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## **Memory Distortion for Footage of an Emotionally Disturbing Police/Civilian Encounter: Investigating the Influence of Bias and Trauma**

Eric A. Korzun

*CUNY John Jay College*, [eric.korzun@gmail.com](mailto:eric.korzun@gmail.com)

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**Memory Distortion for Footage of an Emotionally Disturbing Police/Civilian Encounter:  
Investigating the Influence of Bias and Trauma**

Eric A. Korzun

Advisor: Deryn Strange, PhD

John Jay College of Criminal Justice of the City University of New York

New York, NY

Fall 2021

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### Abstract

Although body-worn cameras (BWCs) are expected to be objective tools for increasing police transparency and accountability, research refutes the idea that people can objectively view footage. Instead, research shows that people's personal biases—for example, the extent to which people view the police like themselves, measured by the Identification with Police Scale (IPS; Tyler & Fagan, 2008) —shape how they view and interpret BWC footage (Jones, Crozier, & Strange, 2017). Additionally, studies of memory distortion reveal that people can come to remember traumatic events as worse than they originally experienced (Strange & Takarangi, 2012). Taken together, then, when viewing traumatic BWC footage, it is possible that viewers will misremember what they witnessed. What is not clear, however, is how bias and trauma interact to magnify or diminish the level of memory distortion one may experience. In the present study, we instructed participants (N=144) to complete the Identification with Police Scale (IPS) before watching an emotionally disturbing BWC video depicting a police-civilian encounter. Based on a group of independent raters' categorization of the video, we broke the footage down into a series of short clips and removed some crux (e.g., the civilian being tased) and non-crux (e.g., backup arriving on scene) clips. We intended to have some participants receive context information justifying the officer's actions before viewing the film, and some not, however a survey flow error meant that everyone received the context information, regardless of condition; this error barred us from determining the impact of context information on memory distortion. Participants then completed the Impact of Events Scale-Revised (IES-R, Weiss & Marmar, 1996) – used to measure the psychological impact of the footage. After 24-hours, participants completed the IES-R a second time. We then tested participants' memory for what they had seen and had not seen, as well as their confidence in their memory. Our results on memory distortion replicated those of previous

studies employing a similar paradigm and provide evidence that people can come to remember BWC footage as more traumatic than their initial experience. As BWC footage is becoming commonplace in society, this research develops our understanding of the impact that viewing emotionally disturbing police-civilian encounters has on memory.

*Keywords:* body-worn cameras, police, memory distortion, bias, trauma

**Memory Distortion for Footage of an Emotionally Disturbing Police/Civilian Encounter:  
Investigating the Influence of Bias and Trauma**

Body worn cameras (BWCs) have been implemented rapidly through the United States and around the world, expected to be objective tools for increasing police transparency and accountability; however, research shows that both internal and external influences, such as personal biases or police reports, shape how people view and interpret recorded police-civilian encounters (Jones, Crozier, & Strange, 2017). Further complicating the picture are studies on memory distortion, which show that people can come to remember traumatic events as worse than they originally experienced (Strange & Takarangi, 2012). Despite scientific evidence suggesting otherwise, the public persist in thinking that memory works like a video camera and is resistant to distorting influences (Simons & Chabris, 2011). Such a misunderstanding potentially places the public at risk of distorting influences from media outlets that routinely play clips from BWC footage, which are often traumatic in nature and highlight the conflict of traumatic police-civilian interactions (Naoroz & Clearly, 2021). This misremembering may have devastating impacts on the community-police relationship. Thus, a proper understanding of the various impacts of viewing emotionally disturbing police-civilian encounters is crucial to add to our current understanding of how people view and recall BWC footage. To date, research has addressed memory and bias issues in relation to traumatic footage independently, but research combining these two is lacking. The aim of this study, therefore, was to close the gap in the literature by investigating how bias and trauma interact to influence one's memory for an emotionally disturbing police-civilian encounter.

**Body Worn Cameras (BWCs)**

Body worn cameras (BWCs) are small devices that attach to law enforcement officers' uniforms and record interactions between community members and law enforcement officers

(BJA, 2015). The video and audio recordings provided by BWCs are meant to be used by law enforcement to demonstrate transparency to their communities, document statements, observations, and behaviors, and deter unprofessional or illegal actions by both law enforcement officers and community members (BJA, 2015). A prime example of the proposed need for BWCs occurred on August 9, 2014, when 18-year-old Michael Brown was killed by a local police officer in Ferguson, Missouri (Culhane, Boman, & Schewietzer, 2016). According to the official reports, the officer was dispatched to the area in response to a call by a store owner who claimed that a large, black male had stolen from the store. Upon confrontation, Brown was shot by the responding officer (Culhane, Boman, & Schewietzer, 2016). Soon after the Brown case, differing reports about the confrontation began to emerge. The responding officer, in an official report, stated that Brown, upon approach, became verbally and physically combative, and the officer only shot Brown in self-defense. Eyewitness accounts, however, stated that the officer was the aggressor, and that Brown was shot unarmed and had surrendered prior to the shooting (Culhane, Boman, & Schewietzer, 2016).

In response to the competing allegations regarding the Brown case, and other police brutality cases such as the tragic killings of Eric Garner (Millman, 2014), Tamir Rice (Queally, 2015), and George Floyd (Sullivan, 2021) as well as many false civilian claims against police officers (Cubitt et al., 2017; Maskaly et al., 2017; Stanley, 2015; White, 2014), there has been a growing conversation on how to increase transparency and build trust between law enforcement agencies and their communities. In the months following the Brown case, President Obama urged Congress to provide \$75 million to deploy 50,000 BWCs across the nation (Zansberg, 2021). In fact, the Task Force on 21<sup>st</sup> Century Policing (2015) suggested BWCs as best practice for police departments looking to increase police transparency and improve police-community relations.

Ever since, politicians, police departments, and civil rights groups have pushed for the implementation of BWCs in most police departments throughout the United States, and many have succeeded. As of November 2017, 62 of the 69 “major city” United States police departments have BWC policies in place (BWC Policy Scoreboard, 2017) and from FY2016 to FY2020, Congress appropriated \$112.5 million for a grant program under the Department of Justice to help law enforcement agencies purchase BWCs throughout the nation (James et al., 2020).

### **Body Worn Camera (BWC) Research**

It is sensible to conclude that BWC footage is the most objective measure available to record police-civilian interactions, compared to other forms of documentation such as police reports or eyewitness accounts. BWC footage includes both verbal and visual information, which should give viewers multiple memory cues, leaving little to the imagination (Jones et al., 2017). Thus, people should rely more heavily on BWC footage than other sources of information, such as police reports, eyewitnesses accounts, or media coverage. Unfortunately, although the idea behind BWC implementation makes logical sense, research examining the impact of BWCs on police-civilian encounters is slim (Lum, Koper, Merola, Scherer, & Reieux, 2015), and the common view of BWC footage as an objective measure is not supported by the empirical research published to date (Lum, Stoltz, Koper, & Scherer, 2019).

