .23$, $p = .10$), as well as

percentage of episodes watched in crime shows ($r(98)= -.05$, $p = .75$) and percentage of episodes in non-crime shows ($r(98)= .21$, $p = .14$) were not significantly correlated. It seems from the results that the significant correlation between number of crime shows and mentions of forensic evidence, the specific concern of the Police Chief Effect is mostly present only in women. However, the similar sex differences in the non-forensic evidence relationships indicate potential differential viewing, learning, or knowledge application behaviors between the sexes.

Table 4

Linear regression (all variables entered) comparisons between male and female participants.

	Evidence Type and Participant Sex					
	Forensic Evidence - Male			**Forensic Evidence - Female**		
Variable	β	***t***	**95% CI *B***	β	***t***	**95% CI *B***
Number of Crime Shows Watched	0.04	0.24	[-0.18, 0.23]	**0.37**	**2.59[1]**	**[0.07, 0.56]**
Percentage Crime Shows Watched	0.22	1.34	[-0.01, 0.03]	0.05	0.26	[-0.02, 0.03]
Involvement	-0.12	-0.70	[-0.23, 0.11]	-0.18	1.30	[-0.28, 0.06]
Number × Percentage Watched	-0.26	-1.50	[-0.01, 0.002]	0.12	0.69	[-0.01, 0.02]
Number × Involvement	0.07	0.44	[-0.05, 0.07]	0.19	1.34	[-0.03, 0.17]
R^2		.11			.20	
F		1.03			2.21	

([1]p<.05)

To examine the predictive relationship between the variables of interest and forensic evidence, backwards linear regression was used, separating the data by sex (see Table 4 above). The model for the male participants was not significant ($F(5,43)=1.03$, $p = .41$, $R^2 = .11$). Similarly, the model for females, as a whole, was not significant ($F(5,45)= 2.21$, $p=.07$, $R^2 = .20$). However, the regression coefficient relating to the number of crime shows watched was a significant predictor of forensic evidence ($p = .01$). As such, a second, simple linear regression model was developed examining total crime shows watched as a predictor of forensic evidence (see Table 5). Results show

that the model was significant ($F(1,49)= 5.40$, $p = .02$, $R^2 = .10$). Although the model only explains about 10% of the variance, there are appears to be a differential relationship between the amount of forensic shows watched and the amount of forensic evidence mentioned between the biological sexes.

Table 5

Simple linear regression examining total number of crime shows watched.

		Forensic Evidence		
Variable	β	***t***		**95% CI *B***
Number of Crime Shows Watched	0.48	5.17		[1.50,3.41]
R^2		.10		
F		**5.40**	p=.02	

DISCUSSION

The present study looked at whether forensic knowledge is influenced or attained by the number of crime shows individuals watch, as well as the percentage of episodes and their involvement with the shows. First, it was hypothesized that when presented with a murder scenario a positive correlation between number of crime shows and forensic evidence mentioned is present. Overall, results revealed no significant correlation between the number of crime shows watched and the amount of forensic evidence mentioned by participants. However, a positive correlation exists between the number of crime shows and non-forensic evidence. This finding could be a result of the level of difficulty in learning about certain types of evidence. For example, the need and process to establish an alibi may be easier to learn conceptually than procedures to safeguard against complex scientific evidence such as DNA. As a result, evidence relating to simpler concepts (i.e. non-forensic) may be easier to learn and later recall when creating a murder scenario than complex evidence (i.e. forensic evidence). While crime shows only correlated with non-forensic evidence, a positive correlation was found between the number of non-crime shows watched and both forensic and non-forensic evidence. This finding is confounded by the variety in themes of non-crime shows watched by participants, but may indicate the presence of criminal and investigative scenarios in some episodes of non-crime shows.

As previously mentioned, differences in the data due to biological sex were examined. Results revealed that the number of crime shows watched was a significant predictor of forensic evidence in women, but not in men. In men, this relationship is a very clearly not significant, but swings into significance in women. Although it is beyond the

scope of this paper, examining differences in learning from television shows between men and women, as well as interest in learning about forensic evidence and differences in bias or sensitivity to the information should be carried out in the future to understand this relationship further. One potential avenue of explanation as to why to explain why females, who watched the same amount of crime shows and mentioned the same amount of forensic evidence as males, mentioned more forensic evidence when watching more crime shows, is cultivation theory. Cultivation theory explains the influence television has in an individual's life experiences and the way people learn from televised media (Morgan & Shanahan, 1997). Research in cultivation has shown there are potential gender differences (Cohen & Weimann, 2000; Strouse and Buerkel-Rothfuss, 1987). For example, evidence shows that vivid memories for prior media violence led to greater recall of descriptive and specific details in females than in males (Riddle et al., 2011). It seems female's cultivation is more content-dependent than of males and one of these content dependencies may relate to crime and police based shows (Cohen & Weimann, 2000).

Secondly, it was hypothesized that a positive correlation between the percentage of crime show episodes watched and forensic evidence mentioned would be found. Results show no significant relationship between percentage of episodes watched and the amount of forensic evidence mentioned by participants. It appears as though the number of episodes an individual watches may have no effect on how much forensic knowledge they've attained. Any relationship between crime shows and forensic evidence may be the result of being exposed to the material, rather than the amount of times a person was exposed to it. However, given the need to differentiate between episodes to maintain public interest in the show, watching more episodes may not mean that people

are exposed to any type of evidence more. This may also help explain the relationship between crime shows and non-forensic evidence, as that is the type of evidence consideration most likely to be repeated between episodes as compared to forensic.

