The Impact of Viewing Social Media Images on Eyewitness Identification

Emma D. Kruisselbrink[1], Ryan J. Fitzgerald[1], & Daniel M. Bernstein[2]

[1] Department of Psychology, Simon Fraser University

[2] Department of Psychology, Kwantlen Polytechnic University

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Author Note

The study's design and hypotheses were preregistered; see https://aspredicted.org/23gv8.pdf and https://aspredicted.org/fz3h6.pdf

Data are publicly available at https://osf.io/sz3yt/?view_only=fdfb998f5c834a65aecea0943f73c220

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Correspondence concerning this article should be addressed to Emma D. Kruisselbrink, Simon Fraser University, 8888 University Drive, Burnaby B.C., V5A 1S6. Email: emma_kruisselbrink@sfu.ca

Abstract

After observing a crime, eyewitnesses may conduct their own investigation on social media to search for the perpetrator. In two experiments, participants viewed an image of an innocent suspect in the time between viewing a mock-crime video and completing a lineup procedure. The image was presented in the context of a social media search or a police mugbook viewing. A control group viewed no photos of innocent people before the lineup. The same images were used in the mugbook and social media conditions, but the social media profiles were designed so that the innocent suspect stood out as the only person who had mutual friends with the participant. In both experiments, the innocent suspect was more likely to be mistakenly identified if they were previously viewed on social media relative to the control condition. The mugshot viewing also increased innocent suspect identifications, but only after the plausibility of the innocent suspect was increased in Experiment 2. Relative to the control condition, participants who viewed either a mugbook or social media had lower accuracy when they identified the suspect with high confidence. These findings indicate that viewing images of innocent people can contaminate the memory of eyewitnesses, influence identifications at a subsequent lineup procedure, and undermine the eyewitness confidence-accuracy relation.

Keywords: Eyewitness; Mugbook; Social media; Repeated identifications; Misinformation

The Impact of Viewing Social Media Images on Eyewitness Identification

Social media makes it possible for eyewitnesses of crimes to search online for images of the perpetrator. These searches could have implications for any subsequent attempt to identify the perpetrator at a police lineup. Social media exposure is a type of post-event information, and its effects may resemble those in other well established post-event information paradigms (e.g., the misinformation paradigm; see Loftus, 1979; Roediger et al., 2001). Perhaps most analogous to social media searches is the mugshot exposure effect, which is when eyewitnesses who have previously viewed a mugshot of an innocent suspect are more likely to mistakenly identify the suspect at a subsequent lineup procedure (Brown et al., 1977; Deffenbacher et al., 2006). Recent research suggests that searching social media can have similar effects (Elphick et al., 2021; Havard et al., 2021; Kleider-Offut et al., 2021), but the relative risks posed by social media and mugshot images have never been directly compared. In the present research, we report two experiments examining whether a common feature of social media – the mutual friends indicator – has the potential to cause even greater risk of misidentification for an innocent suspect.

Contamination of Eyewitness Memory

If an eyewitness has been exposed to an innocent suspect prior to a lineup, there is an increased risk that the witness will mistakenly identify the suspect when they are seen again in the lineup. The risk of contamination from previously viewed images on eyewitness lineup identifications has been empirically demonstrated on numerous occasions including using mugshots (Deffenbacher et al., 2006), showups (Lawson & Dysart, 2014; Valentine et al., 2012), and repeated lineup procedures (Steblay et al., 2013). Memory contamination also alters the relationship between confidence and accuracy for suspect identifications. Even if the conditions of a lineup procedure are pristine, previous exposure to a suspect can increase a witness's

confidence in their identification, making a high-confidence judgement unreliable (Wixted & Wells, 2017).

Mugbook searches are one potential source of contamination in criminal cases. After observing a crime, witnesses may be asked to view mugbooks containing large numbers of mugshots, often of people arrested for similar crimes. The purpose of a mugbook search is to assist police in identifying potential suspects. Mugbook viewings can create leads and guide an investigation, but they can also compromise the reliability of subsequent lineup identifications. If an eyewitness views an innocent person in a mugbook and the police show the same person again to the witness in a perpetrator-absent lineup, the innocent person faces an increased risk of being mistakenly identified at the lineup (Deffenbacher et al., 2006; Dysart et al., 2001; Memon et al., 2002). Identifying an innocent suspect at a mugbook and then identifying them again in a lineup is known a *commitment effect* (Gorenstein & Ellsworth, 1980; Schreiber & Sergent, 1998). Even if the mugshot is not identified by the eyewitness at the mugbook viewing, the mere exposure to the mugshot can increase the likelihood that it will be chosen at a subsequent lineup (Loftus, 1976), which is known as a *familiarity effect* (Goodsell et al., 2015).

Social media searches are another potential source of contamination, and it is becoming increasingly common for eyewitnesses to identify the suspect for the first time by finding their image on social media (Federal/Provincial/Territorial Heads of Prosecutions Subcommittee on the Prevention of Wrongful Convictions, 2018). Social media searches can take a variety of forms, such as entering a name overheard at a crime scene or searching lists of “friends” of known people at the crime scene (Wells et al., 2020). When the eyewitness finds someone on social media, they may be asked to confirm the identification to provide legal evidence. For instance, eyewitnesses have identified defendants on the Facebook social media platform before

making a subsequent identification at pretrial lineup procedures (e.g., *R v. McCullough,* 2011) or during in-court identifications (e.g., *R v. Mohamed*, 2014). The problem with these confirmatory identifications, however, is that it is unclear if the suspect is familiar from the crime or from the social media viewing.

Although the experimental literature on social media contamination on lineup decisions is limited, the existing evidence suggests that the mugshot exposure effect generalizes to the context of social media searches. In one study, viewing an innocent suspect on Twitter significantly increased mistaken identifications of the innocent suspect at a subsequent lineup (Kleider-Offut et al., 2021). In two additional studies, mistaken lineup identifications of innocent suspects also increased after viewing them on social media (25% increase in Elphick et al., 2021; 15% increase in Havard et al., 2021). Although the increases were not significant relative to controls in the latter two studies, the trends are consistent with the expectation that viewing images of an innocent suspect on social media would have the same contaminating effect as viewing mugshots.

The New Jersey Supreme Court considered the issue of eyewitnesses having previous exposure to online images in *State v. Chen* (2011). Cecilia Chen was accused of attacking her ex-boyfriend's current spouse. Shortly after the attack, the ex-boyfriend showed the victim pictures of Chen on a website and told the victim Chen might be the culprit. The victim revisited the images of Chen on numerous occasions prior to identifying her from a police-administered photo lineup. The police intentionally delayed administering the photo lineup for over a year, in the hopes that this would somehow reduce the contamination caused by the previously viewed images of Chen. The New Jersey Supreme Court was unpersuaded by this measure, however, noting that "[t]he delay may not have cleared any taint; plus memories simply do not improve

over time" (para 944).

In the *Chen* decision, the New Jersey Supreme Court distinguished between the suggestion from the ex-boyfriend – who is not a state actor – and suggestion that comes from the police. Chen is the companion case to *State v. Henderson* (2011), which set out a framework of pretrial hearings to decide the admissibility of eyewitness identifications in cases with evidence of "suggestive" police conduct during identification procedure. One purpose of the pretrial hearings is to deter suggestive conduct by the police. Police want evidence to be admitted and thus would aim to be nonsuggestive during the identification procedure to avoid the risk of a hearing. In *Chen,* the Court noted that hearings would not have a deterrence effect on non-state actors. Accordingly, for cases involving suggestion from a non-state actors, they modified the *Henderson* framework to only require a pretrial hearing if there was evidence of conduct that would be "highly suggestive." Even with this high threshold of suggestiveness, the Court ruled that a hearing would be necessary to evaluate whether the victim's identification of Celia Chen was reliable.

Suggestion During Contamination

The potential for contamination from exposure to social media images could be increased if certain images are suggested to the witness. Even if no one else is present to direct the witness toward a particular individual, images could be presented alongside built-in social media features that cause certain individuals to stand out from the others. Social media platforms commonly associate images with information that could have a biasing effect, such as the person's name, location, and mutual friends. This conceptually resembles lineup bias, in which an innocent suspect is more likely to be misidentified if they stand out in a lineup (e.g., Lindsay et al., 1987; Luus & Wells, 1991; Steblay & Wells, 2020). In a photo lineup, variations in how the suspect's

photo is presented can make them stand out from the fillers (Buckhout et al., 1975). For example, Marvin Anderson was mistakenly identified from a photo lineup that included black-and-white images of fillers and a color image of Anderson (Innocence Project, 2022). In the present research, we tested whether singling out a social media profile as the only one with the mutual friend indicator has the potential to be suggestive and amplify the risk of contamination.