An excellent example of the subjectivity of footage comes from Kahan, Hoffman, and Braman (2009), who, after showing dashcam footage to 1350 Americans, found that “objective” video evidence can be perceived differently by the public depending on various individual characteristics such as age, race, education level, socioeconomic status, and political ideologies. To clarify, Kahan and his colleagues (2009) presented participants with dashcam footage of a police officer ramming his car into a fleeing motorist who refused to pull over for speeding. The



footage was public and part of the Supreme Court Case of *Scott v. Harris* (2007). The researchers found strong differences in opinion and perception among the participants depending on their age, race, education level, socioeconomic status, and political ideologies. For example, politically conservative and affluent individuals were more likely to form perceptions that favored the officer, while individuals who were politically liberal, highly educated, and less affluent were more likely to form perceptions that favored the civilian. Thus, the results of the study suggested that dashcam footage, originally thought to be an objective measure of what occurred, can be subjective and open to interpretation.

Although the Kahan et al. (2009) study was conducted using dashboard camera footage, more recent research has found that BWC footage is at risk for similar biases. For example, Culhane, Boman, and Schewitzer (2016) found that the public's perception of BWC footage can be altered by the method by which they are exposed to the event. Culhane and his colleagues (2016) instructed participants to either watch, listen to, or read the transcript of an actual police shooting event, and then rate the justifiability of the shooting. The researchers found that the method by which the participants learned about the event mattered; for example, those who could hear and see the event were significantly more likely to perceive the shooting was justified compared to those who had simply read about it. In addition, the researchers found that the medium of presentation was not all that mattered. A second study was completed by the same researchers after the widely publicized police shooting of Michael Brown in Ferguson, Missouri. Now, they found the opposite results; dissatisfaction with the shooting was found among all conditions but was exacerbated when the participants were presented with video evidence. The two experiments were identical, except one came before and one after the extensive media coverage of the Ferguson event. The researchers concluded then that BWC footage is not immune to certain biases, and its

interpretation can vary greatly depending on the general political climate toward the police at any given time, case facts, or even media coverage of an event.

Other studies like the Culhane et al., (2016) study have suggested that people's perceptions of BWC footage does not stand on its own, but rather can be altered by various external factors (Boivin, Gendron, Faubert, & Poulin, 2016; McCamman & Culhane, 2017). However, these studies neglect to test a critical question of BWCs: can people discount opposing evidence from less objective sources after viewing BWC footage? To test this question, Jones et al. (2017) had participants either watch BWC footage of an event, read an officer's report of the event, which contained misleading information, or both. If participants received both mediums, the researchers manipulated the presentation order, with some participants watching the film before reading the report, and others reading the report before the watching film. Briefly, the BWC footage showed a police officer escorting an inebriated college-aged male off the property of a hotel. The civilian was visibly incoherent, but nonviolent. After the civilian refused to comply with the officer's demands, the officer responded by hitting the civilian with his baton until the civilian was on the ground. In the report, the officer justified his use of force by falsely claiming that the civilian attacked him with a knife – a detail that was not visible in the video. The participants then answered questions to test their memories of the event. The participants' answers closely matched the officer's report regardless of whether they watched the BWC footage or not. Additionally, the degree to which participants identified with the police predicted the level of misinformation they accepted from the officer. For example, those with higher levels of police identification – indicated by an endorsement of items such as “you can usually understand why police officers, in general, are acting as they are in a particular situation” – were more likely to accept the misinformation from the report, over those with lower levels of police identification. The results of the Jones et al.

(2017) study indicated that people rely on their own personal biases to interpret and recall events and are likely to accept misinformation that aligns with their own beliefs, even if presented with seemingly objective counter evidence that tells them otherwise, such as the BWC footage.

The results of the above studies suggest that not only does the public have biases that effect their perceptions of a BWC event, but they are likely to accept information consistent with those biases, even if that information is incorrect. Although valuable, these studies only investigate to what extent people rely on personal biases to interpret BWC footage, but they do not investigate how complicated the effect of those biases may be. For example, bias might not act on its own to distort an individual's perception of an event, but rather be the culmination of effects from other variables, such as memory errors and the nature of the event itself, that is, how traumatic the event appears.

### **The Malleability of Memory**

Research makes it clear that memory is fallible and often prone to error. However, the fallibility of memory is not as clear to the public. A survey conducted by Simons and Chabris (2011) found that 63% of respondents, from a sample representative of the U.S. population, agreed with the statement that memory is like a video camera, recording life events to be revisited at a later point with pin-point accuracy. Experts disagree, and state that memory is—in reality— a reconstructive process (Brewer, 1986). Put simply, when we experience an event, details of that event are stored in various places within our brains that correspond to those details. For example, visual details are stored the occipital lobe, responsible for vision, while auditory details are stored in the temporal lobe, responsible for auditory stimuli (Conway et al., 2001). When asked to recall the event at a later point, the separated details of the event must be “reconstructed” to form a coherent representation of the event. Importantly, this reconstructive process combines both the

perceived physical characteristics of the event, such as the visual and auditory details, as well as the individual's interpretation of the event, which some researchers suggest may be beneficial to solving problems and anticipating future events (Johnson & Sherman, 1990; Newman & Lindsay, 2009; Suddendorf & Corballis, 1997; Szpunar, Addis, McLelland, & Schacter, 2013). This reconstructive process, however, is prone to errors (Schacter, 2013), and information from various sources such as another's recollection of the event or details witnessed on TV can be included in the reconstruction, causing people to remember information that was not part of their original experience.

The unreliability of memory has been well documented in the literature (e.g., Belli et al., 1998; Lindsay et al., 2004; Loftus & Pickrell, 1995). Memory errors are common and often small, such as forgetting to pick up the milk at the store even though that is what you went for. However, memory errors can even involve misremembering entire life events that never happened, such as falsely remembering meeting Bugs Bunny at Disneyland as a child (Braun, Ellis, & Loftus, 2002). The landmark study on the development of false autobiographical memories was completed by Loftus and Pickrell (1995). Enlisting the aid of family members, Loftus and Pickrell (1995) asked participants to respond to written descriptions of four different life events. Three of the events were actual events from the participants' pasts, and one was a "false" episode of being lost in a shopping mall as a child. The researchers gave the participants booklets containing the event descriptions and instructed them to write down what they recalled from the event; if they did not remember the event, the researchers instructed them to indicate so. Finally, the researchers conducted two additional interviews to further probe participants' recall of both the true and the false events. Results from all three sessions were highly consistent – participants correctly remembered 68% of the true events; however, 6 out of 24 subjects (25%) reported a memory of the false event.

