Evaluators' Perceptions of Suspect-Bias Variables

by

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ABSTRACT

Evaluators of eyewitness evidence (e.g., judges, jurors) often must determine whether an eyewitness's identification of a police suspect is accurate or mistaken. It has recently been argued that a particular class of variables—suspect-bias variables—pose a unique threat to the reliability of eyewitness identification evidence. Unlike "general impairment" variables that generally impair eyewitness identification accuracy (e.g., poor viewing conditions, biased lineup instructions), suspect-bias variables produce a suspect-specific bias that increases the risk of confident misidentifications of innocent suspects. The goal of this research was to examine evaluators' sensitivity to suspect-bias variables compared to general impairment variables, and to test whether sensitivity to suspect-bias differs as a function of whether the suspect-bias variable is under the control of the legal system (system suspect-bias) or outside of the legal system's control (estimator suspect-bias). Participant-evaluators (N = 214) read eight crime vignettes paired with one of four different eyewitness variables (system suspect-bias, estimator suspect-bias, general impairment, or no-variable control) and rated the accuracy of each eyewitness. Evaluators also explained the reasoning for their accuracy rating, and their explanations were coded for mentions of procedural suggestion, eyewitness memory strength, memory contamination, and general eyewitness (un)reliability. Evaluators appear to be more sensitive to general impairment variables than to suspect-bias variables. This finding is alarming, as suspect-bias variables pose a greater threat to eyewitness reliability than general-impairment variables. Implications for the collection and evaluation of eyewitness evidence are discussed.

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CHAPTER 1

INTRODUCTION

Due to an eyewitness's misidentification, Malcolm Alexander served 38 years for an aggravated rape charge he was not guilty of before eventually being exonerated by DNA evidence in 2018 (Innocence Project, 2021). Cases like Malcolm Alexander's are often presented to evaluators (e.g., judges, jurors), who are tasked with determining if the eyewitness's identification is reliable. It has recently been argued that one particular class of variables pose a uniquely dangerous threat to eyewitness reliability: suspect-bias variables (Smalarz, 2021). Suspect-bias variables bias an eyewitness specifically towards the suspect (Wells & Olson, 2001) and threaten eyewitness reliability in two ways: by increasing the likelihood that an innocent suspect is identified, inflating confidence in an innocent-suspect identification, or both (Smalarz, 2021). Wells and Olsen (2001) posited that evaluators may be especially sensitive to suspect-bias variables because, unlike variables that impair eyewitness memory generally (general impairment variables) suspect-bias variables can explain why the eyewitness picked the suspect even if the suspect is actually innocent. The primary goal of this study was to empirically examine evaluators' perceptions of eyewitnesses exposed to suspect-bias variables and general impairment variables.

Borrowing from the classic system-estimator variable distinction in eyewitness identification (Wells, 1978), Smalarz (2021) classified suspect-bias variables as either system suspect-bias variables or estimator suspect-bias variables. System suspect-bias variables are variables that produce a suspect-specific bias and are in the legal system's control. Such variables include when a lineup administrator with knowledge of which

lineup member is the suspect influences an eyewitness's decision or when the police show a witness only one suspect (a showup). Estimator suspect-bias variables are variables that produce a suspect-specific bias but are not in the legal system's control (Wells, 1978). Such variables include co-witness discussion prior to police involvement, or when a witness makes an identification attempt on social media prior to a police-orchestrated identification attempt. Importantly, system and estimator suspect-bias variables both pose a significant threat to eyewitness reliability (Smalarz, 2021). However, system and estimator suspect-bias variables may have distinct effects on evaluations of eyewitness identification evidence.

In the current chapter, I will first review research as to how system suspect-bias variables, estimator suspect-bias variables, and general impairment variables affect eyewitness accuracy and evaluations of eyewitnesses. Then I will discuss the ways in which evaluators may be differentially sensitive to system suspect-bias, estimator suspect-bias, and general impairment variables. I will conclude this chapter with an overview of the current study and predicted hypotheses.

Variables Affecting Eyewitness Accuracy

Prior research examining variables affecting eyewitness accuracy has tended to categorize variables as system or estimator variables, without regard to whether variables produce suspect-specific bias or general impairment of eyewitness accuracy. For current purposes, however, and in light of Smalarz's (2021) suggestion that suspect-bias variables can be categorized along the system- estimator-variable distinction, I will organize my review of the literature around that categorization.

System Suspect-Bias Variables. System suspect-bias variables can have detrimental effects on eyewitness accuracy. As noted by Smalarz (2021), system suspect-bias variables include administrator influence, low-similarity lineup fillers, repeated identification procedures, showups, and non-coincidental resemblance. Administrator influence (Charman & Quiroz, 2016; Zimmerman et al., 2017) occurs when the administrator conducting the lineup procedure biases the eyewitnesses's decision via verbal (Charman & Quiroz, 2016; Greathouse & Kovera, 2009) or nonverbal (Gurney, 2015; Gurney et al. 2014) behavior (e.g., a nod or head shake). The administrator may influence the witness to choose to the suspect based off the social cues emitted from these behaviors, ostensibly altering their decision (Kovera & Evelo, 2017). In addition, some research has shown that administrator influence can inflate eyewitness confidence in mistaken identifications (Charman & Quiroz, 2016; Garrioch & Brimacombe, 2001). Low-similarity fillers, another system suspect-bias variable, are fillers that fail to properly siphon error away from the suspect, increasing chances of a false positive identification (Smith et al., 2017). Furthermore, research on what is known as the "dud" effect has shown that low-similarity fillers can actually increase a witness's confidence in a false positive identification (Charman et al., 2011).

Another system suspect-bias variable, repeated identification procedures, has also garnered a great deal of attention as to its negative effects on eyewitness accuracy (Godfrey & Clark, 2010; Steblay & Dysart, 2016). Repeated identification procedures are suggestive (Steblay & Dysart, 2016) and significantly increase the risk of misidentification (Quiqley-McBride, 2021). This is because memory is malleable, and the testing of the witness's memory with a lineup, even the first time, can contaminate

memory for the culprit (Wixted et al., 2021). Testing a witness's memory a second time creates a stronger "signal" for the suspect, and can be prone to a source attribution error, such that the witness cannot accurately specify where they remember the face from (Wixted et al., 2021). As a result, it is recommended that a witness only be exposed to a lineup once, for initial recognition, since any further tests risk memory contamination and potential misidentification (Wells et al., 2020). Showups are an additional system suspect-bias variable in which eyewitnesses are presented with only the police suspect (Wells et al., 2020). Showups increase innocent suspect misidentifications relate to lineups (Smith et al., 2017). Therefore, little disagreement remains in the literature as to the preference for fair lineups over showups (Mickes, 2015; Smith et al., 2017; Steblay et al., 2003; Wells et al., 2020; Wixted & Mickes, 2014).

It is rare that an innocent suspect, purely by chance, looks like the culprit (Wixted & Wells, 2017). However, in the case of non-coincidental resemblance, the suspect may look like the culprit because the suspect came under suspicion precisely because they matched surveillance image or composite of the culprit. This could produce suspect-specific bias if the fillers are not also selected based on their match to the surveillance image or composite of the suspect. As a result, the suspect will stand out amongst the fillers, increasing the chances of a misidentification (Wixted & Wells, 2017) and as mentioned prior, when the fillers are low in similarity compared to the suspect, this can increase the witness's confidence in a false positive identification (Charman et al., 2011).

Estimator Suspect-Bias Variables. Estimator suspect-bias variables are fewer in number than system suspect-bias variables but include unconscious transference, social media exposure, and co-witness memory contamination. Unconscious transference occurs

when someone the witness has interacted with prior is identified as the culprit by an eyewitness (Loftus, 1976). In their study, Buckhout (1974) suggests the possibility that witnesses may transfer their memory of the crime's true culprit onto an innocent bystander after conducting a study where he found that about a quarter of participants incorrectly identified a bystander instead of the actual perpetrator. Some evidence suggests that witnesses may have inflated confidence when identifying a bystander (Geiselman et al., 1996).