Davis and Loftus (2012) characterize social media to be like a mugbook that is essentially limitless, with increased potential for suggestion. Unlike mugbook viewings, which are under the purview of the police and can include safeguards to avoid suggestion, social media searches are unsupervised. This could increase the risk of suspect-specific bias variables, which draw attention to a specific person and increase the likelihood that they will be chosen at an identification procedure (Smalarz, 2021; Wells & Olson, 2001). For example, similar to what happened in *Chen*, a witness may be directed by others to a potential suspect (Davis & Loftus, 2012). In turn, this could lead the witness to expect that the person in the profile will be the perpetrator and increase the risk of them being identified. Mugbooks would also not normally include names or information about known associates, which are often available on social media.

Although mugbook viewings can be structured to minimize the risk of suspect bias variables, they nonetheless pose a risk of contaminating the memory of the eyewitness and leading to mistaken identifications. The main advantage of mugbooks over social media viewings is that they are administered by law enforcement and policies can be implemented to reduce the risk of suggestion. For example, it could be required that the person administering the mugbook viewing be otherwise uninvolved in the investigation. Even with such a precaution, however, witnesses may expect that the perpetrator will be present if they know that a mugbook contains people who have committed similar crimes. This expectation alone would not direct

attention to a specific suspect, but unlike lineups – which can be designed to include known innocent fillers who are not at risk of wrongful conviction – everyone in a mugbook is a potential suspect. Therefore, any mistaken identification at a mugbook poses a risk of leading to a wrongful conviction.

The Current Studies

In two experiments, we tested whether the mutual friends feature on social media would be suggestive of a potential suspect and cause even greater memory contamination than mugshot exposure. Based on the existing research on social media identifications (Elphick et al., 2021; Havard et al., 2021; Kleider-Offut et al., 2021), there is no evidence that social media exposure affects identification decisions any differently than mugshot exposure does. However, social media and mugshot viewings were not directly compared in any of the previously published experiments. In the existing literature, there also has been no consideration of the potential for a social-media-specific bias caused by a suggestion of mutual friends.

There are numerous reasons that mutual friends, a common feature of social media, could direct an eyewitness to a potential suspect. If a friend of the witness thinks they know the perpetrator, then it would be reasonable for an eyewitness to similarly conclude that they would likely also have mutual social media connections. Alternatively, if the witness knows a person who was present at the crime scene and this person is “friends” on social media with someone who matches the description of the perpetrator, the witness may interpret the friend status as a signal that the person who matches the description is indeed the perpetrator. Finally, if a social media search yields a list of profiles and mutual friends is indicated for only one of those profiles, that profile could stand out to the witness because it is different from all the others. In both experiments, we test a scenario in which a profile of an innocent person stands out on social

media as the only one with mutual friends.

Experiment 1

Participants viewed no images, mugbook images, or social media images in the form of Facebook profiles. The mugbook and Facebook profiles were perpetrator-absent and contained an innocent person who matched a general description of the perpetrator. In the social media condition, participants were under the impression that they had a friend who knew the perpetrator, and the innocent suspect was then the only Facebook profile that depicted mutual friends. Following a short delay, participants completed a perpetrator-present lineup or a perpetrator-absent lineup. The perpetrator-absent lineup included the person from the mugbook or Facebook profile who matched the perpetrator's description. This person was designated to be the innocent suspect in perpetrator-absent lineups.

Empirical research is limited on the question of what happens when the lineup includes the perpetrator and does not include the previously viewed image, but misinformation studies show that accuracy can remain unaffected when participants do not have the option to select the misleading post-event information and instead are given a memory test that includes a target detail and an unfamiliar lure (McCloskey & Zaragoza, 1985). If mugshots and social media images work similarly to other types of misinformation, participants with a good memory might be able to identify the perpetrator even after having their memory contaminated by a mugshot or social media image. Alternatively, the innocent suspect's image could replace the participant's memory of the perpetrator (Loftus & Loftus, 1980) or result in the two identities blending together (Goodsell et al., 2015; Perfect & Harris, 2003).

We pre-registered three hypotheses (https://aspredicted.org/23gv8.pdf) before collecting the data:

1) In perpetrator-absent lineups, there will be more mistaken identifications of the innocent suspect in the social media condition than in the mugbook and control conditions.
2) In perpetrator-absent lineups, there will be more mistaken identifications of the innocent suspect in the mugbook condition than in the control condition.
3) In perpetrator-present lineups, there will be more correct identifications in the control condition than in both the social media and mugbook conditions[1].

Method

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. Approval for the study was obtained from a university Institutional Review Board.

Participants

Power analysis was conducted using Brant's online calculator (Brant, n.d.), with the aim to achieve .80 power to detect differences in innocent suspect identifications between the social media and mugbook exposure groups. For a small-to-medium-sized effect (Cohen's $h = 0.35$), it was estimated that 101 participants per group were required.

A total of 756 participants were recruited through a psychology department participant pool and Amazon Mechanical Turk (MTurk). For participants who completed the study multiple times ($n = 34$), only their first response was retained. All additional responses were removed. Ninety-four participants were removed for failing the attention check ($n = 20$), reporting video problems ($n = 8$), withdrawing at the reconsent portion ($n = 7$), or providing partial data ($n = 59$).

[1] In the pre-registration there was an error in the directionality of the perpetrator-present hypothesis. Our intent was to hypothesize that, consistent with previous research (Elphick et al., 2021; Kleider-Offutt et al., 2021), correct identifications would be lower in the social media and mugbook conditions than in the control condition. However, the pre-registration mistakenly includes a prediction that correct identifications would be higher in the social media and mugbook conditions than in the control condition. As can be seen in the Results, there were no differences in correct identifications across these conditions.

The final sample comprised 662 participants: 266 university students and 396 MTurk workers. University students were awarded partial course credit. MTurk workers received $3 compensation. The university student sample had an average age of 19.25 years (*SD* = 2.29) and included 187 females, 73 males, 3 non-binary participants, and 3 participants who preferred not to indicate gender. Most students identified as White (26.1%), South Asian (18.8%), or Chinese (17.8%). MTurk workers had an average age of 39.07 years (*SD* = 11.49), and included 155 females, 237 males, 1 non-binary participant, and 2 participants who did not indicate gender. The majority of MTurk participants identified as White (64.1%).

Design

A 2 (Lineup type: perpetrator-absent, perpetrator-present) × 3 (Exposure: social media, mugbook, control) between-subjects design was used. The critical outcome variable was suspect identifications.

Materials

Videos. Crime videos were created for two perpetrators (both White males, aged 17-18). Multiple perpetrators were used, as recommended by Wells and Windschitl (1999), to improve construct validity and increase generalizability. The video depicted a car robbery that lasted approximately 30 s, with the perpetrator's face visible for approximately 7 s. The perpetrator first pulls on the locked handle of the driver's side door, walks in front of the car, and then opens the unlocked car door on the passenger side of the vehicle, takes a wallet from the glove box, then opens the door to the backseat of the car and takes a backpack. The crime videos are available at https://osf.io/sz3yt/?view_only=fdfb998f5c834a65aecea0943f73c220

Social Media Profiles. A total of 49 fake social media profiles were created. Two of the profiles depicted an innocent suspect. The perpetrators were paired so that the second perpetrator

served as the innocent suspect for the first perpetrator, and vice versa. Our aim was for the innocent suspect to be a plausible replacement for the perpetrator. However, we did not measure similarity between the two perpetrators, and the results indicate that there were other plausible choices in the social media and mugbook tasks.

The remaining 47 profiles functioned as fillers. Images for the filler profiles were obtained by searching online for headshots. Fillers were not matched to the perpetrator or the innocent suspect in terms of appearance, except that fillers were always the same sex as the perpetrator. Additional criteria included a neutral facial expression, street-style clothing (e.g., no suits), and a dissimilar appearance to both perpetrators (e.g., different skin tone or different hair color/style, etc.). Race varied among the profiles and included White, Black, Asian, and Hispanic individuals. In all images only the head and shoulders were visible.