Since the Loftus and Pickrell (1995) study, numerous similar studies have been completed. Using diverse methodologies, researchers have been able to convince participants to misremember various types of false autobiographical events, including having tea with Prince Charles (Strange, Sutherland, & Garry, 2006), cheating on a test (Russano et al., 2005), being hospitalized overnight (Hyman, Husband, & Billings, 1995), and spilling punch at a family wedding (Hyman, Husband, & Billings, 1995). Recently, however, the generalizability of findings from memory implantation studies has been questioned, due to the large variability in false memory formation among studies. To address this concern, Scoboria and his colleagues (2017) – in a recent mega-analysis of memory reports from eight peer-reviewed false memory implantation studies, detailing over 400 memory-report transcripts – developed a reliable coding system for defining false memories. Using this coding system, the researchers found that across the eight studies, 30.4% of the participants were classified as having developed a false memory, and 53.3% were judged to have accepted the event as genuine to some degree. Not only did this mega-analysis provide the most valid estimate of false memory formation, but it also gave notice to the complexities of false memory formation, and how the likelihood of false memory formation depends on a variety of events and interactions among variables that have yet to be thoroughly examined.

Although many of the researchers in the above-mentioned studies were able to create false memories of trivial events, there can be tragic, real-life consequences to this phenomenon. For example, experts on false confessions have coined the term *internalization* to describe when an innocent individual believes that he committed the crime he is being accused of (Kassin & Wrightsman, 1985). While being interrogated, an innocent person may feel anxious, tired, and subjected to highly suggestive methods of interrogation. This person may lack confidence in his own memory for the event, and, after a while, may come to believe that the investigators are telling

the truth, and that he committed the crime. This fault in memory can lead the innocent person to confess to a crime he did not commit, and can lead to devastating consequences, ultimately leading to the innocent person behind bars.

Memory issues can also occur when the event being remembered is traumatic (Strange & Takarangi, 2015). Throughout the literature on false memories, there has been a long-standing debate on the nature of traumatic memories. Some experts have argued that trauma memory is fixed and unable to be altered, remaining incredibly accurate over the course of a lifetime (Conway et al., 1994; Pillemer, 1984; Winograd & Killinger, 1983). Many proponents of this view have focused on PTSD sufferers, arguing that many of the symptoms of PTSD, such as intrusive symptoms and flashbacks, reveal that traumatic memory is indeed different than regular memory. In fact, some studies have found that those with PTSD have difficulty intentionally repressing trauma-related stimuli (McNally et al., 2001), and are more likely to over-remember rather than under-remember a traumatic event (Geraerts et al., 2006).

More recent research, however, has noted that like all memories, trauma memories are malleable and prone to distortion (Strange & Takarangi, 2015). Research examining memory distortion for traumatic events has suggested that people typically remember more trauma than they originally experienced, also known as “memory amplification” (Strange & Takarangi, 2015). Memory amplification can have real consequences: the more amplification a person experiences, the more likely he/she is to report the “re-experiencing” symptoms associated with PTSD, such as intrusive thoughts and flashback images. The most influential study on memory amplification involved Desert Storm veterans (Southwick et al., 1997), who were asked whether certain traumatic events occurred during their service at one month and two years following the veterans’ return. At the two-year follow-up, the researchers found that 88% of the veterans responded

differently from their original answers for at least one of the events and 61% responded differently from their original answers for more than one event. Most of these responses changed from a response of no to a response of yes – a sign of memory amplification. Indeed, the researchers found that the more severe the veterans' intrusive symptoms were, the more likely they were to experience memory amplification.

Although Southwick et al. (1997) found evidence for memory amplification in the field, there were still questions that were left unanswered. Specifically, a lack of experimental control led researchers to wonder if people could develop memory distortion for specific aspects of a traumatic event under controlled conditions. Some studies have investigated the impact of suggestive questioning on people's memories for traumatic, surprising, and collective events (Crombag, Wagenaar, & van Koppen, 1996; Nourkova, Bernstein & Loftus, 2004; Ost, Vrij, Costall, & Bull, 2002). However, these studies did not answer if traumatic memory distortion could happen systematically and without external suggestion (Strange & Takarangi, 2012). Thus, Strange and Takarangi (2012), adapted a paradigm developed by Gerrie, Belcher, and Garry (2006) and Gerrie and Garry (2007) to examine trauma memory for a single traumatic event with an obvious structure. Specially, they were interested in whether people would come to remember an event as being more traumatic than they originally experienced.

Briefly, Strange and Takarangi (2012) showed participants a series of film clips of a fatal car accident on a country road, each separated by two seconds of blank screen. The next day, participants took an unexpected memory test, which included images from scenes they had seen, scenes removed from the original film, and filler images not included in the video at all. Participants were very good at recognizing what they had and had not seen, but also falsely remembered seeing 26% of the missing clips. Additionally, participants were more likely to falsely

remember seeing the more traumatic clips compared to the less traumatic clips. This finding ran counter to the findings of Gerrie, Belcher, and Garry (2006) and Gerrie and Garry (2007), who found that people were most likely to falsely remember the *least* critical parts of a *benign* event. When the event being remembered was *traumatic*, however, Strange & Takarangi (2012) found the opposite pattern: people were most likely to falsely remember the cruxes, or the more crucial aspects of the film.

To explain their results, Strange and Takarangi (2012), suggested that memory amplification could be attributed to issues with an individual's source monitoring (Johnson et. al, 1993; Lindsay, 2008). Briefly, the source monitoring framework (SMF) claims that memory distortion happens because we do not store the origin of every detail of our memories (Strange & Takarangi, 2015). Thus, without careful attention, it is easy to make mistakes and confuse information that happened after the event with actual information from the event. For example, traumatic events are likely to be extensively rehearsed, both intentionally by providing a statement to the police or talking through the event with family, friends, or a therapist (Strange & Takarangi, 2015), and unintentionally by experiencing the intrusive symptoms associated with PTSD (Ehlers & Clark, 2000). Each rehearsal runs the risk of exposure to misleading details, such as inadvertent suggestion during conversation or confusion with similar events witnessed on the news (Strange & Takarangi, 2015). Over time, the misleading details can become just as familiar to the individual as the details of the actual event, leading the individual to believe the false details of the event (Strange & Takarangi, 2015).

Therefore, in a follow-up study, Strange and Takarangi (2014) argued that if source monitoring errors were responsible for the memory distortion, then they should be able to manipulate the likelihood of the errors by encouraging different approaches to source monitoring.