Social media searches are a type of estimator suspect-bias variable that has gained more attention with the proliferation of social networking services (Harvard et al., 2021). Also known as "internet sleuths" (Yardley, 2018), those trying to conduct a "Facebook identification" may attempt to search for the culprit via social media before being exposed to a lineup (Mark & Sampson, 2013). This has led to some negative real-world consequences. For example, Reddit users have misidentified individuals who were subsequently harassed (Lee, 2013). One study by Elphick et al. (2021) found that after viewing a crime, witnesses who had been exposed to a lookalike on social media prior to viewing a lineup were less likely to recognize the culprit. This same study found no significant effect of eyewitness confidence for those who provided a false identification, however.

A third estimator suspect-bias variable, co-witness contamination, can occur when multiple eyewitnesses speak to and potentially mislead one another (Paterson & Kemp, 2006), resulting in inaccurate information being reported about a crime or perpetrator (Mojtahedi et al., 2020; Mojtahedi, 2017). Co-witness contamination (also known as co-witness influence) is particularly problematic, as it has been found that co-witness

discussion is significantly more misleading than postevent information from a non-social source (Gabbert et al., 2004). Co-witness influence may happen at the scene of the crime before the police arrive, such as when two witnesses discuss the culprit's appearance, potentially misleading one another (Paterson & Kemp, 2006). For example, Zajac and Henderson (2009) had a confederate provide a witness with false information about a certain facial feature on the culprit's face. When that witness was exposed to a lineup containing members that all held that feature, false identifications increased. Confidence, however, did not significantly differ by condition (Zajac & Henderson, 2009).

General Impairment Variables. There is an abundance of research related to the detrimental effects of general impairment variables on eyewitness accuracy. Research has shown that viewing a crime from a far distance (Lindsay et al., 2008; Wagenaar & van der Schrier, 1996) or under low lighting (Loftus & Harley, 2005) can decrease eyewitness accuracy. Furthermore, divided attention can also significantly decrease eyewitness accuracy (Lindsay et al., 2008), as well as if the culprit is wearing a disguise (Meissner & Brigham, 2001). Additionally, long retention intervals between the crime and identification (Deffenbacher et al., 2008) and short exposure durations (Palmer et al., 2010) can lower eyewitness accuracy. Importantly, however, the detrimental effects of each of these variables on eyewitness accuracy are general, increasing filler identifications and false rejections of the culprit, rather than increasing innocent-suspect identifications specifically.

How Variables Affect Evaluations of Eyewitnesses

Wells and Olsen (2003) posited that suspect-bias variables may be potentially more impactful to evaluators than general impairment variables because suspect-bias

variables provide an explanation for why the wintess picked the suspect from a lineup of known-innocent fillers. It has also been argued that evaluators are more sensitive to system variables than to estimator variables because system variables are easier to comprehend (Desmarais & Read, 2011). However, this was not in the context of system or estimator suspect-bias variables. Nevertheless, the individual effects of some system- and estimator-suspect-bias variables have been studied.

System Suspect-Bias Variables. Research on evaluators' perceptions of system suspect-bias variables has produced mixed findings. Some research, like that by Modjadidi and Kovera (2018), found that watching a videotape of an identification procedure in which the administrator influenced the witness decreased mock-jurors' guilty verdicts by increasing their perceptions of the suggestiveness of the identification procedure. Essentially, when the videotaped identification procedure was admitted into evidence and that procedure contained suggestion, jurors' ratings of procedural suggestion increased, leading to lower guilty verdicts. More recent research has revealed more complex effects of system suspect-bias on evaluators' judgments of eyewitness accuracy. For example, Kulak and Smalarz (in prep.) found that when evaluators who viewed tapes where administrator influence had occurred were less likely to believe the eyewitness because they perceived the identification procedure to be suggestive. However, in addition to this *indirect, negative* effect of administrator influence on evaluators' belief of eyewitnesses, Kulak and Smalarz also found evidence of a *direct, positive* effect of administrator influence on evaluations of eyewitnesses, independent of the negative, indirect effect. In other words, administrator influence had both negative

and positive effects on evaluations of the eyewitness. The question remains as to whether these dual effects may appear for different system suspect-bias variables.

Research is further mixed as to how evaluators perceive other system suspect-bias variables. One study found that jurors' perceptions of the strength of the detective testimony were altered when evaluators learned that the lineup was biased (the suspect stuck out amongst the fillers), such that evaluators rated the evidence of the defendant's guilt as weaker, but this did not change their verdict decisions (Jones et al., 2020). Another study found that when a lineup was biased, it often went undetected by jurors, but when jurors were attuned to the biased nature of the lineup, they did not trust the suspect identification (Carlson et al., 2022). In other words, similar to the indirect effects of administrator influence (Kulak & Smalarz, in prep.), when evaluators did perceive that the lineup was biased (unfair), they rated eyewitness accuracy as lower. Otherwise, when evaluators did not perceive the lineup to be biased, this did not affect their ratings of eyewitness accuracy. Therefore, it seems possible that evaluators may be sensitive to a biased lineup containing poor fillers. Furthermore, Carlson et al. 2022 found that jurors did not rate eyewitness accuracy differently whether the lineup procedure was fair or biased, or a showup was used (Carlson et al., 2022). In the case of showups, Jones et al. (2020) noted that evaluators were not sensitive to a showup relative to a fair six-person lineup. Meaning, evaluators ratings of eyewitness accuracy was not affected by lineup presentation, nor were they sensitive to the biasing nature of showups. Jones and colleagues (2020) concluded that jurors may have been using the showup as confirmatory of the defendant's guilt, which is consistent with the direct effect of administrator influence found by Kulak and Smalarz (in prep.).

To my knowledge, little is known about how an eyewitness exposed to multiple lineups containing the same suspect may appear to evaluators However, some research has investigated a similar phenomenon, known as mugshot bias. Desmarais and Read (2011) suggest that evaluators have become sensitive to mugshot bias, or when an eyewitness sees the suspect in a mugshot prior to seeing the suspect in a lineup, such that evaluators adjust their sentencing criteria accordingly when rendering a verdict. Essentially, when evaluators notice that an eyewitness has been exposed to the suspect more than once, they were more likely to realize the inadmissibility of said evidence.

Estimator Suspect-Bias Variables. Little research exists on how evaluators perceive estimator suspect-bias variables. One study that came close to examining evaluators' sensitivity to the potential for co-witness contamination found that jurors were less likely to believe eyewitnesses who previously discussed what they saw with each other (Paterson et al., 2013). But, Paterson and colleagues also found that jurors weighted eyewitness agreement more heavily than eyewitness discussion when rendering a verdict. In other words, evaluators seemed more sensitive to whether the eyewitnesses agreed with each other, rather than the fact that they had spoken to each other. This finding suggests that evaluators might not appreciate the potential for memory contamination from a co-witness. The lack of sensitivity to the detrimental effects of estimator suspect-bias variables more generally may be because unlike system suspect-bias variables that can have an indirect negative effect on belief in the eyewitness through procedural suggestion (Kulak & Smalarz, in prep.), such a relationship is not present for estimator suspect-bias variables. Therefore, evaluators may be less likely to adjust for biasing effects when an estimator suspect-bias variable is present.

General Impairment Variables. Research is mixed as to how evaluators perceive general impairment variables. In their 2011 meta-analysis, Desmarais and Read found that in comparison to system suspect variables, laypeople were less sensitive to general impairment variables. Similarly, Cutler and colleagues (1998) found that the presence of certain general impairment variables had little to no effect on verdicts or probability ratings of accuracy. Jones and colleagues (2020) tested how evaluators assess eyewitness evidence when four general impairment variables were simultaneously present. Evaluators read a trial transcript containing all four variables and were randomly assigned to receive the good or bad condition for each (e.g., for lighting, well or poorly lit). The authors found that evaluators did demonstrate awareness that conditions were poor, but this did not reflect in their verdicts. In contrast, Jones and Penrod (2018) found that evaluators were sensitive to certain general impairment variables, including weapon focus, seeing the culprit for a short duration, and delay between crime occurrence and identification.

However, as noted earlier, it may not be problematic that evaluators are relatively insensitive to general impairment variables, as they do not produce a suspect-specific bias (Wells & Olsen, 2001). In their discussion, Jones et al. (2020) claimed that their findings suggest that jurors seemed to be swayed by the fact that the eyewitness made an identification despite the poor witnessing conditions (when a general impairment variable was present). In other words, if the suspect is identified, despite potentially detrimental witnessing conditions, the eyewitness was not biased towards specifically identifying the police suspect, making them seem more credible.