Profiles were organized to resemble the results of a Facebook search. Four pages with twelve profiles per page were presented, for a total of 48 profiles. All profiles had the name "Mark Smith." The first profile in the Facebook search results was the innocent suspect. The innocent suspect's profile indicated participants had five mutual friends with them. The purpose of this was to lead participants to the innocent suspect, alerting them to the possibility that he could be the perpetrator. The remaining profiles indicated no mutual friends. Participants were able to click on a profile in the search result to see a larger image of the profile. See the Supplemental Materials for profile and mugshot examples.

Mugbook. A mugbook was created using the same innocent suspect and filler images used for the social media profiles. Mugbooks consisted of 48 images total, with 12 images presented per page. To match the social media condition, the innocent suspect was the first image presented in the mugbook. Participants were able to click on a mugshot to see a larger

image of the person.

Lineups. The lineups comprised six images simultaneously presented in a 2 × 3 array. Perpetrator-present lineups consisted of the perpetrator and five fillers, and perpetrator-absent lineups consisted of the innocent suspect and five fillers. Perpetrator presence in the lineup was manipulated using the single lineup paradigm (Oriet & Fitzgerald, 2018), as shown in Table 1. The placement of the perpetrator and innocent suspect in lineups was counterbalanced across all six lineup positions.

To select lineup fillers, 10 participants provided descriptions of the perpetrator. Images of people with neutral facial expressions who matched the perpetrator descriptions were then found online. A pilot study was conducted with 222 participants to test the fairness of the lineups. These pilot participants did not complete the main study. Participants viewed one of the two videos and then completed a 6-member perpetrator-absent lineup in which participants were required to pick someone from the lineup. The number of plausible lineup members, also known as the lineup's effective size, is represented by the statistic, *E* (Tredoux, 1998; Malpass, 1981). *E* is a widely used lineup fairness estimate that can be computed from the distribution of choices across the lineup members. It ranges from 1 (biased lineup) to 6 (completely fair lineup) for 6-member lineups. Rather than the common practice of providing a description of the perpetrator to mock-witnesses, participants were witnesses with a memory of the perpetrator. This avoids issues with the more conventional practice of providing a description of the perpetrator to nonwitnesses and gives a more direct measure of effective size (Quigley-McBride & Wells, 2021). Lineups for both perpetrators had *E* values between 4.6-4.7, indicating that lineups were fair and had between 4 and 5 plausible lineup members. The breakdown of identifications to determine lineup fairness can be found in the Supplemental Materials.

Table 1

Counterbalancing of Crime Videos, Mugshot/Social Media Photos, and Lineup Suspects

Stimulus Set	Video	Social Media/Mugbook	Perpetrator-Present Lineup	Perpetrator-Absent Lineup
1	Perpetrator A	Perpetrator B	Perpetrator A (suspect) + Fillers matched to Perpetrator A	Perpetrator B (suspect) + Fillers matched to Perpetrator B
2	Perpetrator B	Perpetrator A	Perpetrator B (suspect) + Fillers matched to Perpetrator B	Perpetrator A (suspect) + Fillers matched to Perpetrator A

Demographics. Participants completed a demographic questionnaire that asked about their age, gender, and ethnicity.

Distractor Tasks. Three distractor tasks were used to separate the crime video and the Facebook/mugbook image viewings: classifying items as nonverbal behavior (e.g., vocal pitch, clothing, facial expressions, posture, etc.), completing the Nonverbal Immediacy Scale (e.g., "I use my hands and arms to gesture while talking to people," Richmond et al., 2003), and completing simple math problems. A sudoku puzzle was used to separate the image viewings and the lineup.

Procedure

Undergraduate Students. Participants completed the study using the online survey platform, Qualtrics. The study was advertised as a nonverbal behavior study, with the purpose of measuring the reliability of the Nonverbal Immediacy Scale. Participants provided consent and were randomly assigned to one of the six experimental conditions in the 2 (Lineup type: perpetrator-present, perpetrator-absent lineup) × 3 (Exposure: social media, mugbook, or control)

design. Before viewing one of the two crime videos, participants were told the video would be unrelated to the nonverbal behavior tasks. Given that the study was conducted remotely in an unsupervised environment, we wanted to ensure that participants did not skip the crime video. To check if participants watched the full video, there was an attention check at the end of the video. Following Tupper et al. (2018), a white circle was shown with the caption "this is a white circle, please remember this circle as you will be asked about it later" for the last seven seconds of all videos. Participants were then asked what shape was shown at the end of the video and were excluded from data analysis if they answered incorrectly. Following the attention check question, participants completed the distractor task for seven minutes. After the distractor task, participants were informed that the study purpose was to examine eyewitness identifications and that the video from the beginning of the study was a non-violent crime to which they were an eyewitness. Participants then received the option to reconsent and continue with the study or withdraw without penalty.

After reconsenting, participants in the social media condition were informed that the name Mark Smith was overheard at the robbery, and that one of their friends thinks they know Mark Smith. Participants then viewed the Facebook search results for that name. In the mugbook condition participants were told that the police thought the perpetrator could be in a mugbook of people who had committed similar crimes. In both conditions, participants were instructed that if they see the perpetrator they should take note of his position as they would be asked about it later. Participants in the control group did not complete any intervening image-viewing task.

None of the Facebook profiles or mugshots contained the perpetrator. Participants were given as much time as needed and could go back and view profiles or mugshots multiple times. Participants were not given the option to skip pages. The button to proceed to the next page of

the search tasks was hidden until the participant had been on the page for three seconds. After viewing the fourth page of mugshot or social media images, participants were asked if the perpetrator was present in the images. The question was open-ended and participants reported their decision by typing what position they thought the perpetrator was in or reporting that the perpetrator was not present (see the Supplemental Materials for exact instructions). Participants were able to go back and look through the Facebook or mugbook images again before reporting their final answer. Following the completion of the Facebook and mugbook tasks, or immediately after reconsenting in the control condition, another 7-minute distractor task commenced in which participants could complete a sudoku puzzle or take a break.

After the second distractor task participants viewed a 6-member lineup. Half the participants viewed perpetrator-absent lineups, and half viewed perpetrator-present lineups. Participants were told that the perpetrator may or may not be in the lineup, and to click on the image of the perpetrator if the perpetrator was present or to indicate that the perpetrator was absent by selecting “not present”. Following their decision, they rated their confidence on a 11-point scale, ranging from 0% to 100% in 10-point increments. Finally, participants reported demographic information and then were debriefed.

MTurk Participants. After collecting as many participants as possible from the university participant pool before the end of term, the sample was 400 participants short of the target sample size, so the remaining participants were recruited from MTurk. Prior to launching the full study on MTurk, a pilot study (N = 58) was conducted. In this pilot test, which used the same procedure as the university sample, overall correct identification rates were at chance levels. Accordingly, a second pilot test (N = 20) was conducted in which the two distractor tasks were decreased from 7 minutes to 3 minutes. This increased correct identification rates above

chance. As such, to avoid a floor effect, the two distractor tasks were decreased from 7 minutes to 3 minutes for the MTurk sample. Pilot study data were excluded from the analyses (for results of the Pilot Studies, see Supplemental Materials). Other than distractor task length, the procedure for MTurk workers was the same as for undergraduate students.

Data are publicly available at https://osf.io/sz3yt/?view_only=fdfb998f5c834a65aecea0943f73c220

Results

Hypothesis Tests

Table 2 shows the percentage of responses in each category for both perpetrator-present and perpetrator-absent lineups. When the perpetrator was absent from the lineup, a 3 (Exposure: control, social media, mugbook) × 3 (Decision: suspect, filler, no identification) loglinear analysis revealed an effect of exposure on lineup decisions, χ^2 (4, N = 330) = 25.29, p < .001, V = .20. Specifically, there was an effect of exposure on innocent suspect identifications. Follow-up pairwise analyses showed that mistaken identifications of the innocent suspect were higher after social media exposure than after mugbook exposure, z = 3.80, p < .001, OR = 5.25, 95% CI [2.05, 13.45], and no exposure, z = 3.85, p < .001, OR = 5.45, 95% CI [2.13, 13.95], supporting our first hypothesis. Contrary to our second hypothesis, the innocent suspect identification rate did not significantly differ between mugbook and control conditions, z = 0.06, p = .944, OR = 1.04, 95% CI [0.32, 3.32]. The only other significant difference was for filler identifications: participants in the control group made more filler identifications than participants who viewed social media, z = 2.27, p = .026, OR = 1.99, 95% CI [1.08, 3.65].