They employed a similar design to Strange and Takarangi (2012), but this time, added manipulations to affect people's source monitoring strategies – a more heuristic approach (rapid, and less controlled, leading to more memory distortion) versus a systematic approach (slower and more controlled, leading to less memory distortion). Participants watched the traumatic film, with static highlighting the missing scenes. In the systematic condition, the researchers warned the participants before encoding that scenes had been removed from the film. In the heuristic condition, the researchers gave the participants a description of the missing scenes along with the visual static. The purpose of the description was to allow participants to imagine what occurred between the depicted scenes. Drawing on the SMF, the researchers expected that if participants did create mental imagery that fit the label of the missing scenes, then the missing scenes would feel more familiar at test. Their results revealed that the warning worked to promote less memory distortion, while people exhibited more memory distortion when they saw a label describing the missing content. Based on the results, the researchers concluded that mental imagery plays a role in traumatic memory distortion, and that manipulations designed to affect source monitoring behavior also affect the degree of memory distortion. The results of Strange & Takarangi (2012) and Strange and Takarangi (2014) reveal something unique about how people view and remember traumatic videos: that people can come to remember a traumatic video as worse than they originally experienced, and this memory distortion can be manipulated, based on which source monitoring behavior is encouraged.

Because much of the BWC footage that people are asked to review is likely to be both traumatic and emotional, it is reasonable to assume that individuals exposed to footage would be susceptible to many of the memory errors apparent after exposure to traumatic events. Indeed, as BWC usage has increased among police departments, media outlet coverage of BWC footage has,

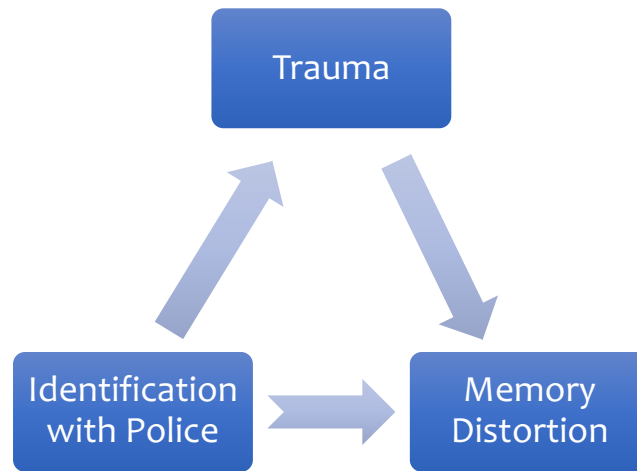
unsurprisingly, grown as well (Schneider, 2018). Unfortunately, few studies have examined how BWCs are displayed in the media, but the research that has been published has found that media coverage of BWCs often highlights the conflict of traumatic police-civilian interactions (Naoroz & Clearly, 2021). To elaborate, Naoroz and Clearly (2021), conducted a content analysis on newspaper articles from 6 of the top 10 circulated newspapers spanning a 4-year period from May 2012 to May 2016, coding them using five media frames: conflict, human interest, attribution of responsibility, morality/accountability, and economics. The researchers found that that conflict (57%) was the most prevalent frame, followed by attribution of responsibility (52%), and morality/accountability (52%). Notably, the researchers found that following the shooting of Michael Brown in Ferguson, Missouri, there was an increased use of conflict, responsibility, and morality/accountability frames; the exact reasoning for this increased use of conflict could not be determined by the study, but the results of Naoroz and Clearly (2021) illustrate that media coverage changes depending on current events and the political climate of the times.

Although Naoroz and Clearly (2021) used newspaper articles for their analysis, it can be argued that television news outlets offer similar biases, leaving viewers at risk for a host of distorting influences. Indeed, the frame by which a media outlet chooses to display BWC footage could sway viewers to interpret the footage in a biased manner. For example, if media outlets highlight the conflict and trauma of BWC footage, it could influence how viewers perceive and remember the footage in question. Other sources of information, such as police reports or conversations with friends, family, or acquaintances could further expose viewers to distorting influences. If then asked to recall the events of the footage, viewers may confuse details from the footage with details from those other sources, exhibiting source monitoring errors. Additionally, after viewing traumatic BWC footage, it is possible that viewers will remember the footage as

being more traumatic than they initially experienced. This misremembering may have devastating impacts on the community-police relationship, and could extend the social gap between the police and its community. Indeed, we have already seen anecdotal evidence of this impact after the widely publicized police killing of George Floyd in 2020, with a recent Gallup poll revealing the lowest reported levels of confidence in the police in almost 30 years (Brenan, 2020).

### **Current Study**

To date, research has addressed memory and bias issues in relation to traumatic footage independently, but research combining these two is lacking. Specifically, it is still unclear how bias and trauma interact to influence one's memory for a police-civilian encounter. For example, does bias work on its own to create memory distortion, or is the impact of bias mediated by the amount of trauma one experiences from witnessing the traumatic event? The aim of this study, therefore, was to combine the paradigms of Strange and Takarangi (2012) and Jones, Crozier, and Strange (2017). We aimed to test a model in which one's identification with the police impacts memory distortion indirectly, through the mediating impact of trauma. Additionally, we aimed to investigate whether receiving context information – such as through a police report (Jones et al. 2017) – justifying the officer's actions before watching the BWC footage impacts memory distortion. We predicted that the relationship between police identification and memory distortion would be fully mediated by the amount of trauma experienced (see Figure 1), and that context information justifying the officer's actions would decrease memory distortion.

**Figure 1***Proposed Mediation Model*

*Note.* Proposed mediation model, predicting that police identification would impact memory distortion indirectly, through the amount of trauma experienced.

To test our questions, we instructed participants to complete the Identification with Police Scale (IPS; Tyler & Fagan, 2008) before watching an emotionally disturbing BWC video depicting a police-civilian encounter; we intended to have some participants receive context information justifying the officer's actions before viewing the film, and some not, however a survey flow error meant that everyone received the context information, regardless of condition. Based on a group of independent judges' categorizations of the video, we broke the footage down into a series of short clips and removed some crux clips – clips rated by the judges as more crucial to the overall story and more traumatic in nature, such as the civilian being tased – and non-crux clips – clips rated by the judges as less crucial to the overall story and less traumatic in nature, such as backup arriving on scene. Participants then completed the Impact of Events Scale-Revised (IES-R; Horowitz et al., 1979) – used to measure psychological impact. After a 24-hour delay, participants completed the Impact of Events Scale-Revised again, answered basic questions about the body worn camera footage, and completed a surprise memory task that involved viewing 18 clips and

rating them as *Old* or *New*. In this task, participants viewed six clips from the footage that they had previously seen (*Old*), six clips from the footage that they had not seen (*Missing*), and six control clips that were not from the footage (*New*). For each decision, participants also provided their confidence in their decision (1 “not at all” – 5 “extremely”).