Memory Beliefs and Perceptions of Police

Individual differences in evaluators' beliefs about variables related to eyewitness evidence may affect how they are influenced by different types of variables affecting eyewitness accuracy. For example, whether an evaluator holds accurate beliefs about how memory functions could potentially influence their sensitivity to certain eyewitness variables (e.g., estimator suspect-bias variables, general impairment variables), which could in turn, influence their evaluations of an eyewitness's accuracy. One common misconception cited as often held by laypersons is that "memory is like a video camera," (Lacy & Stark, 2013). One study by Brewin et al. (2013) found that more than 60% of their sample agreed that memory does not decay over time but is rather stored permanently. Such misconceptions could potentially alter an evaluator's perception of estimator suspect-bias, leading evaluators to underestimate the effects of such variables on eyewitness accuracy. Consider an evaluator who learns that an eyewitness was exposed to an estimator suspect-bias variable such as co-witness contamination. If the evaluator holds misconceptions about the contaminability of memory, their judgments of the witness's accuracy may not be affected. However, if an evaluator holds accurate beliefs about the contaminability of memory, information about potential co-witness contamination may be more likely to decrease their evaluations of eyewitness accuracy. Hence, the current research measured evaluators' beliefs about memory to assess whether beliefs about memory moderated the influence of different types of variables affecting eyewitness accuracy on evaluations of the eyewitness.

Another individual difference that may affect evaluators' sensitivity to certain variables affecting eyewitness accuracy are evaluators' perceptions of police. Individuals who believe the police are procedurally unfair exhibit lower trust in the police (Nix et al.,

2015; Resig et al., 2018; Sunshine & Tyler, 2003; Tyler et al., 2015). Differences in evaluators' trust in police could influence their evaluations of certain eyewitness variables. For example, evaluators with lower trust in the police may be particularly sensitive to procedures involving system suspect-bias. Specifically, this may increase the strength of the negative indirect effect of procedural suggestion on eyewitness belief, ultimately decreasing belief in the eyewitness.

The Current Study

The primary goal of this research was to examine evaluators' sensitivity to different variables affecting eyewitness accuracy. An additional goal of this research was to examine how individual differences in evaluators' endorsement of accurate or inaccurate memory beliefs and degree of trust in the police affect evaluators' sensitivity to system suspect-bias, estimator suspect-bias, and general impairment variables. In a within-subjects design, evaluators were presented with eight different crime vignettes and eight different eyewitness variables (system suspect-bias, estimator suspect-bias, general impairment, or no-variable control). Evaluators provided judgments of eyewitness accuracy, as well as a rationale for their accuracy judgment.

In line with past research showing a suppression effect for evaluations of administrator influence (Kulak & Smalarz, in prep.), I predicted a null overall effect of system suspect-bias variables on perceptions of eyewitness accuracy. To my knowledge, there is little research on the presence of estimator suspect-bias variables, so I was unsure whether their presence would increase or decrease evaluations of eyewitness accuracy. Finally, I predicted that the presence of general impairment variables would decrease evaluations of eyewitness accuracy.

Regarding evaluators' explanations of their ratings of eyewitness accuracy, I predicted that the presence of system suspect-bias variables would increase mentions of concerns about procedural suggestion. Additionally, I predicted that the presence of estimator variables would increase mentions of concerns about memory contamination and identification unreliability. Finally, I predicted that the presence of general impairment variables would increase mentions of concerns about memory strength.

I also conducted exploratory analyses to determine whether individual differences in evaluators' perceptions of the police or endorsement of certain memory beliefs influenced evaluators' perceptions of eyewitness accuracy or the concerns they mentioned in their explanations of their evaluations.

CHAPTER 2

METHOD

Participants and Design

I sought to obtain 200 participants in order to have 200 data points in each cell of the within-subjects design. I collected data from 239 participants who self-identified as female (72.4%), male (25.2%), or other (1.4%); two participants did not report their gender identity. Participants ranged in age from 18 to 64 years old (M = 23.3, SD = 6.5); three participants did not report their age. Participants reported their race/ethnicity as American Indian or Alaska Native (1.4%), Asian (8.9%), African American or Black (2.3%), Hispanic or Latinx (20.6%), Native Hawaiian or Pacific Islander (1.4%), White (57%), or other (7.5%); two participants did not report their race/ethnicity. A majority of participants had never been called for (77.6%) or served on (97.7%) a jury. Participants reported their political orientation as conservative (11.7%), moderate (48.1%) or liberal (39.3%); two participants did not report their political orientation.

I pre-registered a plan to terminate data collection after obtaining the target sample size after excluding participants who failed to finish the study or answer the attention check correctly. Nine participants failed to complete the study and 16 failed the attention check; data from these participants were removed prior to analyses. The final sample consisted of 214 participants, all students 18 and older recruited from Arizona State University West Campus' research participation system pool. Participants received course credit for their participation.

The research was preregistered on the Open Science Framework and can be accessed here: https://osf.io/7bpfd. The experiment utilized a 4 (Eyewitness Variable:

System Suspect-bias, Estimator Suspect-bias, General Impairment, Control) × 8 (Vignette) × 2 (Variable Set: A vs. B) mixed-design. Eyewitness variable and vignette were within-subjects factors, and variable set (described below) was a between-subjects factor.

Materials

Eight different crime vignettes were created for this study, all of which involved a female eyewitness viewing a crime committed by a male perpetrator (see Appendix A). Each crime was randomly paired with one of four variable conditions: system suspect-bias variable, estimator suspect-bias variable, general impairment variable, or no-variable control. For stimulus sampling purposes, we used two sets (A & B) of these eight variable conditions. Table 1 displays each eyewitness variable and the variable's classification as well as its variable set. These eyewitness variables were written in such a way that they could be randomly paired with any of the eight crime vignettes (see Appendix A). In total, there were 64 versions of variable presentation.

Table 1.

Eyewitness Variables Used, Variable Type, and Stimulus Set

Eyewitness Variable	*Set A*	*Set B*
System Suspect-bias	Filler Similarity	Repeated Procedures
System Suspect-bias	Showup	Non-coincidental Resemblance
Estimator Suspect-bias	Unconscious Transference	Social-media Search
Estimator Suspect-bias	Co-witness Contamination	Co-witness Influence
General Impairment	Lighting	Glasses
General Impairment	Disguise	Distance
Control	--	--

Control	--	--

Note: Depending on context, some variables can be classified as system and estimator variables.

Measures

There were two main dependent measures. Following each vignette, participants rated the likelihood that the eyewitness's identification of the suspect was accurate or mistaken along a 11-point sliding scale ranging from 0 (*Definitely Mistaken)* to 10 (*Definitely Accurate)*. Next, participants provided an open-ended response to the following question: *Please explain what led you to rate the witness's accuracy as you did.*

Participants also responded to two individual difference measures. The first assessed participants' endorsement of beliefs about memory. The first 10 items on the scale were adapted from Simon and Chabris (2011) and contained 10 statements about memory's completeness, passivity, immutability, accuracy, and permanence. A sixth category reflecting memory's contaminability was created specifically for this study and consistent of the following two items: *Memory of an event can be altered or distorted after the memory has been formed (R)*, *Once you have experienced an event and formed a memory of it, that memory does not change*. With the addition of these two statements, the total amount of items was 12 ($\alpha = .70$). Each of the six categories contained one statement consistent with, and one inconsistent with, what is known about memory. Items endorsing accurate beliefs were reverse-scored such that higher values corresponded to greater endorsement of memory misconceptions. Participants responded along 4-point Likert scales, ranging from 1 (*Strongly Disagree)* to 4 (*Strongly Agree)* with a fifth "Don't Know" option. Refer to Appendix B for the complete scale.

The second individual difference measure assessed participants' degree of trust in the police. Participants reported their agreement with six items (α = .95), two adapted from Jackson et al. (2012), and four from Tyler et al. (2014). Participants responded along a 4-point Likert scale, ranging from 1 (*Strongly Disagree)* to 4 (*Strongly Agree)*. An example item from the scale: *The police usually act in ways that are consistent with my own ideas about right and wrong*. Refer to Appendix B for the complete scale.