A 3 (Exposure: control, social media, mugbook) × 3 (Decision: suspect, filler, no identification) loglinear analysis was conducted for perpetrator-present lineups. Contrary to our

third hypothesis, the analysis revealed no effect of exposure on lineup decisions, χ^2 (4, N = 332) = 3.38, p = .496, V = .07.

Table 2

Identification Decisions (%) from Perpetrator-Present and Perpetrator-Absent Lineups

Experiment	Perpetrator	Exposure Condition	Suspect	Filler	No Identification
1	Present	Control	32.2 (38)	38.1 (45)	29.7 (35)
		Social Media	34.0 (35)	30.1 (31)	35.9 (37)
		Mugbook	28.8 (32)	31.5 (35)	39.6 (44)
	Absent	Control	5.2 (6)	34.8 (40)	60.0 (69)
		Social Media	23.1 (24)	21.2 (22)	55.8 (58)
		Mugbook	5.4 (6)	27.9 (31)	66.7 (74)
2	Present	Control	64.2 (129)	17.9 (36)	17.9 (36)
		Social Media	49.2 (98)	22.1 (44)	28.6 (57)
		Mugbook	51.3 (102)	24.1 (48)	24.6 (49)
	Absent	Control	4.0 (8)	51.5 (102)	44.4 (88)
		Social Media	38.8 (76)	31.6 (62)	29.6 (58)
		Mugbook	33.5 (69)	35.9 (74)	30.6 (63)

Note. Frequencies in parentheses. The suspect in perpetrator-present lineups was the perpetrator, whereas the suspect in perpetrator-absent lineups was the innocent suspect.

Exploratory Analyses

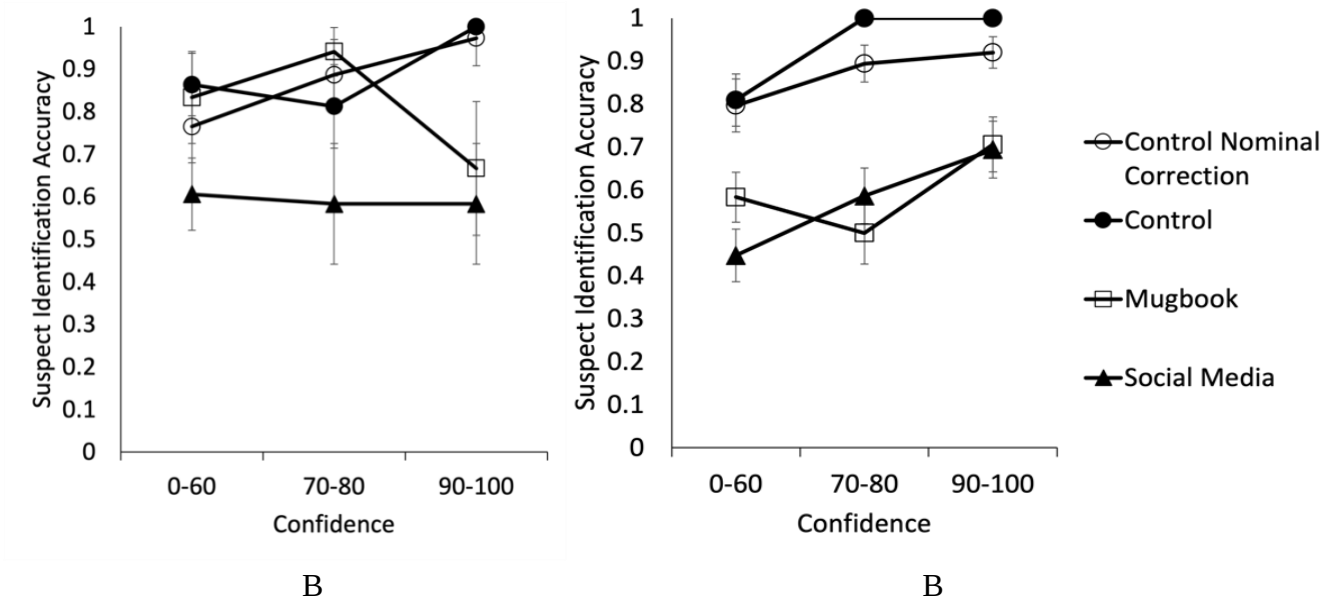
Sample Differences. We checked if the results differed between the undergraduate and MTurk samples. For perpetrator-present lineups, MTurk participants were worse than university students at correctly identifying the perpetrator (25% vs. 42% respectively). Particularly, correct identifications were low for Perpetrator B on MTurk. A breakdown of identification decisions for each perpetrator for MTurk and university students can be found in the Supplemental Materials.

Confidence. A confidence-accuracy characteristic (CAC) curve is depicted in Figure 1 to show suspect identification accuracy at a given level of eyewitness confidence (Mickes, 2015). Accuracy was calculated by dividing the perpetrator identification frequency by the sum of perpetrator and innocent suspect identification frequencies. Designated innocent suspect identifications were used to calculate accuracy for all conditions. For the control condition, we also estimated the innocent suspect identification rate by dividing the overall mistaken identification rate in perpetrator-absent lineups by the nominal size of the lineup. To increase the stability of the suspect identification accuracy estimates, responses to the 11-point confidence scale were binned into categories of low (0-60%), moderate (70-80%), and high confidence (90-100%). Identification frequencies for each level of confidence can be found in the Supplemental Materials.

The CAC in Figure 1A shows that high confidence identifications were only indicative of high accuracy in the control condition. In the control condition, suspects identified with 90-100% confidence were 100% accurate. By contrast, suspects identified with 90-100% confidence were only 58% accurate in the social media condition and only 67% accurate in the mugbook condition. Irrespective of confidence, suspect identification accuracy in the social media condition was generally low and suspect identification accuracy in the control condition was generally high. In the mugbook condition, confidence was inversely related to accuracy, such that suspects identified with low and moderate confidence were more accurate than suspects identified with high confidence.

Figure 1

Confidence-Accuracy Characteristic



B B

Note. Panel A is Experiment 1 data. Panel B is Experiment 2 data. Innocent suspect identifications in "Control Nominal Correction" are estimated by dividing the overall error rate in culprit-absent lineups by the number of lineup members. Innocent suspect identifications in "Control" are designated innocent suspect identifications.

Social Media and Mugbook Decisions. Table 3 reports decisions in the initial social media and mugbook tasks. More participants selected the innocent suspect on social media than in the mugbook, $z = 2.89$, $p = .004$, $OR = 2.29$, 95% CI [1.30, 4.04].

Table 3

Decisions (%) in the Social Media and Mugbook Tasks

Experiment	Exposure Task	Suspect	Filler	No Identification	Unclear
1	Social Media	19.3 (40)	29.0 (60)	45.9 (95)	5.8 (12)
	Mugbook	9.5 (21)	33.8 (75)	50 (111)	6.3 (14)
2	Social Media	32.9 (130)	25.1 (99)	41.5 (164)	0.5 (2)
	Mugbook	32.6 (132)	20.5 (83)	46.7 (189)	0.2 (1)

Note. Frequencies in parentheses. Unclear accounts for decisions in which the participant did not specify the person they identified (e.g., "on the first page", "I think so, I am not confident"). One

participant in the mugbook condition in Experiment 1 (0.5%) made no decision.

Commitment and Familiarity Effects. Table 4 shows the breakdown of lineup choices as a function of social media and mugbook choices. If the participant chose the innocent suspect at the social media or mugbook viewing and then identified them again at the lineup, it was interpreted as commitment. If the innocent suspect identified the innocent suspect at the lineup but did not initially choose them at the social media or mugbook viewing, it was interpreted as a familiarity effect.

In the social media condition, commitment to the innocent suspect was evident. Of the participants who chose the innocent suspect from social media, 66.7% chose them again at the lineup. This is significantly greater than the 9.7% of participants who chose the suspect at the lineup after either identifying a filler or making no identification on social media, $z = 5.46$, $p < .001$, $OR = 18.57$, 95% CI [5.87, 58.80].