### **Pilot Testing**

To create our study materials, we completed 3 phases of pilot testing. Each phase built on the last in a stepwise fashion. For each stage of our procedure, we followed the steps outlined in Strange and Takarangi (2012).

### **Materials**

Our footage was BWC footage taken from the internet (<https://youtu.be/xQU15JWVaD8>). The footage is six minutes long with audio, and in color. It is publicly available and depicts a man being tased by the police. Briefly, a police officer is seen approaching a parked car and asking the passengers for identification. The officer and the civilians in this film are white. After the passengers refuse to comply, the officer attempts to place the male passenger in handcuffs. The male passenger resists, and the officer tases the male passenger. The remainder of the footage includes the male passenger being tased continuously, while a child in the back-seat cries. The film ends with the officer cursing at the male passenger, who is on the ground in handcuffs.

### **Phase 1**

First, we asked a small group of independent judges (N=6) to split the entire footage into smaller clips. We instructed the judges to first watch the footage in its entirety, and then watch it a second time, identifying pieces that depicted discrete events within the larger footage. We explained that there was a clear beginning, middle, and end, but we wanted to divide the footage into smaller clips. Lastly, we told the judges that the clips should be about 8-15 seconds long, and

that for each selected clip, they should be able to provide a single description of what happened. This exercise provided us with 24 clips that ranged from 6 seconds to 15 seconds, with an average of 9.58 seconds ( $SD = 2.7$  s).

## Phase 2

Next, we asked a second group of independent judges ( $N=46$ ) to first, watch the footage in its entirety. At the end of the footage, we informed the judges that we were going to play the footage again, but this time, it would be broken into small clips. For each clip, we instructed the judges to rate it as crucial to the overall story, not crucial, or unsure. From the ratings provided by the judges, we selected 6 clips to remove from the footage for the complex memory task, labeled as *Missing* clips ( $M_{time} = 9.67$  s;  $SD = 1.75$  s;  $Total_{time} = 58$  s), as well as 6 *Old* clips that would remain in the footage, but also be used for the complex memory task ( $M_{time} = 10.67$  s;  $SD = 3.74$  s;  $Total_{time} = 64$  s). Importantly, for both the *Missing* and *Old* clips, we chose two clips from the beginning, two clips from the middle, and two clips from the end, ensuring we did not choose consecutive clips or the first and last clips of the film. Finally, each clip type was composed of three clips known as cruxes – clips rated as more crucial to the overall story and more traumatic in nature – such as the child crying in the backseat or the initial tasing of the citizen (*Old* Crux:  $M = 12$  s,  $SD = 4.36$  s; *Missing* Crux:  $M = 10.66$  s,  $SD = 1.53$  s; Total Crux:  $M = 11.33$  s,  $SD = 3.01$ ) and three that were non-cruxes – clips rated as less crucial to the overall story and less traumatic in nature, such as the officer walking up to the car (*Old* Non-Crux:  $M = 9.33$  s,  $SD = 3.21$  s; *Missing* Non-Crux:  $M = 8.67$  s,  $SD = 1.53$  s; Total Non-Crux:  $M = 9$  s,  $SD = 2.28$  s).

## Phase 3

Lastly, to ensure that our cruxes and non-cruxes were different, we asked a third and final group of independent judges ( $N=138$ ) to watch the footage in its entirety and then rate for each

clip: a) How much does this clip stand out in your memory of the movie? b) How well does this clip fit in to the overall movie? c) How crucial was this clip to the overall story? d) How traumatic was this clip for you? e) How pleasant was this clip? and lastly, f) How surprising was this clip? (1 = not at all to 7 = extremely/completely). Table 1 displays the descriptive statistics for each question according to whether the clips were *Old* or *Missing* and whether they were judged to be cruxes or non-cruxes. As indicated by the t-tests in Table 1, the crux and non-crux clips were significantly different from each other in most categories, and so we decided to continue to the main study with these clip categorizations. Note that we did not consider it a problem that there was no difference in pleasantness across the two types of clips; we did not expect that there would be.

**Table 1**

Mean ratings for *Old* and *Missing* clips as a function of whether they were chosen to be cruxes or non-cruxes.

	<i>Old</i> Clips		<i>Missing</i> Clips		t-test (crux vs non-crux)
	Cruxes	Non-Cruxes	Cruxes	Non-Cruxes	
How much stands out in memory	3.92 (.76)	4.02 (.78)	4.32 (.72)	3.89 (.80)	$t(137) = 4.63, p < .01$
How well fits the movie	3.88 (.78)	4.02 (.79)	4.25 (.78)	3.82 (.87)	$t(137) = 3.55, p = .001$
How crucial?	3.91 (.83)	3.94 (.85)	4.27 (.73)	3.72 (.88)	$t(137) = 5.72, p < .01$
How traumatic?	2.98 (1.08)	3.38 (1.05)	3.69 (1.06)	3.12 (1.09)	$t(137) = 2.11, p = .037$
How pleasant?	2.38 (1.10)	2.13 (1.22)	2.04 (1.29)	2.17 (1.10)	$t(137) = 1.73, p = .085$
How surprising?	3.04 (1.12)	3.15 (1.14)	3.51 (1.15)	3.11 (1.10)	$t(137) = 4.08, p = .003$

*Note:* t-test collapses across *Old* and *Missing* clips into *Crux* and *Non-Crux* categories.

## Method

### Participants

John Jay College's Human Research Protection Program approved our experiment. We collected data during the Fall 2020 and Spring 2021 academic semesters. We based our sample size estimate on an a priori G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007) analysis. Our

power analysis calculated that with an alpha of .05 and 80% power, we would need a sample of 260 to detect differences between those who received context information justifying the officer's actions (manipulation group), and those who did not (control group). As a result, three hundred and six people from the subject pools at John Jay College of Criminal Justice – who received course credit – and Amazon's Mechanical Turk (MTurk) – who were paid \$0.75 for their participation in Part A and \$1.00 for their participation in Part B – completed the study. We restricted data collection to individuals residing in the United States and excluded participants ( $n=162$ ) who failed to follow instructions, who stated that they had seen the film before, or who did not complete both parts of the study. After these exclusions, our final sample included 144 participants (88 females, 56 males; 49 from John Jay College of Criminal Justice, 95 from MTurk) aged 18-78 years ( $M = 33.9$ ,  $SD = 15.2$ ). Of these, 75 (52%) identified as White, 27 (18.8%) as Hispanic/Latino, 26 (18.1%) as Black/African American, 11 (7.6%) as Asian, 4 (2.8%) as Other, and 1 (0.7%) preferred not to say. In addition, when asked to report their highest level of education, 1 (0.7%) preferred not to respond, 64 (44.4%) reported finishing high school, 6 (4.2%) reported earning their GED, 17 (11.8%) reported earning an associate degree, 34 (23.6%) reported earning a bachelor's degree, 8 (5.6%) reported earning a master's degree, and 14 (9.7%) reported earning a professional degree. Although our final participant pool was lower than anticipated, a sensitivity test revealed that with our final sample size of  $N = 144$ , an  $\alpha = .05$  and power = .80, we could detect a medium effect size ( $d = .47$ ) from our manipulation, and so we continued the analysis with our final sample size.