Procedure

Participants were recruited through the research participation system at Arizona State University's West Campus. Participants received a link to a Qualtrics survey, which directed them to a consent form describing the basic purpose of the research. After consenting to participate, participants (hereafter called evaluators) read eight vignettes describing a crime. Each evaluator was randomly assigned to either Set A or B, determining which set of eyewitness variables the vignettes would be paired with. The order of the crime vignettes and which eyewitness variable the vignette was paired with were randomized via Qualtrics survey flow.

All evaluators were informed that they would be reading eight vignettes about a crime and that the police had conducted an identification procedure in which the eyewitness identified the suspect. Evaluators were instructed that they would determine the likely accuracy of the eyewitness's identification and explain their reasoning behind that judgment. Evaluators were then presented with each of the eight crime vignettes, and after reading each, they provided an accuracy rating and an explanation for their rating. Randomly embedded amongst the eight vignettes was an attention check that began to describe a shoplifting scenario, but at the end of the vignette stated: *This crime has been*

included to ensure that you are paying close attention. Please select any value from the accuracy scale, then type "I am paying attention" in the text box below.

After completing ratings for the eight crime vignettes, evaluators answered questions about their degree of trust in the police and their endorsement of beliefs about how memory functions. Both scales and the questions within them were presented in randomized order. All evaluators then responded to basic demographic questions regarding their gender, age, race/ethnicity, political orientation, and whether they had been called for or served on a jury. Finally, evaluators were debriefed and awarded credit for their participation.

CHAPTER 3

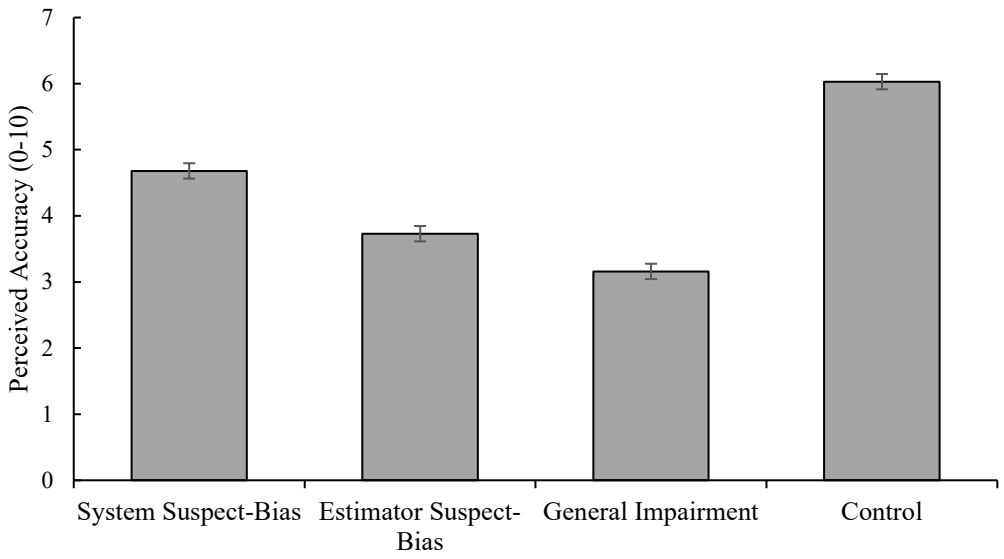
RESULTS

Judgments of Eyewitness Accuracy

To examine how evaluators' accuracy ratings were affected by eyewitness variable type, I ran a linear mixed-effects model (lmer) in R, with eyewitness accuracy entered as a dependent variable and eyewitness variable entered as a fixed effect with four levels. Participant and variable set were entered as random effects. There was a significant effect of eyewitness variable on evaluators' judgments of eyewitness accuracy, $F(3, 639) = 148.99$, $p < .001$.

Figure 1.

Ratings of Eyewitness Accuracy by Eyewitness Variable



Pairwise comparisons revealed that each variable type significantly reduced evaluators' perceptions of eyewitness accuracy compared to the no-variable control condition. Compared to when no eyewitness variable was present (M = 6.03, SD = 1.97), evaluators rated eyewitness accuracy significantly lower when a system suspect-bias variable was present (M = 4.68, SD = 1.70), $t(639) = 9.31$, $p < .001$, $d = 0.74$, 95% CI [0.97, 1.72] an estimator suspect-bias variable was present (M = 3.73, SD = 1.76), $t(639) = 15.82$, $p < .001$, $d = 1.25$, 95% CI [1.92, 2.67], or a general-impairment variable was present (M = 3.16, SD = 1.51), $t(639) = 19.75$, $p < .001$, $d = 1.56$, 95% CI [2.49, 3.24]. As shown in Figure 1, perceptions of accuracy were lowest when a general impairment variable was present.

To determine if individual differences in evaluators' memory beliefs and trust in police influenced the effects of the eyewitness variables, I conducted two additional linear mixed-effects models. The first model included the fixed effect of eyewitness variable as well as participants' memory beliefs and the two-way interaction between eyewitness variable and participants' memory beliefs. Participant and variable set were again entered as random effects. Evaluators who responded to more than two memory belief items with "don't know" were excluded from analysis. Evaluators' memory beliefs significantly predicted their evaluations of eyewitness accuracy, $\beta = 0.85$, $SE = 0.18$, $t(205.57) = 4.63$, $p < 0.001$. Specifically, with each unit increase in an evaluator's endorsement of inaccurate memory beliefs, their ratings of eyewitness accuracy increased by 0.85. Evaluators' memory beliefs did not significantly interact with eyewitness variable to influence evaluations of eyewitness accuracy, $F(3, 1450) = 25.83$, $p = 0.33$.

The second model included the fixed effect of eyewitness variable as well as participants' trust in police and the two-way interaction between eyewitness variable and participants' trust in police. Participant and variable set were again entered as random effects. Level of trust in the police significantly predicted evaluations of eyewitness accuracy, $\beta = 0.19$, $SE = 0.09$, $t\ (212) = 2.14$, $p = 0.03$ Specifically, with each unit increase in an evaluator's level of trust in the police, evaluators' ratings of eyewitness accuracy increased by 0.19. Evaluators' level of police trust did not significantly interact with eyewitness variable to influence evaluations of eyewitness accuracy, $F(3, 1492) = 0.90$, $p = 0.44$.

Evaluators' Concerns by Eyewitness Variable

Evaluators' explanations for their rating in each of the eight vignettes were coded by myself and another member of the research lab. Both coders were blind to the variable that was assigned to each vignette. A third, blind coder resolved any disagreements in coding. After achieving agreement on the first 45%, I coded the remaining data. I departed slightly from the preregistered plan to code for only four concepts (procedural suggestion, memory strength, memory contamination, and identification unreliability) after noticing that evaluators sometimes mentioned these variables in a positive manner as well (e.g., the eyewitness had a strong memory).

As a result, eight total concepts were coded for across each explanation: procedural suggestion (or lack thereof); memory strength (weak or strong); contamination of memory (or lack thereof) and general (un)reliability. Per the eight concepts, evaluators received a 0 if the response did not contain a reference to the concept for their justification, a 1 if the response contained a reference to the concept for their justification,

and a missing value if the response was "don't know" or uninterpretable. To receive a 1 for the concept of *procedural suggestion*, the evaluator had to mention that the procedure used by the police was unfair or influencing in some way. If the evaluator indicated that procedure was fair or unbiased, they received a 1 for *not suggestive*. To receive a 1 for the concept of *memory strength*, the evaluator had to mention that the witness had a good memory, had a good view of the suspect, or that the witness identified the suspect in a short period of time. If the evaluator mentioned the witness having a bad memory or a poor view of the suspect, they received a 1 for the concept of *memory weak*. To receive a 1 for the concept of *pristine memory*, the evaluator had to mention that they believed the witness's memory was unaffected by external sources. If the evaluator mentioned that they believed witness's memory was affected by external sources, they received a 1 for *contamination*. Finally, to receive a 1 for *identification reliability*, the evaluator had to make general statements about the witness's reliability, or the reliability of eyewitness identifications as a whole. If evaluators made general statements about the witness being unreliable or the unreliability of eyewitness identifications as a whole, they received a 1 for *identification unreliability*. The entire codebook can be viewed in Appendix C.