Familiarity effects in the social media condition were less evident. Recall that 9.7% of participants who did not choose the innocent suspect on social media later identified the innocent suspect at the lineup. This is not significantly different from the suspect identification rate for control participants (5.2%), who had no familiarity with the innocent suspect, $z = 1.10$, $p = .271$, $OR = 1.95$, 95% CI [0.63, 6.07]. Instead, most participants who either identified a filler on social media or did not choose on social media opted to reject the lineup containing the previously seen innocent suspect.

Due to low sample size, we could not meaningfully assess commitment and familiarity effects in the mugbook condition. The low sample size was partly because participants were randomly assigned to receive a perpetrator-present or -absent lineup before they made a choice from the mugbook, and only five of the 21 participants who chose the innocent suspect from the

mugbook were assigned to the perpetrator-absent lineup. By comparison, 24 of the 40 participants who chose the innocent suspect from social media were assigned to the perpetrator-absent lineup.

Table 4

Social Media/Mugbook Choice and Perpetrator-Absent Lineup Choices (%)

Experiment	Exposure Condition	Exposure Choice	Lineup Choice		
			Suspect	Filler	No Identification
1	Social Media	Suspect	66.7 (16)	16.7 (4)	16.7 (4)
		Filler	7.1 (2)	25.0 (7)	67.9 (19)
		No Identification	11.4 (5)	11.4 (5)	77.3 (34)
	Mugbook	Suspect	40.0 (2)	20.0 (1)	40.0 (2)
		Filler	2.4 (1)	22.0 (9)	75.6 (31)
		No Identification	3.4 (2)	33.9 (20)	62.7 (37)
2	Social Media	Suspect	75.4 (49)	20.0 (13)	4.6 (3)
		Filler	30.6 (15)	28.6 (14)	40.8 (20)
		No Identification	13.6 (11)	43.2 (35)	43.2 (35)
	Mugbook	Suspect	81.2 (56)	11.6 (8)	7.2 (5)
		Filler	16.7 (7)	45.2 (19)	38.1 (16)
		No Identification	5.3 (5)	50.0 (47)	44.7 (42)

Note. Frequencies in parentheses. Participants who made unclear decisions in the social media/mugbook task were excluded.

Discussion

In Experiment 1, participants were told that a friend might know the perpetrator, and the presence of mutual friends was used to direct participants to the profile of an innocent person. Consistent with Hypothesis 1, this innocent person was significantly more likely to be misidentified from a lineup by participants who viewed social media under these suggestive conditions compared with participants who viewed mugshots or viewed no post-event images. The odds of identifying the innocent suspect from the perpetrator-absent lineup following social

media exposure were five times higher than the odds for participants who viewed mugshots or viewed no images.

Despite mugshot exposure having a negative impact on eyewitness identification in previous literature (e.g., Dysart et al., 2001; Goodsell et al., 2009; Memon et al., 2002), we found no differences in identifications of the innocent suspect between the control and mugbook conditions. This finding was not in line with Hypothesis 2. A possible explanation is that only a limited number of participants identified the innocent suspect during the mugbook task due to the innocent suspect being an implausible replacement. Additionally, only five of these participants were assigned to view a perpetrator-absent lineup, which limited the opportunity for commitment in the mugbook condition.

Contrary to Hypothesis 3, correct identifications were unaffected by exposure to the innocent suspect in the social media and mugbook tasks. This finding is inconsistent with the memory blending/replacement account and suggests that accessibility to the original memory of the perpetrator was unaffected by image viewings. However, this does not preclude the possibility of memory replacement under different conditions. Indeed, under different experimental conditions, viewing social media images has led to reductions in correct identifications at subsequent lineups (Elphick et al., 2021; Kleider-Offutt et al., 2021).

Social media exposure had the greatest impact when the participant selected the innocent suspect at the social media viewing and there was potential for commitment at the lineup. The odds of participants making a commitment error were 18 times higher than the odds of making a familiarity error. The absence of familiarity effects could have been the result of using innocent suspects who were not easily confused with the perpetrators. Lineup identifications of the innocent suspect in the control condition were relatively low (5%), and much lower than what

has typically been found in mugbook research (~20%; e.g., Blunt & McAllister, 2009; Lindsay et al., 1994; Memon et al., 2002). Although we did not explicitly measure the similarity of the perpetrators and innocent suspects, it is possible that the designated innocent suspect was not similar enough in appearance to the perpetrator to be perceived as a plausible replacement by the participants. This could speak to the strength of the bias in the social media condition. Even though the innocent suspects were not especially plausible as replacements for the perpetrators, participants were still more likely to choose them at the lineup if they saw the innocent suspect on social media and were directed to him with the suggestion of mutual friends.

There are two limitations in Experiment 1, however, that make it unclear if the mutual friends feature is entirely responsible for the large increase in innocent suspect identifications in the social media condition. First, random assignment occurred before participants completed the social media or mugbook task. Consequently, most participants who selected the innocent suspect in the mugbook had already been randomly assigned to view a perpetrator-present lineup. This limited the opportunity to analyze commitment or familiarity in the mugbook condition and also limited the opportunities for commitment in the mugbook condition. Second, the social media manipulation came in two parts: instructions and the presence of mutual friends. In Experiment 2, we examined whether mutual friends could have a suggestive effect when instructions were equated across the mugshot and social media conditions. We also reprogrammed the experiment so that participants were randomly assigned to the perpetrator-present and perpetrator-absent conditions after they made a decision at the social media or mugshot task.

Experiment 2

In addition to addressing the limitations of Experiment 1, in Experiment 2 we asked

participants who made lineup identifications to report when they saw the person previously. If eyewitness memories are contaminated by mugshots or social media profiles, it could lead to source monitoring or identity blending errors. In a source monitoring error the eyewitness initially rejects the innocent suspect at the mugbook or social media search, but the eyewitness subsequently misidentifies the innocent suspect because they are familiar. The eyewitness misattributes the familiarity to the crime instead of the image search (Johnson et al., 1993; Goodsell et al., 2015; Perfect & Harris, 2003). In an identity blending error the eyewitness mistakenly believes that the perpetrator and innocent suspect are the same person, encountered at both the crime and the mugbook/social media viewing (Goodsell et al., 2015; Perfect & Harris, 2003; Ross et al., 1994).

We pre-registered two hypotheses (https://aspredicted.org/fz3h6.pdf) prior to data collection. We found no differences in correct identifications among the three conditions in Experiment 1, so we made no predictions for correct identifications in Experiment 2. Our hypotheses for Experiment 2 focus on mistaken identifications from perpetrator-absent lineups:

1) There will be more mistaken identifications of the innocent suspect in the social media condition than in the mugbook and control conditions.
2) There will be more mistaken identifications of the innocent suspect in the mugbook condition than in the control condition.

Method

Participants

A total of 1406 participants were recruited through MTurk and a psychology department participant pool. For participants who completed the study multiple times (n = 13), only their first response was retained. All additional responses were removed. Two hundred and seven

participants were removed for failing the attention check (n = 36), reporting video problems (n = 6), withdrawing at the reconsent portion (n = 12), or providing partial data (n = 153).

The final sample consisted of 1199 participants: 112 university students and 1087 MTurk workers. University students were awarded partial course credit. MTurk workers received $2 compensation. The university sample comprised 74 females and 38 males, with an average age of 19.18 years (SD = 1.47). The majority of students identified as White (30.4%), South Asian (23.2%), or Chinese (8.9%). MTurk workers had an average age of 41.92 years (SD = 12.61), and included 544 females, 520 males, 10 non-binary participants, one non-gendered participant, one trans man, and nine participants who did not indicate gender. The majority of MTurk participants identified as White (74.8%).

Design and Procedure

The design, procedure, and materials were the same as Experiment 1 with a few notable differences. First, we increased the sample size. Experiment 1 had small group sizes for commitment and familiarity, so we increased the sample size to be able to properly examine commitment and familiarity effects. Second, we reduced the distractor task time for university participants to match MTurk participants. Participants completed two distractor tasks, each being three minutes in length.