## **Design**

We meant to employ an experimental design with two conditions (Report/No Report), in which we would randomly assign participants to one of the two conditions before they began the



study. In the “Report” condition, we would show participants context information presenting the backstory of the BWC footage to justify the officer’s actions; in the “No Report” condition, we would not show participants the context information, and they instead would watch the BWC without any prior knowledge. However, because everyone received the context information, regardless of condition, we employed a simple within-subjects design. The participants completed the study in two parts, with a 24-hour delay in between.

## **Materials**

### ***Context Information***

Before watching the BWC footage, the participants read context information, presenting the backstory of the BWC footage to justify the officer’s actions, with the idea that adding context information would lessen the impact of the film on participants. The context information was created by the researchers on the project.

Briefly, the context information described three things that happened before the recorded police/civilian interaction: 1) A witness called the police about a suspicious car; 2) the witness also said that the man in the suspicious car was carrying a gun; and 3) the police pulled over a man driving a car that matched the description given by the police. We expected that if the participants read that the suspect in the footage had a gun, they would be more likely to justify the officer’s actions, and thus be less impacted by the film (Appendix C).

### ***The BWC Footage***

We used the same BWC footage utilized in the pilot testing and explained in detail above (<https://youtu.be/xQU15JWVaD8>). Importantly, we removed the clips that made up the *Missing* category of the video memory task before participants viewed the film in the event phase. To

prevent participants from noticing the *Missing* clips, we followed each clip with two seconds of black screen.

### ***Basic Facts Memory Test***

We provided participants with a basic memory test before the recognition memory task. This memory test consisted of 8 open-ended questions and required respondents to recall certain aspects of the film, such as “Where was the man in the clip sitting when the police arrived?” or “What did the officer ask the man in the film for?” (Appendix D). The basic facts memory test acted as an attention check in our study to ensure that the participants were paying attention and remembered general aspects of the film.

### ***Recognition Memory Task***

We removed clips from the BWC footage to create the recognition memory task, based on the answers from our pilot testing. The recognition memory task contained the six *Old* and six *Missing* clips identified in the pilot testing, separated into three crux clips and three non-crux clips each, as well as six *New* (control) clips. The *New* (control) clips were also freely available online, and clearly depicted various police-civilian events with details in contrast to our chosen BWC footage, making them easily identifiable. For example, some clips were filmed using dashcam cameras as opposed to BWCs, while other clips were filmed at night, or took place on a city street or rural area, rather than a parking lot. All clip types were of approximately equal length (*Old*:  $M = 10.67$  s,  $SD = 3.72$ ; *Missing*:  $M = 9.67$  s,  $SD = 1.75$  s; *New*:  $M = 9.67$  s,  $SD = 1.75$  s). We randomized the order of clip presentation to control for order effects. The Recognition Memory Task required the participants to watch the 18 clips, and for each clip, rate them as *Old* or *New*. Participants also rated their confidence in their decision on a scale from 1-5 (1 = Not at all, 5 = Very).

## Measures

### *Perceptions of the Officer*

We examined the participant's perceptions of the officer's culpability and behavior in the BWC footage with five questions (Jones et al., 2017). Examples of the questions included "Overall, how professional was the officer?" and "How responsible was the officer for escalating the situation?" (Appendix E). The responses on each item ranged from 1 (*Not at all*) to 5 (*Extremely/Completely*). We averaged participant responses to the 5 questions to form our *perceptions of the officer* measure ( $\alpha = .87$ ). Responses ranged from 1 to 5, with higher scores indicating more favorable perceptions (Jones et al., 2017).

### *Perceptions of the Civilian*

We examined the participants' perceptions of the civilian's culpability and behavior in the BWC footage with four questions (Jones et al., 2017). Examples of the questions included "Overall, how threatening was the civilian?" and "How responsible was the civilian for escalating the situation?" (Appendix E). The responses on each item ranged from 1 (*Not at all*) to 5 (*Extremely/Completely*). We averaged participant responses to the 4 questions to form our *perceptions of the civilian* measure ( $\alpha = .84$ ). Responses ranged from 1 to 5, with higher scores indicating more favorable perceptions (Jones et al., 2017).

### *Impact of Events Scale-Revised (IES-R)*

We asked participants to complete the Impact of Events Scale-Revised (IES-R, Weiss & Marmar, 1996; see Appendix F). The IES-R is a revised version of the IES (Horowitz, Wilner, & Alvarez, 1979), and is a widely used measure to assess the psychological impact of various traumas, both in the lab and in real-world settings. The IES-R has three subscales: Intrusions, Avoidance, and Hyperarousal. The IES-R has been shown to have high internal consistency ( $\alpha$

=0.96) [Intrusions:  $\alpha$  range 0.84—0.97; Avoidance:  $M \alpha = 0.82$ , range 0.84—0.97; Hyperarousal:  $M \alpha = 0.82$ , range 0.79—0.91] with strong validity (Creamer et al., 2003; Motlagh, 2010). Note that we removed three items from the IES-R that related to sleeping, as one of the tests took place immediately after viewing the footage, and thus the items were not applicable to our study sample (Strange & Takarangi, 2012). The items removed included: 1) I had trouble saying asleep (Intrusions Subscale); 2) I had trouble falling asleep (Hyperarousal Subscale); and 3) I had dreams about it (Intrusions Subscale). Note that even with the three items removed, internal consistency of the IES-R remained high ( $\alpha = .95$ ).

### ***Identification with Police Scale (IPS)***

We gave the 7-item Identification with Police Scale (IPS, Tyler & Fagan, 2008; see Appendix G) to participants to measure the degree to which they identified with the police (Cronbach's alpha = .87). We used a modified version of scale developed by Granot et al. (2014) and used by Jones, Crozier, and Strange (2017). Examples of the questions included “If you talked to most police officers, you think you would find that they have similar views to your own on many issues” and “Your background is similar to that of most police officers.” Each question was rated on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree). Higher scores indicated a greater level of identification with the police, with a scale from 7-49.