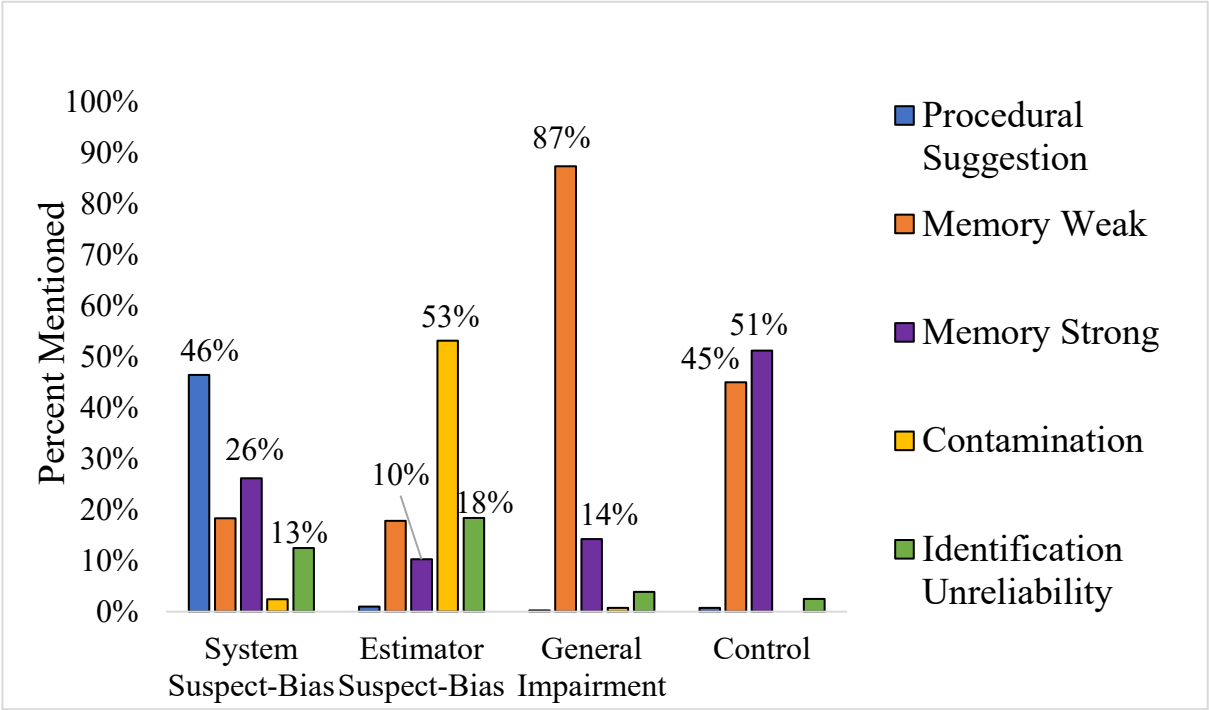
Recall that the final dataset contained responses from 214 participant-evaluators, each of whom provided ratings and explanations for eight vignettes. This yielded a total of 1,712 explanations. However, 76 explanations were discarded because an evaluator responded with "don't know" or were uninterpretable. Of the remaining 1,636 explanations, 198 (12%) mentioned a concern about procedural suggestion, 692 (42.3%) mentioned a concern about memory weakness, 229 (14%) mentioned a concern about memory contamination, and 152 (9.3%) mentioned a concern about the general

unreliability of eyewitness identification. In terms of positive justifications, 3 responses (0.002%) mentioned that the procedure was not suggestive, 415 (25.4%) mentioned something regarding memory strength, 23 (1.4%) mentioned that the witness's memory was uncontaminated (i.e., pristine), and 79 (4.8%) mentioned the general reliability of eyewitness identification. Because of the low frequency of mentions of lack of procedural suggestion, lack of memory contamination (i.e., pristineness), and general reliability of eyewitness identification, I did not conduct inferential analyses on these concepts.

Originally, I preregistered a plan to run general linear mixed-effects models (glmer) in R to examine the rates at which evaluators mentioned each concept as a function of eyewitness variable. However, when I ran the models in R, the models did not converge. Specifically, R reported a singularity error, meaning that some random effects variances were estimated to be exactly or near zero (Matuschek et al 2017; McElreath, 2015). Furthermore, for some of the coded concepts, the concern was not mentioned at all in the control condition, resulting in no variability in the control condition. In those cases, I simply report the percentage of participants who mentioned each concept for each eyewitness variable.

Figure 2

Percent of Evaluators Who Mentioned Each Concept in Each Eyewitness Variable Condition



Procedural Suggestion

As shown in Figure 2, evaluators rarely mentioned a concern about procedural suggestion in the control condition (n = 3), the estimator-suspect bias condition (n = 4), and the general-impairment condition (n = 1). When a system suspect-bias variable was present, however, 46% of evaluators' explanations for their accuracy rating (n = 190) mentioned a concern about procedural suggestion. Due to there being so few mentions of procedural suggestion in the other three eyewitness variable conditions, no inferential analysis was conducted for this concept.

Memory Strength or Weakness

As shown in Figure 2, compared to when no eyewitness variable was present, evaluators mentioned a concern about memory weakness significantly more often when a general impairment variable was present $OR = 0.11$, 95% CI [0.07, 0.17], $z = 11.96$, $p < 0.001$, a system suspect-bias variable was present, $OR = 3.86$, 95% CI [2.51, 5.94], $z = -8.00$, $p < 0.001$, or an estimator suspect-bias variable was present, $OR = 3.99$, 95% CI [2.58, 6.15], $z = -8.14$, $p < 0.001$.

Furthermore, as shown in in Figure 2, compared to when no eyewitness variable was present, condition, evaluators mentioned a concern about memory strength significantly less often when a general impairment variable was present, $OR = 6.99$, 95% CI [4.40, 11.11], $z = -10.72$, $p < 0.001$, a system suspect-bias variable was present, $OR = 3.16$, 95% CI [2.11, 4.74], $z = -7.35$, $p < 0.001$, or an estimator suspect-bias variable was present, $OR = 10.25$, 95% CI [6.15, 17.08], $z = -11.69$, $p < 0.001$.

For further context regarding explanations for evaluations of system suspect-bias variables, which contained a substantial number of references to memory strength, I provide below two examples of evaluator's responses that were coded for mentioning the concept of memory strength in a system suspect-bias variable condition:

> "The witness might be a bit more accurate because only 15 minutes passed since they saw the event. However, plenty of young men could've been nearby wearing a dark green shirt."
>
> "Since the suspect was found quickly after the incident then there is a greater chance that no memory failures have occurred. Assuming the suspect was not wearing anything to cover their face I would say this could be an accurate identification."

Memory Contamination

As shown in Figure 2, evaluators rarely mentioned a concern about memory contamination when in the system suspect-bias condition (n =10), general-impairment condition (n = 3) or control condition (n = 0). When an estimator suspect-bias variable was present, however, 53% of evaluators' explanations for their accuracy rating (n = 216) mentioned a concern about memory contamination. Due to there being so few mentions of contamination in the other three eyewitness variable conditions, no inferential analysis was conducted for this concept.

Identification Reliability

As shown in Figure 2, evaluators rarely mentioned a concern about identification unreliability when in the system suspect-bias condition (n =51), general-impairment condition (n = 10) or control condition (n = 16). When an estimator suspect-bias variable was present, however, 18% of evaluators' explanations for their accuracy rating (n = 75) mentioned a concern about identification unreliability. Due to there being so few mentions of identification unreliability in the other three eyewitness variable conditions, no inferential analysis was conducted for this concept.