Lastly, it was hypothesized that there would be a stronger correlation between the level of involvement in crime shows and forensic evidence than Vicary and Zaikman's study (2017) given that a murder prompt was being used instead. Interestingly, results revealed that crime show involvement had no relationship with forensic evidence in our study. This result may be due to different participant demographic characteristics, the scenario itself, or statistical considerations. The previous study had a small effect size in the results, indicating that the relationship between involvement and forensic evidence may be fickle. The previous study also had higher statistical power given a sample size of three times the one in the present study (Vicary and Zaikman, 2017). Although we conclude that there is no relationship between involvement and forensic evidence, this result may change if additional participants were present. However, the result may also trend towards non-significance.

To explore which variables potentially explained forensic and non-forensic evidence considerations in the murder prompt, linear regression was also conducted. The number of shows watched, the percentage of episodes, involvement, and the interactions of number of shows with involvement and number of shows with percentage episodes failed to predict forensic evidence in the overall sample. However, the number of crime shows watched predicted non-forensic evidence in accordance with the correlational data referred to above.

Conclusion

Overall, the number of crime shows or episodes viewed, as well as participant involvement in the show, do not predict the number of forensic evidence mentioned. This study finds no evidence of a Police Chief effect when sex differences are not taken into account. Due to the strong gender differences found between number of crime shows and forensic evidence, differences in the Police Chief effect may be present between men and women. Future research should look at these potential differences in the Police Chief Effect or employ different methodology to account for differential CSI learning from different shows in biological sex. Specifically, the studies should explore different learning and recall processes that may be present.

As mentioned previously discussed, signal detection theory (SDT) methods would greatly improve the evaluation of all CSI Effect variants. SDT allows for the analysis of changes in response bias and detectability based on comparisons between a decision being made and the real state of things (Green & Swets, 1966). More recent approaches to SDT, such as fuzzy SDT (Hancock et al., 2000; Parasuraman et al., 2000), take into account that decisions are not binary in nature and can be made on a continuum. Exploring the shift in response bias and detectability using these methods will provide greater nuance in determining the existence of a CSI effect, its effect on jurors decisions, and whether any decision shifts occur due to improved CSI knowledge or a simple bias shift.

Limitations

The design of the present study is subject to the following limitations. The primary limitation of these results is that the present study is focused solely on undergraduate

students and the sample did not represent the general population or a population of people likely to be involved in crime. Evidence shows that college populations may not be representative of real-world populations due to age composition and differences in engagement with academic material (Gallander Wintre, North, & Sugar, 2001). This study benefits from non-student populations and examinations of all age groups. The second limitation concerns satisficing behavior. It is possible that some participants did not evaluate multiple alternatives and chose to write the bare minimum. This has been shown to be a potential problem in academic research (i.e. Savla et al, 2019). A third limitation concerns the need for cognition. In the previous study, need for cognition, or the tendency to engage in activities that require thinking, was considered to be assessed by the Crime Show Involvement Scale. The present study did not measure need for cognition directly. However, the Crime Show Involvement Scale may offer an informal and indirect measure of need for cognition given its emphasis on engaging in thinking when watching crime shows. It is important to note that the scale is not a validated measure of need for cognition.

One final limitation relates to our participant's undergraduate bachelor programs. The present study did not take into account the participant's enrolled major. There are certain criminal or legal related majors that could potentially give a participant a higher advantage about knowledge in forensics or investigative processes than those who are studying non-crime related majors. If this is the case, their knowledge might not be based solely on the crime shows they watch, but also what they've learned in their classes. In the future, the individual's major, as well as any other potential avenues for obtainment of forensic evidence, should be assessed.

APPENDIX A: IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Peter A Hancock** and Co-PI: **Giovanna Alves**

Date: **September 25, 2018**

Dear Researcher:

On 09/25/2018 the IRB approved the following human participant research until 09/24/2019 inclusive:

Type of Review:	UCF Initial Review Submission Form Expedited Review
Project Title:	Relationship between Forensic Exposure and Forensic Knowledge
Investigator:	Peter A Hancock
IRB Number:	SBE-18-14332
Funding Agency:	
Grant Title:	
Research ID:	N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu .

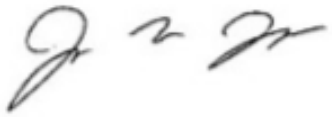
If continuing review approval is not granted before the expiration date of 09/24/2019, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

This letter is signed by:



Signature applied by Racine Jacques on 09/25/2018 02:51:38 PM EDT

Designated Reviewer

APPENDIX B: CRIME SHOW INVOLVEMENT SCALE

Responses ranged from (1) Never to (4) almost all of the time. Administered on Qualtrics.

1. "While watching this show, I try and guess what is going to happen at the end of the episode."

2. "After watching the show, I think about what I have just seen and heard."

3. "I discuss with others what I have seen on this show."

4. "I have looked up information about what I have seen on the show."

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