## **Procedure**

### ***Event Phase***

We told participants that we were interested in understanding interactions between police officers and citizens. We collected informed consent electronically prior to participation (Appendix A & Appendix B). After providing consent, we presented the participants with the IPS measure. Once completed, participants read the provided police report then watched the BWC

footage. After watching the footage, participants assessed their perceptions of both the civilian and the officer, completed the IES-R for the first time and then we asked them to return to the study in 24 hours. Figure 2 depicts each step of the Event Phase.

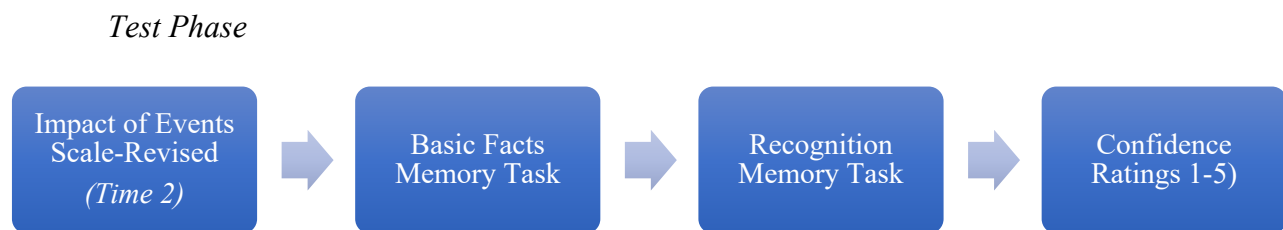
**Figure 2**



**Test Phase**

24 hours later, the participants completed the IES-R a second time as well as the two surprise memory tasks (Basic Facts Memory Test and Recognition Memory Task). After completing each of the tasks, we debriefed the participants, thanked them, and compensated them for their time (Appendix H). Figure 3 depicts each step of the Test Phase.

**Figure 3**



### Results

Recall that we aimed to test a model in which one's identification with the police impacts memory distortion indirectly, through the mediating impact of trauma. Additionally, we aimed to investigate whether receiving context information justifying the officer's actions before watching the BWC footage impacts memory distortion. Obviously, to test these hypotheses, the context information needed to be manipulated, such that half of the respondents would receive the context

information, and half not. Unfortunately, due to a methodological error in the survey flow, we discovered that all participants, regardless of condition, received the context information. As a result of this error, we were unable to evaluate the impact of the context information on memory distortion. Nonetheless, we were able to determine whether memory distortion occurs for body worn camera footage and whether one's identification with the police impacts memory distortion indirectly, through the mediating effect of trauma.

Therefore, in the section that follows, we first examined participants' memory accuracy and confidence, determined by their performance in the complex memory task. We then examined whether memory performance was impacted by whether the clip was crux or non-crux, or external influences such as one's personal biases. Finally, we turned to our mediation analysis – based on our proposed model – to test if the amount of trauma experienced mediated the relationship between one's identification with the police and memory distortion.

### **Memory Accuracy and Confidence**

We began our analysis by first ensuring that our participants were impacted by the footage, as measured by the Impact of Events Scale-Revised (IES-R). Total scores on the IES-R were much higher than those seen in Strange and Takarangi (2012), as well as others who have employed similar paradigms. Table 2 shows participant scores on the IES-R for both Time 1 and Time 2 split into the 3 subscales of intrusions avoidance, and hyperarousal, as well as the average total impact scores. Indeed, a mean score greater than 20 suggests the participants were severely impacted by the film and likely experienced analogue PTSD symptoms (Weiss & Marmar, 1997). Surprisingly, none of the impact scores significantly correlated with memory performance (see Table 2), a finding counter to Strange and Takarangi (2012).

**Table 2**

Means, 95% confidence intervals, and correlation coefficients for impact scores at Time 1 and Time 2.

Impact Scores	<i>M</i>	95% <i>CI</i>		<i>SE</i>	Correlations with Memory Performance
		<i>LL</i>	<i>UL</i>		
<b>Time 1</b>					
Intrusions	8.47	7.34	9.59	0.57	$r(143) = 0.12, p = .14$
Avoidance	9.00	7.70	10.30	0.66	$r(143) = 0.15, p = .07$
Hyperarousal	6.75	5.91	7.59	0.42	$r(143) = 0.12, p = .16$
Total Impact	24.19	21.19	27.19	1.52	$r(143) = 0.14, p = .09$
<b>Time 2</b>					
Intrusions	7.19	6.18	8.21	0.51	$r(143) = 0.03, p = .70$
Avoidance	10.36	9.12	11.61	0.63	$r(143) = 0.06, p = .48$
Hyperarousal	4.94	4.14	5.74	0.41	$r(143) = 0.06, p = .51$
Total Impact	22.76	19.88	25.64	1.46	$r(143) = 0.05, p = .57$

### Memory Accuracy

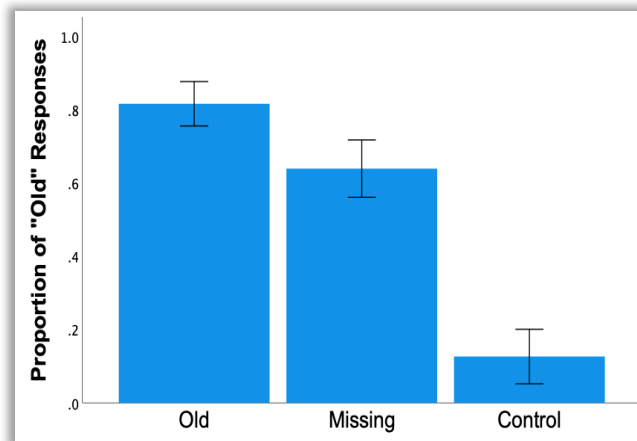
After ensuring that the participants were impacted by the footage, we then sought to examine their memory for the footage, determined by their performance in the Recognition Memory Task and measured as the proportion of *Old*, *Missing*, and *New* clips the participants identified as coming from the original film. Recall that in the recognition memory task, participants watched 18 clips and rated them as *Old* or *New*. Figure 4 displays participants' *Old* responses to *Old*, *Missing* and *Control* clips as a proportion of the total responses for each clip type. Participants correctly recognized *Old* [ $M = .79$ , 95% *CI* [.75, .83], *SE* =.02] and rejected *New* clips [ $M = .09$ , 95% *CI* [.06, .13], *SE* =.02] at a high rate. However, the participants also falsely claimed to have seen 61% of the *Missing* clips [ $M = .61$ , 95% *CI* [.56, .66], *SE* =.03], or an additional 34.5 seconds (14.4%) of the footage.