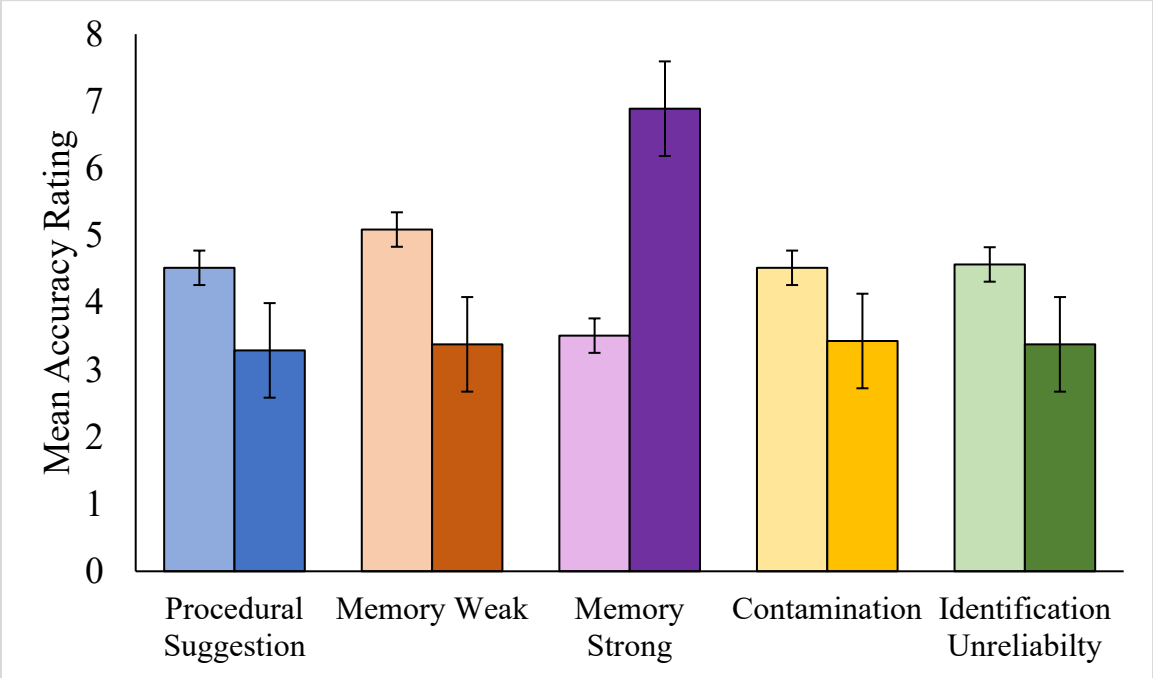
Effects of Evaluators' Concerns on Perceptions of Eyewitness Accuracy

To examine the association between evaluators' accuracy judgments and the five concepts that yielded sufficient variability across conditions (procedural suggestion; memory strength or weakness; memory contamination; and identification unreliability), I ran five different linear mixed-effects model (lmer) in R. Eyewitness accuracy was entered as the dependent variable, participant was entered as a random effect, and whether a concept was mentioned was entered as a fixed effect with two levels each (0 =

not mentioned, 1 = mentioned). Set was going to be entered as a random effect as well, but once again a singularity error occurred, such that the random effect of set was too low (Matuschek et al 2017; McElreath, 2015). These analyses were exploratory, so I did not make any predictions as to how eyewitness accuracy judgments would be influenced by these concerns.

Figure 3

Evaluators' Eyewitness Accuracy Ratings by Each Concept Mentioned



Note. Darker bars refer to when the concept was mentioned.

Procedural Suggestion

As shown in Figure 3, evaluators' ratings of eyewitness accuracy were significantly lower when evaluators' explanations included that the procedure was suggestive, (M = 3.29, SD = 1.76) than when there was no mention of procedural

suggestion (M = 4.52, SD = 2.57), t(1551.65) = -6.52, p < .001, d = -0.48, 95% CI [-0.63, -0.42].

Memory Strength

Furthermore, shown in Figure 3, evaluators' ratings of eyewitness accuracy were significantly lower when evaluators justified their rating with concerns about the witness's memory being weak (M = 3.38, SD = 1.95) compared to when they did not (M = 5.09, SD = 2.70), t(1583.93) = -14.43, p < .001, d = -0.71, 95% CI [-0.81, -0.61].

As shown in Figure 3, evaluators' ratings of eyewitness accuracy were significantly higher when evaluators mentioned memory strength (M = 6.89, SD = 2.18) compared to when they did not (M = 3.51, SD = 1.81), t(1604.35) = 28.86, p < .001, d = 1.61, 95% CI [1.50, 1.72].

Memory Contamination

Evaluators' ratings of eyewitness accuracy were significantly lower when concerns about memory contamination were raised (M = 3.43 SD = 1.87) compared to when they were not (M = 4.52, SD = 2.62), t(1517.38) = -6.20, p < .001, d = -0.43, 95% CI [-0.57, -0.29].

Identification Reliability

Evaluators' ratings of eyewitness accuracy were significantly lower when evaluators mentioned identification unreliability (M = 3.38, SD = 2.17) compared to when they did not (M = 4.47, SD = 2.57), t(1618.43) = -5.10, p < .001, d = -0.43, 95% CI [-0.60, -0.27].

CHAPTER 4

DISCUSSION

The primary goal of this study was to examine evaluators' sensitivity to different eyewitness variables, specifically system suspect-bias, estimator suspect-bias, and general impairment variables. Although I predicted a null effect of system suspect-bias variables, I found that evaluators rated eyewitnesses as significantly less accurate when they were exposed to a system suspect-bias variable compared to when they were not. More in line with my predictions, I found a similar effect for estimator suspect-bias and general impairment variables, such that evaluators rated eyewitnesses as significantly less accurate when they were exposed to estimator suspect-bias or general impairment variables compared to when no variable was present. Notably, these findings are distinct in magnitude, such that the differences in effect size of when a system suspect-bias (d = 0.74) compared to an estimator suspect-bias (d = 1.25), or a general impairment variable (d = 1.51) presence are quite substantial. Specifically, the effect size for general impairment variables was considerably larger than that of system and estimator suspect-bias variables. The effect of system suspect-bias variables was especially weak. This finding is inconsistent with Desmarais and Read (2011), who suggested that evaluators are adept at assessing system variables.

Also surprising was the finding that the effect of eyewitness variables on evaluators' ratings of eyewitness accuracy did not differ as a function of their endorsement of inaccurate memory beliefs or levels of trust in police. I am unsure as to why this was insignificant for inaccurate memory beliefs, but it is possible that holding inaccurate memory beliefs predicted what concepts evaluators mentioned in their ratings,

but this was not tested. For levels of police trust, it is possible no interaction appeared because the measures tapped the extent to which police hold similar values as our evaluators, rather than trust that the police would be unbiased and effective in their conduct. The current findings are preliminary however, and future studies should attempt to replicate these, potentially using a different measure of trust in police.

An additional goal of this study was to determine what concepts evaluators may raise when assessing eyewitness accuracy, and whether the presence of system suspect-bias, estimator suspect-bias, or general impairment variables would influence the concepts mentioned in evaluators' justifications. Consistent with my predictions, a system suspect-bias variable being present resulted in more concerns about procedural suggestion. This prediction originated from a previous finding that other system suspect-bias variables, like administrator influence, can lead to increase in ratings of procedural suggestion (Kulak & Smalarz, in prep.; Modjadidi & Kovera, 2018). However, those studies found an increase in procedural suggestion through a mediational model, which was not tested here. In any case, it seems evaluators are somewhat attuned to the presence of procedural suggestion when a system suspect-bias variable is present.

Additionally, I found that the presence of a system suspect-bias variable resulted in a sizable amount of mentions about memory strength. Although speculative, this could be in a similar vein to the direct effect of administrator influence on ratings of the eyewitnesses found in Kulak & Smalarz, (in prep.). Essentially, evaluators may perceive the suspect-specific bias of the system suspect-bias variables used in this study as informative of eyewitness accuracy. In turn, this may cause evaluators to mention the eyewitness's memory to be strong when a system suspect-bias variable is present.

However, this may also have been a result of, in the showup condition, the vignette states that the suspect was apprehended rather quickly. Although untested, this specific vignette may be a potential driving force behind this finding.

The next variable, estimator suspect-bias, led to a substantial number of concerns surrounding memory contamination, was partially consistent with my hypothesis. This finding is somewhat puzzling, as I did not find support that evaluators mentioned general identification unreliability as well when an estimator suspect-bias variable was present. I would assume that if evaluators believed that witnesses could be influenced by external sources, they would find identifications unreliable more generally. As for the final variable, the presence of a general impairment variable resulted in the largest number of concerns about memory weakness. This finding, paired with having the lowest ratings of eyewitness accuracy overall, suggests that evaluators might be the most concerned with generally impairing conditions on recall, despite no suspect-specific bias. Finally, the control condition led to a relatively even split between memory strength and weakness. A possible explanation for this might depend on general beliefs evaluators may hold for the reliability of memory, without any suspect-specific or generally impairing factors present. This could potentially explain why I found no significant interaction between evaluators' endorsement of beliefs about memory and their ratings of eyewitness accuracy, as they seem to be rather divided.