Third, we used different mock-crime videos and lineups. In Experiment 1 there was a low rate of correct identification for Perpetrator B in the MTurk sample. Although this was the only subset of data in Experiment 1, we conducted a pilot test with 148 MTurk participants and again found a low correct identification rate for Perpetrator B (15%; for full details of the pilot study, see Supplemental Materials). Accordingly, we replaced Perpetrators A and B with Perpetrators C and D, who were expected to be plausible replacements for each other because they were

frequently confused by participants in a previous study by the second author. Both perpetrators were young, White men (see Supplemental Materials). The single lineup paradigm was used, such that Perpetrator C served as the innocent suspect for Perpetrator D and vice versa. To create the lineup stimuli for each perpetrator, we selected fillers who matched a basic description of the perpetrator and were identified in a previous study as matching participants' memory for the perpetrator.

Fourth, the instructions were changed in the social media and mugbook tasks to be standardized between the two conditions. The new instructions for the social media and mugbook tasks can be found in the Supplemental Materials.

We also changed how participants reported their choice in the social media and mugbook viewings so we could equate the number of participants assigned to perpetrator-present and perpetrator-absent conditions after making an innocent suspect selection at the viewings. Instead of an open ended question, participants answered a multiple choice question about the perpetrator's position during the viewing tasks (see the Supplemental Materials). Participants were then assigned to view a perpetrator-present or -absent lineup based on their decision in the search task (i.e., if they chose the innocent suspect, a filler, or indicated not present).

Finally, following an identification from the lineup, participants in the social media and mugbook conditions were asked where they recognized their lineup choice from. If participants only selected the social media or mugbook task as the source of their recognition, they were invited to elaborate with an open-ended question. Additionally, at the end of the study, participants in the social media condition were asked if they noticed the mutual friends feature on social media. Those who said, "yes" were then asked if their attention was drawn to the profile with mutual friends.

Results

Hypothesis Tests

Table 2 shows the breakdown of responses for perpetrator-present and perpetrator-absent lineups. When the perpetrator was absent from the lineup, a 3 (Exposure: control, social media, mugbook) × 3 (Decision: suspect, filler, no identification) loglinear analysis revealed an effect of exposure on lineup decisions, χ^2 (4, N = 600) = 73.26, p < .001, V = .25. Follow-up pairwise analyses showed that there was an effect of exposure on innocent suspect identifications. Mistaken identifications of the innocent suspect were higher after social media exposure compared to the control condition, z = 8.43, p < .001, OR = 15.04, 95% CI [7.01, 32.28], but did not significantly differ between social media and mugbook conditions, z = 1.11, p = .267, OR = 1.26, 95% CI [0.84, 1.89]. Therefore, our first hypothesis was partially supported. Mistaken identifications were higher after mugbook exposure compared to the control condition, z = 7.55, p < .001, OR = 11.96, 95% CI [5.57, 25.69], supporting our second hypothesis. Follow-up pairwise analyses for the effect of exposure on rates of filler identifications and no identifications can be found in the Supplemental Materials.

Exploratory Analyses

Lineup Fairness. The perpetrator-absent results for the control condition were used to determine lineup fairness. *E* values were between 2.19-3.05, showing that lineups contained 2-3 plausible lineup members (Tredoux, 1998; Malpass, 1981). See the Supplemental Materials for a breakdown of identifications for lineup fairness.

Perpetrator-Present Lineups. When the perpetrator was present in the lineup, a 3 (Exposure: control, social media, mugbook) × 3 (Decision: suspect, filler, no identification) loglinear analysis revealed an effect of exposure on lineup decisions, χ^2 (4, N = 599) = 11.64, p

= .020, V = .10. Specifically, there was an effect of exposure on suspect identifications. Follow-up pairwise analyses showed that correct identifications of the suspect were higher in the control condition than in the social media condition, z = 3.03, p = .002, OR = 1.85, 95% CI [1.24, 2.76], and the mugbook condition, z = 2.61, p = .009, OR = 1.70, 95% CI [1.14, 2.54]. The correct identification rate did not significantly differ between social media and mugbook conditions, z = 0.42, p = .674, OR = 1.08, 95% CI [0.73, 1.61]. The only other significant difference was for non-identifications: participants who viewed social media were more likely than participants in the control group to not make an identification from a lineup containing the perpetrator, z = 2.53, p = .011, OR = 1.84, 95% CI [1.15, 2.95].

Noticing Mutual Friends. As a manipulation check, we asked participants in the social media condition if they noticed whether any of the profiles in the social media task contained mutual friends. A total of 45.1% of participants in this condition reported that they noticed the mutual friends feature. Of these participants, 42.7% reported that their attention was drawn to the profile with mutual friends.

We examined whether noticing mutual friends on social media affected lineup identifications. When the perpetrator was absent from the lineup, a 3 (Exposure task: noticed mutual friends, did not notice mutual friends, mugbook) × 3 (Lineup decision: suspect, filler, no identification) loglinear analysis revealed a significant association between the exposure task and the lineup decision, χ^2 (4, N = 402) = 12.67, p = .013, V = .14. Follow-up pairwise analyses showed lineup identifications of the innocent suspect were higher for participants who noticed the mutual friends feature (50.6%) compared to both participants in the mugbook condition (33.5%), z = 2.79, p = .006, OR = 2.03, 95% CI [1.22, 3.37], participants in the social media condition who did not notice the mutual friends feature (29.0%), z = 3.09, p = .002, OR = 2.51,

95% CI [1.39, 4.52]. Innocent suspect identifications did not differ between participants who did not notice mutual friends and mugbook participants, $z = 0.81$, $p = .418$, $OR = 1.23$, 95% CI [0.74, 2.05]. When the perpetrator was present in the lineup, 40.4% of participants who noticed the mutual friends feature and 56.4% of participants who did not notice the mutual friends feature correctly identified the perpetrator. A 3 (Exposure task: noticed mutual friends, did not notice mutual friends, mugbook) $\times$ 3 (Decision: suspect, filler, no identification) loglinear analysis revealed no significant association between the exposure task and perpetrator-present lineup decisions, χ^2 (4, $N = 398$) = 5.92, $p = .205$, $V = .09$. The full breakdown of identification decisions based on participants noticing the mutual friends feature in the social media task can be found in the Supplemental Materials.

Confidence. CAC curves are depicted in Figure 1B. Identification frequencies for each level of confidence can be found in the Supplemental Materials. As in Experiment 1, high confidence was only indicative of accuracy in the control condition. In the control condition, suspects identified with 90-100% confidence were accurate 100% of the time. In the social media and mugbook conditions, suspect identification accuracy was low at all levels of confidence and suspects identified with 90-100% confidence were only accurate approximately 70% of the time.

Social Media and Mugbook Decisions. Table 3 reports decisions in the initial social media and mugbook task. There were no overall differences between the social media and mugbook conditions in innocent suspect identifications, $z = 0.09$, $p = .928$, $OR = 1.01$, 95% CI [0.76, 1.36]. When the social media condition was split by participants' noticing the mutual friends feature, 46.6% of participants who noticed the mutual friends feature identified the innocent suspect in the social media task. In comparison, 21.7% of participants who did not

notice the mutual friends feature identified the innocent suspect in the social media task. The difference was significant, $z = 5.23$, $p < .001$, $OR = 3.12$, 95% CI [2.02, 4.84]. Additionally, social media participants who noticed the mutual friends feature were more likely to identify the innocent suspect in the intervening search task than participants who viewed the mugbook (32.6%), $z = 3.23$, $p = .001$, $OR = 1.81$, 95% CI [1.26, 2.59]. Mugbook participants identified the innocent suspect more in the intervening search task than social media participants who did not notice the mutual friends feature, $z = 2.85$, $p = .004$, $OR = 1.73$, 95% CI [1.18, 2.54].

Commitment and Familiarity Effects. Perpetrator-absent lineup choices were examined for commitment and familiarity effects. Table 4 shows the breakdown of lineup choices as a function of social media and mugbook choices. A commitment effect was present for participants who chose the innocent suspect on social media, 75.4% of whom chose the innocent suspect again at the lineup. This was greater than the 30.6% of participants who chose the innocent suspect from the lineup after choosing a filler on social media, $z = 4.77$, $p < .001$, $OR = 6.94$, 95% CI [3.03, 15.91], and the 13.6% of participants who chose the innocent suspect from the lineup after making no identification on social media, $z = 7.54$, $p < .001$, $OR = 19.49$, 95% CI [8.33, 45.60]. Familiarity effects were also detected in the social media condition: Compared to the control condition (4.0%), participants were more likely to identify the innocent suspect at the lineup if they identified a filler on social media (30.6%), $z = 5.75$, $p < .001$, $OR = 10.48$, 95% CI [4.12, 26.62], or made no identification on social media (13.6%), $z = 2.89$, $p = .004$, $OR = 3.73$, 95% CI [1.44, 9.66].