There are a few possible limitations present in this study. One potential limitation could involve interrater reliability. As mentioned previously, coding was performed by myself and another coder. Although both blind to condition and recruiting an independent third coder to resolve discrepancies, I coded the remaining data after 45% of the data was

agreed upon. This could be a potential concern as there was no additional checks for interrater reliability after the 45% mark.

Additionally, this study utilized a purely college student sample, therefore potentially hindering the ecological validity, or generalizability of these results to a larger, more diverse sample. However, some research suggests that college student samples and community members do not significantly differ in beliefs about eyewitness accuracy (Desmarais & Read, 2011; Kassin & Barndollar, 2001), even specifically beliefs about system and estimator variables (Desmarais & Read, 2011). Therefore, I do not exclude the possibility these two samples would be different, but I do not believe that difference would be significant. Although, I do believe a more diverse sample might have significant differences in memory beliefs and degrees of police trust that could influence their evaluations of eyewitness accuracy.

Finally, the current research did not test a mediation model involving the direct and indirect effects of system suspect-bias variables, like those found in Kulak and Smalarz (in prep) with administrator influence. However, I intend to test this as well as differential sensitivity to system suspect-bias, estimator suspect-bias, and general impairment variables in a between, rather than within-subjects design, with a larger sample. Future directions should focus on investigating potential routes for educating fact-finders about the issues surrounding suspect-bias, as well as how to handle evaluation of suspect-bias variables present in eyewitness evidence. Potentially, jury instructions could include information as to how better assess eyewitness evidence, especially if a system or estimator suspect-bias variable is present.

Suspect-bias variables are a critical threat to eyewitness reliability (Smalarz, 2021), but this study shows that evaluators seem to be more concerned with the presence of general impairment variables. Furthermore, evaluators seem to be less concerned with system suspect-bias compared to estimator suspect-bias. This is alarming, potentially producing detrimental effects on evaluations of eyewitness accuracy when a suspect-specific bias is present. Malcolm Alexander's case involved a poorly accessed system suspect-bias variable: repeated identification procedures (Innocence Project, 2021). From Alexander's case to this study, evaluators need to be informed as to how the suspect-specific, biasing nature of system and estimator suspect-bias variables can prove much more harmful to the reliability of eyewitness evidence than general impairment variables.

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APPENDIX A

CRIME VIGNETTES AND EYEWITNESS VARIABLES

Vignette	Crime
1	The witness reported that she was pumping gas at a gas station when she saw two men in the gas station parking lot beginning to get into a fight that turned physical. One man reached for a pocketknife, stabbed the other in the chest, then ran away down the street. The witness called 911, but the victim died before the paramedics reached the scene.
2	The witness was driving south on a major street when she pulled up to a large intersection. A pedestrian began to cross the street in front of her. She saw a car driving up quickly from behind in the lane next to her. Just before reaching the intersection, the car swerved to the side but ultimately struck the pedestrian, who was killed on impact. The driver fled the scene.
3	The witness was walking along a downtown street when she saw a man suspiciously looking into cars parked on the street. She stopped to watch the man, who suddenly broke one of the windows open and grab what looked like a laptop out of the car. He then walked quickly away in the opposite direction.
4	The witness stated that she was walking to the bus station when she heard a child crying from down an alleyway. The witness walked toward the alleyway and saw a man placing something inside of a dumpster and telling the child to “shut the **** up”. When the man saw her, he grabbed the child by the arm and quickly fled the scene. The witness walked down the alley and saw an automatic weapon in the dumpster. She called 911, who retrieved the weapon along with a large bag of narcotics.
5	The witness reported that she was arriving back at home when she saw a man climbing out of the window of her apartment. When the man saw her, he quickly ran away. The victim called the police and they arrived at the scene within minutes. When they escorted her inside, she discovered that all of her jewelry, cash, and passport had been stolen.
6	The witness was waiting for the city train in the early morning, where she saw a man and a woman in a verbal fight near the platform. The fight began to escalate, and the man started shouting and threatening the woman, though his words were very slurred. The woman shouted back and pointed her finger at the man, calling him a homeless drunk. She cursed at him and turned around as if to walk away, when suddenly the man pushed the woman down into the tracks below. The witness tried to call for help, but the train was arriving and fatally struck the woman. The man fled the platform.
7	A witness reported she was passing by a high school on her normal route to walk her dog when she saw a man spray painting graffiti on

	a wall on the side of the school gymnasium. When the man noticed the witness, he dashed off down the block and out of sight.
8	The witness reported that she was driving in her car when she saw smoke coming out of a small business building nearby. She drove up to the building and saw a man, who she said looked panicked, throw a gas canister aside and run away from the building. She tried to photograph the man while he ran by her car but was unable to get her phone in time. The woman called 911, but shortly thereafter, the building burst into flames and appeared to be completely destroyed.

Eyewitness Variable	**Set**	**Variable Type**	**Description**
Filler Similarity (Poor Fillers)	A	System Suspect-Bias	There was a man who had also witnessed the event. He and the other witness began talking with each other about what they saw while they were waiting for the police to arrive. They both agreed that the culprit was a short, younger man with brown hair, but the man said that the culprit's hair was parted on the left side and that the culprit had what looked like a birthmark below his eye. The female witness hadn't noticed the part in his hair and didn't remember seeing a birthmark. But when the witness was called to the police station to view a lineup a couple of weeks later, there was a lineup member who had a part in his hair and a birthmark below his eye. She picked him from the lineup.
Showup	A	System Suspect-Bias	The eyewitness told the police that the suspect was a young man wearing a dark green shirt. The police asked the witness to wait at the scene with a second officer while they patrolled the neighborhood. After about 15 minutes, the patrol officer returned with a man in the back seat of the car. They had the man get out of the car

			in front of the witness. He looked to be about 17 or 18 years old and was wearing a dark green shirt. The eyewitness identified him as the perpetrator.
Repeated Identification Procedures	B	System Suspect-Bias	One week after the crime, the police met the witness at her apartment to show her a photo lineup. The witness studied the lineup for a few minutes, but eventually she that said she didn't recognize anyone. A few days later, the police called the witness to the police station to show her a new photo lineup. The witness noticed that there was one lineup member who had been in the previous lineup that she saw. She identified him as the culprit.
Non-coincidental resemblance	B	System Suspect-Bias	The eyewitness worked with a sketch artist to create a composite sketch of what the culprit looked like. Upon viewing the completed composite sketch, one of the police officers thought that the sketch looked just like a man who lived in the neighborhood near where the crime was committed. The officer obtained a photo of this man and put it into a lineup alongside five people who did not look like the composite sketch. The witness viewed the lineup and identified the man who looked like the composite sketch.
Unconscious Transference	A	Estimator Suspect-Bias	When the eyewitness was brought in to identify the suspect, one member of the lineup looked familiar to the eyewitness, and the witness identified that person. The police learned that the person who the witness identified

			lived in the same apartment complex as the eyewitness, and that the eyewitness had likely crossed paths with this person on prior occasions. When the police asked the witness whether she recognized the person from the crime or from her apartment complex, she said she didn't remember seeing him at her complex and instead thought that he was the person who committed the crime.
Co-witness Contamination	A	Estimator Suspect-Bias	There was a man who had also witnessed the event. He and the other witness began talking with each other about what they saw while they were waiting for the police to arrive. They both agreed that the culprit was a short, younger man with brown hair, but the man said that the culprit's hair was parted on the left side and that the culprit had what looked like a birthmark below his eye. The female witness hadn't noticed the part in his hair and didn't remember seeing a birthmark. But when the witness was called to the police station to view a lineup a couple of weeks later, there was a lineup member who had a part in his hair and a birthmark below his eye. She picked him from the lineup.
Social Media Search	B	Estimator Suspect-Bias	The event took place in a fairly small town. The witness wanted to try to find the culprit herself by looking through social media. She went onto Facebook and started looking through profiles of people who were around the same age as the perpetrator. Eventually, she found the profile of a guy who seemed like he hung out

			with a rough crowd and looked a lot like the perpetrator. She called the police investigator and told him that she thought she knew who did it, and she gave them the guy's name.
Co-witness Influence	B	Estimator Suspect-Bias	There was a man who had also witnessed the event. A few days later, the police scheduled the witnesses to come to the police station separately to attempt identifications from a photo lineup. The man came in first. On his way out of the police station, he bumped into the other eyewitness, who had arrived early and was locking her car. He recognized her from the incident and asked her how she was doing. He told her that the police showed him a lineup with six people and that "the mother ****er was the fourth guy in there." When the witness went in to attempt the identification herself, the lineup had six people. Remembering what the other witness had said, she also selected #4.
Lighting	A	General Impairment	The witness was interviewed at the police station about what she witnessed. She said that she did not have a very clear view of the perpetrator because it was dark out and the perpetrator was not near a streetlight. A week later, the witness was called in to the police station to view a photo lineup. She identified the police suspect.
Disguise	A	General Impairment	The witness claimed she could only see the upper half of the culprit's face because he was wearing a facemask. The police recorded what she could

			remember of the culprit's appearance, and within a couple of days presented her with a photo lineup. She identified the police suspect.
Glasses	B	General Impairment	The witness was interviewed immediately at the scene. However, she claimed that she did could not see as clearly as normal because she had forgotten her glasses at home. The police obtained her description of the culprit, and a week later presented the witness with a photo lineup. She identified the police suspect.
Distance	B	General Impairment	The witness told the police that although she was at the scene, everything happened very quickly, and she did not think to look carefully at the perpetrator until "he was too far away to be sure." She described the culprit to the best of her ability, which was noted by the police. Three days later, the police presented the witness with a photo lineup, and she identified the police suspect.
No Information (1)	A	Control	The witness was interviewed about what she witnessed, and she provided a description of the culprit to the police. A week later, the witness was called in to the police station to view a photo lineup. She identified the police suspect.
No Information (2)	A	Control	After the incident, the witness described what she had seen to the police and told them everything she could remember about the culprit's appearance. A few days later, the police met her at her apartment and

			showed her a photo lineup. She identified the police suspect.
No Information (3)	B	Control	The witness was taken from the scene to the police station, where she provided a videotaped description of what she witnessed. Two days later, the police called her to come back to the station to view a photo lineup. She identified the police suspect.
No Information (4)	B	Control	When police arrived at the scene, they interviewed the witness about what she saw and what the culprit looked like. A couple of days later, the police met her at a local coffee shop to present her with a photo lineup. She identified the police suspect.

APPENDIX B

MEMORY BELIEFS AND POLICE TRUST SCALES

Participants reported agreement with 10 statements about memory's completeness, passivity, immutability, accuracy, permanence, and contaminability along 4-point Likert scales (1 = Strongly Disagree, 2 = Mostly Disagree, 3 = Mostly Agree, 4 = Strongly Agree, with a fifth option to respond "Don't Know"). There are 2 statements for each category, one consistent and one inconsistent with each belief. Consistent statements were reverse scored.

The first 10 items are from Simons and Chabris (2011); the last two were created by the author.

Completeness
The completeness of our memories can be affected by what we were attending to at the time of the event (R)
Our memory of an event provides us with a complete picture of what we saw happening

Passivity
When we witness an event, what we see can be shaped by our personal beliefs or biases (R)
Memory passively records exactly what we see in front of our eyes

Immutability
Memory is constantly being reconstructed and changed every time we remember something (R)
Recalling a memory is like replaying the same tape and having the same experience over again

Accuracy
Some of our memories turn out to be quite mistaken (R)
Human memory is generally highly accurate

Permanence
A memory can decay over time until that memory no longer exists (R)
Memory of everything experienced is stored permanently in the brain, even if we can't access all of it

Contaminability

Memory of an event can be altered or distorted after the memory has been formed (R)

Once you have experienced an event and formed a memory of it, that memory does not change

Assessment of participants' level of trust in the police using six items, rated on 4-point Likert scales ranging from 1 = Strongly Disagree to 4 = Strongly Agree:

Two items from Jackson et al. (2012):

1. The police usually act in ways that are consistent with my own ideas about right and wrong

2. The police usually stand up for values that are important for people like me

Four items from Tyler et al. (2014):

3. Overall, the police are honest

4. I have a great deal of respect for the police

5. I feel proud of the police

6. I feel that people should support the police

APPENDIX C

CODEBOOK FOR EVALUATOR'S RESPONSES

Explanations for Eyewitness Evaluations Codebook

Participants responded to 8 different vignettes, denoted by SB1-8. P# is the participant number. These explanations are why they gave an eyewitness the accuracy rating they did.
We will be coding all 8 responses across different positive and negative criteria:

Not Suggestive/Suggestive
Not suggestive: If the participant states that they believe the lineup was fair, or that they think the police/officer/administrator did a good job.

Suggestive: If the participant mentions anything about a lineup being unfair, something the police/officer/administrator did wrong or should have done differently, or if they believe the police/officer/administrator influenced or "tainted" the witness's identification.

Memory Strong/Weak
Memory Strong: Any mention the participant makes about the witness's memory being strong (but **not** how their memory was affected by others - that's memory contamination). Also, if participants believe the witness got a good look of the perpetrator. Also, temporal details, if the witness identified the suspect in a short period of time/immediately after the crime.

Memory Weak: Any mention the participant makes about the witness's memory being weak (but **not** how their memory was affected by others - that's memory contamination). Also, if participants do not believe the witness had a good look of the perpetrator (was too far away). Also, temporal details, if the witness identified the suspect after a long period of time after the crime.

Pristine/Contaminated
Pristine: If the participant believes the witness's memory was unaffected by external information.

Contaminated: If the participant mentions or believes the witness's memory was influenced in any way by external information.

ID Reliable/ID Unreliable
ID Reliable: General circumstances or statements the participant believes makes the witness's identification reliable without relating to the other above categories. Any beliefs that the witness's identification or eyewitness identifications in general are reliable. Do not mark this category if is redundant with any of the other categories.

ID Unreliable: General circumstances or statements not related to the above categories that the participant believes makes the witness's identification unreliable. Any beliefs that

the witness's identification or eyewitness identifications in general are unreliable. Do not mark this category if is redundant with any of the other categories.
--
Code: No: 0 Yes: 1 Unsure: 2 Irrelevant/No response/Nonsense:3
If the participant's explanation falls under suggestive only and none of the other categories, you would put a '1' under the suggestive column, and a '0' under the other columns.
For example:

Not Suggestive	Suggestive	Memory Strong	Memory Weak	Pristine	Contaminated	ID Reliable	ID Unreliable	Other Notes
0	1	0	0	0	0	0	0	0

A statement could fall under more than one category. If you are unsure about a statement, mark it with a '2'. If the participant responded with nonsense or "don't know," give them a '3'. In the other notes column, explain any statements you are unsure about.

APPENDIX D

IRB APPROVAL

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Laura Smalarz
NCIAS: Social and Behavioral Sciences, School of (SSBS)
-
Laura.Smalarz@asu.edu

Dear Laura Smalarz:

On 10/15/2020 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Evaluations of verbal and numerical eyewitness confidence in the context of estimator variables
Investigator:	Laura Smalarz
IRB ID:	STUDY00012728
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Confidence in Context IRB Protocol, Category: IRB Protocol; • Consent_Form_ConfidenceInContext, Category: Consent Form; • Crime_Vignettes_Stimuli_ConfidenceInContext, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Instructions_Questions_Measure_ConfidenceInContext, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • SONA_Recruitment_Material_ConfidenceInContext, Category: Recruitment Materials;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 10/15/2020.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

If any changes are made to the study, the IRB must be notified at research.integrity@asu.edu to determine if additional reviews/approvals are required. Changes may include but not limited to revisions to data collection, survey and/or interview questions, and vulnerable populations, etc.

Sincerely,

IRB Administrator

cc: Taylor Lebensfeld
Laura Smalarz
Taylor Lebensfeld