A commitment effect was also present in the mugbook condition. Within the sample of participants who chose the innocent suspect in the mugbook, 81.2% chose them again at the lineup. This is significantly greater than the 16.7% of participants who identified the innocent

suspect at the lineup after identifying a filler in the mugbook, $z = 6.65$, $p < .001$, $OR = 21.54$, 95% CI [7.83, 59.21], and the 5.3% of participants who identified the innocent suspect after making no identification in the mugbook, $z = 9.89$, $p < .001$, $OR = 76.68$, 95% CI [25.93, 226.75]. Familiarity was only detected in participants who chose a filler at the mugbook viewing (16.7%), which led to higher innocent suspect identification rates than in the control condition (4.0%), $z = 3.09$, $p = .002$, $OR = 4.75$, 95% CI [1.62, 13.94]. There were no differences in innocent suspect identifications between controls (4.0%) and participants who made no identification from the mugbook (5.3%), $z = 0.51$, $p = .610$, $OR = 1.33$, 95% CI [0.42, 4.19].

Source Attributions. After making a lineup identification, participants in the social media and mugbook conditions were asked to attribute the source of previous familiarity for their lineup choice. Participants could report recognizing their lineup choice from the crime video, the social media/mugbook, or both the crime video and the social media/mugbook. Participants also had the option to report that they did not remember the source. We report the number of suspect identifications per source attribution in Table 5. The social media and mugbook conditions followed the same pattern, so data are aggregated across these conditions. The breakdown of attributions per condition can be found in the Supplemental Materials, along with the breakdown of reasons participants gave for choosing the social media or mugbook task only as their source of recognition.

We first looked at attribution errors made by participants when an innocent suspect was identified from the lineup. When the innocent suspect was identified from the lineup it was an error to attribute the suspect to either the video only or the video and search task. The difference between video-only (41.4%) and video-and-search-task (47.6%) attributions was not significant, $z = 1.06$, $p = .289$, $OR = 1.30$, 95% CI [0.82, 2.07].

Next, we looked at perpetrator-present identifications to examine how often attributions were associated with correct identifications of the perpetrator. When participants gave the correct attribution of video only, the perpetrator was identified 73.8% of the time. Participants who made an error in attributing the perpetrator to both the video and the intervening search task correctly identified the perpetrator 53.2% of the time. The difference was significant, $z = 3.09$, $p = .002$, $OR = 2.48$, 95% CI [1.38, 4.45].

Table 5

Source Attributions

Perpetrator	Source Attributions	Suspect Identifications	Total Identifications
Present	Video Only	158	214
	Search Task Only	3	6
	Video and Search Task	33	62
	Don't Remember Where	6	10
Absent	Video Only	60	164
	Search Task Only	11	15
	Video and Search Task	69	93
	Don't Remember Where	5	9

Note. These data are aggregated from the social media and mugbook conditions. Total identifications refers to suspect and filler identifications.

Discussion

The effect of social media exposure on mistaken identifications of the innocent suspect replicated in Experiment 2. Social media exposure increased mistaken identifications of the innocent suspect compared to controls with no post-event image exposure, partially supporting Hypothesis 1. Exposure to the mugbook also increased innocent suspect identifications relative to controls, supporting Hypothesis 2.

Contrary to Experiment 1 and Hypothesis 1, mistaken identifications of the innocent suspect did not differ overall between the social media and mugbook conditions. Instead, the effect of social media exposure compared to mugbook exposure was dependent on participants

noticing the mutual friends feature on social media. The innocent suspect was the only profile who had mutual friends on social media. Participants who noticed the mutual friends feature on social media were more likely to mistakenly identify the innocent suspect from the perpetrator-absent lineup than both participants in the mugbook condition and participants in the social media condition who did not notice the mutual friends feature.

The mugbook exposure effect and high rates of choosing the innocent suspect in the social media/mugbook tasks are both consistent with our expectation that the innocent suspect would be perceived by the eyewitness as being more similar to the perpetrator than in Experiment 1. Nonetheless, there were low rates of mistaken identifications of the innocent suspect from perpetrator-absent lineups in the control condition in Experiment 2, suggesting the innocent suspect was a plausible replacement for the perpetrator in the social media and mugbook tasks but was not the most plausible alternative in the lineup task. This speaks to the strength of memory contamination from the social media and mugbook tasks. There were increased rates of mistaken identifications of the innocent suspect at the lineup after previous exposure to them, even though the innocent suspect was not the most plausible lineup member for control participants.

Another difference from Experiment 1 is that prior exposure to the innocent suspect on social media and in the mugbook in Experiment 2 led to decreased correct identifications of the perpetrator compared to the control condition. This could be interpreted as further indication that, compared with Experiment 1, the innocent suspects in this experiment were more plausible as replacements for the perpetrators to the participants. Specifically, it is possible that increased plausibility of the innocent suspects at the social media or mugshot viewing caused an increased potential for their image to interfere with the witness's memory of the perpetrator.

General Discussion

Contamination of memory from social media searches has been identified as a risk factor for mistaken identification that must be examined (Wells et al., 2020). If witnesses view social media images prior to participating in a lineup procedure, the circumstances of the viewing could be suggestive and influence a subsequent lineup identification decision. We used a controlled social media paradigm to enhance our understanding of social media contamination. In two experiments, participants who viewed an innocent suspect with mutual friends on social media were more likely than controls to mistakenly identify the innocent suspect if they were seen again in a perpetrator-absent lineup. When the innocent suspect was a plausible replacement for the perpetrator in the social media and mugbook tasks in Experiment 2, exposure to the innocent suspect on social media also reduced correct identifications of the perpetrator at a subsequent lineup. Contamination from the social media and mugbook tasks also weakened the confidence-accuracy relationship. High confidence suspect identifications in the social media and mugbook conditions did not indicate high accuracy.

We found that viewing social media profiles had the greatest impact when participants noticed the mutual friends feature. Participants who noticed the mutual friends feature in Experiment 2 had a higher rate of choosing the innocent suspect in the perpetrator-absent lineup compared to participants who did not notice the mutual friends feature and mugbook participants. It is well established that contamination from mugbook exposure reduces identification accuracy (Deffenbacher et al., 2006). When participants in the social media condition in Experiment 2 did not notice the mutual friends feature, performance was at a similar level to the mugbook condition. This suggests that for social media to have a greater contaminating effect than other types of repeated identifications, such as mugbooks, any

suggestive elements of the social media profiles must be prominent enough to be noticed by the witnesses. If a witness does not notice that only one profile in a social media search has mutual friends, there is a lower chance that the mutual friends feature would bias the witness to attend to that profile.

A possible explanation for why noticing mutual friends in Experiment 2 increased mistaken identifications is that the mutual friends feature made the profile stand out and increased the extent to which participants interacted with the profile. Research on lineup bias shows that attention will be drawn to a person who stands out in a lineup (Lindsay et al., 1987; Luus & Wells, 1991; Steblay & Wells, 2020). When the innocent suspect was less plausible in Experiment 1, participants who did not select the innocent suspect from the social media task may have quickly discounted the innocent suspect as a possible suspect and scrolled past without paying much attention to them. Noticing mutual friends may have caused participants to look closely at the profile when they otherwise would have skipped over it. In Experiment 2, participants were already more likely to attend to the plausible innocent suspect. Noticing the mutual friends feature may have made participants even more likely than they already were to look at the profile of the plausible innocent suspect and encode them.

Eisen et al. (2020) note that external information provided on social media may increase suspect plausibility. In our studies, the mutual friends feature may have been interpreted as an external cue of a potential match and increased suspicion that the innocent suspect was the perpetrator. Participants may have doubted their original memory for the perpetrator and interpreted the mutual friends feature to mean that the innocent suspect must have been the perpetrator instead. When the innocent suspect was already a plausible replacement, participants may have initially thought that the innocent suspect could have been the perpetrator, but the

degree of match to their memory may not have reached the threshold for recognition. The mutual friends feature may have then been used as an additional factor to confirm their suspicions that the innocent suspect was the perpetrator. Other features that are common on social media, such as location data, could have similar effects for innocent suspects.

Commitment and Familiarity

Our results suggest that contamination effects are most likely if the witness identifies an innocent suspect at the exposure event and has the chance to repeat their identification at a lineup. Consistent with previous research on mugbook exposure, which has demonstrated strong commitment effects (Brigham & Cairns, 1988; Dysart et al., 2001; Memon et al., 2002), participants frequently committed to their previous identification from social media or mugbook images and identified the same innocent person again at the lineup. Familiarity effects were less common and only detected when we used a more plausible innocent suspect in Experiment 2. When a less plausible innocent suspect was used in Experiment 1, the lack of familiarity effects on the lineup decision may have been a result of shallow encoding of the innocent suspect during the exposure task. That is, participants might have judged the innocent suspect to be implausible during the exposure and not studied the innocent suspect sufficiently to produce a feeling of familiarity at the lineup. In Experiment 2, the increased plausibility may have increased how much participants attended to the innocent suspect, resulting in a better memory trace. When the innocent suspect was seen again at the lineup, participants may have then chosen them because they were the most familiar option.

Memory Source Attributions

In Experiment 2 we examined whether innocent suspect identifications in the social media and mugbook conditions were best explained by identity blending or source monitoring

errors. In previous research, both source monitoring and identity blending have been proposed as explanations for the mugbook exposure effect (Goodsell et al., 2015). Our results provide further evidence for these explanations. Of the participants who mistakenly identified the innocent suspect at the lineup, approximately half reported that they were only familiar with the innocent suspect from the crime. Given that they were actually only familiar with the innocent suspect from the exposure event, these participants appear to have made a source monitoring error. After identifying the innocent suspect from the lineup, a similar number of participants reported that the lineup member was familiar from both the crime and the exposure event. Given that they actually saw the perpetrator at the crime and the innocent suspect at the exposure event, these participants appear to have perceived that they were the same person, which is consistent with the identity blending explanation.

Effects of Viewing Images on Correct Identifications

Our results suggest that viewing an innocent suspect prior to completing a lineup containing the perpetrator has the greatest effect when the innocent suspect is a plausible replacement for the perpetrator. We did not find any differences in correct identifications between the social media, mugbook, and control conditions when an implausible innocent suspect was present on social media and in the mugbook. However, correct identifications decreased in the social media and mugbook conditions compared to the control condition when the innocent suspect was a more plausible perpetrator replacement. This result is consistent with previous research showing that exposure to images of an innocent suspect can decrease correct identifications (e.g., Elphick et al., 2021; Kleider-Offutt et al., 2021; Goodsell et al., 2009; Gorenstein & Ellsworth, 1980). The memory source attributions provide some basis for why this might happen. Participants tended to be accurate in their identifications when they correctly

attributed the source of the lineup member's familiarity (i.e., the crime video only). Identification accuracy from perpetrator-present lineups decreased when participants cited both the video and intervening search task as their source of familiarity, which is consistent with a memory blending explanation (Goodsell et al., 2009). Specifically, participants who reported that the perpetrator was seen at the exposure event may have been unable to access their memory of the perpetrator because the trace has blended with someone who was actually present at the exposure event, such as the innocent suspect.

Confidence

Viewing images of suspects on social media poses an issue for confidence assessments at a subsequent lineup procedure. In their synthesis of the eyewitness literature, Wixted and Wells (2017) found that confidence only predicts accuracy when memory is uncontaminated. In our experiments, high confidence was predictive of high suspect identification accuracy for control participants, who had no prior familiarity with the innocent suspect. However, high confidence was a poor predictor of suspect identification accuracy when eyewitnesses were exposed to post-event information before making a lineup decision. It did not matter if the innocent suspect was familiar from viewing social media or mugbook images. The previous familiarity appears to have contaminated the witness's memory and rendered their confidence assessments to be uninformative, supporting Wixted and Wells' conclusion that confidence is only predictive of suspect identification accuracy in the absence of memory contamination. This finding also fits with previous literature showing that the confidence-accuracy relationship is weakened under non-pristine identification conditions, such as when the lineup is biased (Fitzgerald et al., in press; Steblay & Wells, 2020; Wixted & Wells, 2017), when the perpetrator changes their appearance (Charman et al., 2022), or when witnesses are given identification feedback (Steblay

et al., 2013). Viewing images on social media is another non-pristine condition that weakens the confidence-accuracy relationship.

Limitations

The current studies had a notable limitation. We used a narrow situation to study social media exposure in an artificial environment. There are numerous factors in real world situations that were not captured in our paradigm, so our task was not the same as searching for a perpetrator on social media in the real world. Participants were not able to conduct their own search on social media, and instead were given a search task designed to look like the output of a search on Facebook. In addition, the same mugshot images were used in the social media and mugbook tasks, meaning that the social media images were not realistic to the ambient images typically found on social media. Our mugbook task was also not modeled after what is typically used in mugbook research. We aimed to isolate the mutual friends factor on social media, so we modeled our mugbook to be similar to the social media condition for experimental control. We cannot say how lineup identifications would fare if a different mugbook or social media task was used. More realistic paradigms should be used in future research to more fully capture the effects of social media and mugbooks.

To examine bias from mutual friends, we a priori designated an innocent suspect to be in the social media/mugbook tasks and the perpetrator-absent lineup. We were primarily concerned with the mutual friends feature biasing participants and subsequent identifications, meaning our innocent suspect had to be pre-designated to be the only profile containing mutual friends. Previous research on mugbook exposure has used whomever the participant selects in the mugbook as the innocent suspect for lineups (e.g., Brigham & Cairns, 1988; Dysart et al., 2001; Goodsell et al., 2009; 2015). Had we used participants' social media and mugbook selection as

the innocent suspect instead of the designated innocent suspect, participants would have had more opportunities for commitment.

Policy Implications

Our findings reinforce the need for scrutiny of eyewitness identifications that were preceded by viewings of images on social media or mugbooks. In addition to replicating the mugshot exposure effect, we found that viewing images in the context of a social media search can contaminate the memory of eyewitnesses, increase the risk of mistaken identifications, and decrease the informativeness of eyewitness confidence. We also found that features of the social media platform have the potential to be suggestive.

According to the Supreme Court of New Jersey, the threshold of suggestibility needed for a pretrial admissibility hearing depends on the source of the suggestion. For police-initiated suggestion, evidence of "suggestive circumstances" is sufficient (*State v. Henderson*, 2011). However, if the suggestion comes from a non-state actor, there must be evidence of "highly suggestive circumstances" (*State v. Chen*, 2011). For example, in *Chen* the suggestion was clear. The victim was explicitly told by her husband that his ex-girlfriend was likely the culprit and shown images. The victim then looked at the images multiple times prior to completing a lineup.

Our research shows one way that the features of social media websites could draw the attention of eyewitnesses to certain individuals and put them at risk of mistaken eyewitness identification. Although there is no explicit mention in the *Chen* decision of how to treat suggestion when no actor is involved, the absence of police involvement could encourage judges to apply the higher threshold of suggestibility. If this higher standard is applied, suggestions on social media might not be considered overt enough to warrant a pretrial hearing to examine the admissibility of evidence. However, our findings indicate that even subtle aspects of social

media platforms have the potential to direct eyewitnesses to particular individuals.

Conclusion

Experts recommend against conducting repeated identifications with the same witness and same suspect (Wells et al., 2020; Wixted et al., 2021). Repeated identifications contaminate eyewitness memory by increasing the risk of mistaken identifications and altering the confidence-accuracy relationship (Wixted & Wells, 2017; Steblay & Dysart, 2016). Our results show that viewing an innocent suspect on social media is another type of repeated identification that contaminates memory. Social media exposure can contaminate memory more than traditional paths of repeated identifications, such as mugbooks, when witnesses notice that one social media profile in a search stands out as having mutual friends. Wells et al. (2020) recommend that witnesses should be instructed to avoid conducting their own investigations on social media. Our results provide support for this recommendation. If a witness conducts their own investigation on social media, a subsequent formal identification procedure will be tainted by the social media search. Our research shows that subtle forms of suggestibility can alter subsequent eyewitness identifications. Even if nobody directs a witness to a specific person, the features of social media – in our case, the mutual friends feature – can cause an innocent person to stand out. This gives further reason to doubt the reliability of lineup identifications conducted after the witness has already conducted their own investigation on social media.

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