We assessed the participants' memory accuracy in a series of planned comparisons. Participants were more accurate at identifying *New* clips than *Old* clips,  $t(143) = -5.0, p < .001, d$

= -.42. They were also more accurate at identifying *Old* than *Missing* clips,  $t(143) = 6.19, p < .001, d = .52$  and *New* than *Missing* clips,  $t(143) = 15.88, p < .001, d = 1.32$ .

#### Figure 4

*Proportion of Old, Missing and Control clips to which participants responded "old."*



*Note:* Error bars represent the confidence interval of the mean

#### Confidence

After assessing the participants' confidence in their decisions through a series of planned comparisons, we found that the participants were more confident in their responses to *Old* [ $M = 4.49$  95% CI [4.39, 4.58],  $SE = .05$ ;  $t(143) = 6.19, p < .001, d = .52$ ] and *New* [ $M = 4.76$  95% CI [4.69, 4.84],  $SE = .04$ ;  $t(143) = 10.12, p < .001, d = .84$ ] than *Missing* clips. However, participants were still very confident that they had seen the *Missing* clips ( $M = 4.26$ , 95% CI [4.15, 4.36],  $SE = .05$ ).

#### Cruxes Vs. Non-Cruxes

Recall that we separated our *Old* and *Missing* clips into crux and non-crux clips to determine whether participants' memory accuracy varied depending on how crucial the clip was to the overall story. We found that participants were more likely to recall the *Old* clips that contained crux ( $M = .82$ , 95% CI [.77, .86]) compared to non-crux information ( $M = .77$ , CI [.72,



.82]);  $t(143) = 2.03, p=.04, d=0.17$ ). Moreover, participants were more confident that they had seen the *Old* clips that contained crux ( $M = 4.56, 95\% \text{ CI } [4.46, 4.65]$ ) compared to non-crux information ( $M = 4.42, 95\% \text{ CI } [4.31, 4.52]$ ,  $t(143) = 3.19, p=.002, d=.266$ ).

Replicating Strange and Takarangi's (2012) results, this pattern also held for the *Missing* clips (see Figure 5); participants were more likely to falsely recall the *Missing* clips that contained crux ( $M = .65, 95\% \text{ CI } [.58, .70]$ ) as opposed to non-crux information ( $M = .57, 95\% \text{ CI } [.52, .63]$ ,  $t(143) = 2.73, p=.007, d=.23$ ). However, there was no significant difference in their confidence levels for falsely seeing *Missing* clips that contained crux, ( $M = 4.30, 95\% \text{ CI } [4.18, 4.42]$ ) as opposed to non-crux information ( $M = 4.21, 95\% \text{ CI } [4.09, 4.33]$ ,  $t(143) = 1.45, p=.148, d=.12$ )

### Figure 5

*Proportion of Missing Crux and Missing Non-Crux clips to which participants responded "old."*



*Note:* Error bars represent the confidence interval of the mean

### External & Internal Influences

After determining participants' overall levels of memory accuracy and confidence, we then turned to our internal and external influences. Specifically, we wanted to know whether exposure to a police report presenting the backstory of the BWC footage, thereby justifying the officer's actions, would lessen the impact of the footage on the participants, thereby influencing their

memory for the footage. Additionally, we wanted to know whether participants' internal characteristics, such as demographics (e.g., age, gender, race), identification with police levels, or perceptions of the civilian and/or officer had any impact on participants' memory distortion.

### ***Context Information***

As previously reported, the methodological error in our survey flow caused all participants, regardless of assigned condition, to receive the context information that justified the officer's actions. Thus, we were unable to test the impact of context information on memory distortion.

### ***Demographics***

Next, we sought to determine whether the participants' basic demographics had an impact on memory distortion. We found that none of the following demographics significantly correlated with memory distortion: age ( $r(143) = -.028, p=0.74$ ), sex ( $r(143) = .09, p=0.29$ ), race ( $r(143) = .02, p=0.82$ ), education ( $r(143) = .001, p=0.99$ ). In addition, John Jay students did not perform any differently on the memory task than the MTurk participants ( $t(142) = 1.91, p=.849$ ).

### ***Identification with Police***

Next, we turned our attention to the participants' IPS scores to determine whether the degree to which they identified with the police impacted their memory performance. Overall, our sample had moderately high identification with police levels ( $M = 33.4, 95\% \text{ CI } 32.2, 34.6, SE = .62$ ). However, we found that participants' identification with the police had no significant impact on either level of impact ( $r(143) = -.126, p=0.13$ ) or memory distortion ( $r(143) = -.052, p=0.54$ ).

### ***Perceptions of the Actors***

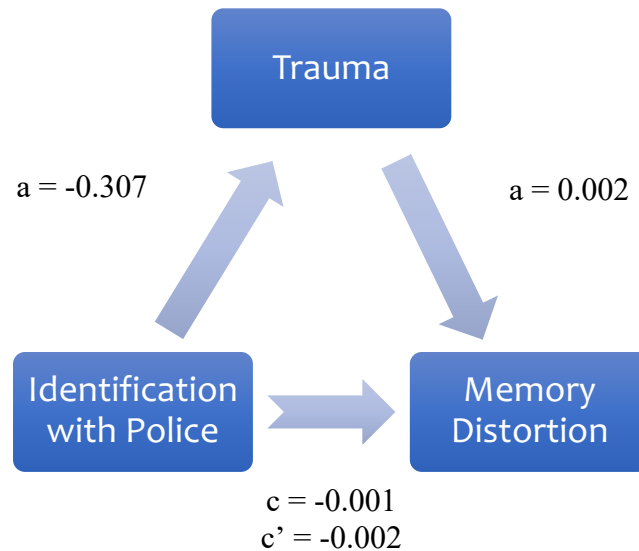
Recall that we had also asked the participants a series of questions concerning their opinions of the culpability and behavior of both the civilian and the officer in the BWC footage. Unsurprisingly, participants' identification with police levels had a strong, positive correlation

with their overall perceptions of the officer ( $r(143)=.317, p<.001$ ). In other words, participants who had greater identification with police levels also reported significantly more favorable impressions of the officer. IPS scores did not significantly correlate with the participants' perceptions of civilian, however ( $r(143)=.085, p<.314$ ). In addition, neither participants' perceptions of the officer ( $r(143)=-.123, p=.14$ ), nor their perceptions of the civilian ( $r(143)=.134, p=.11$ ) significantly correlated with memory distortion.

### **Mediation Analysis**

Once we had determined the participants' overall memory accuracy and confidence as well as the impact of various internal and external factors on memory distortion, we then turned our attention to our main question: does police identification impact memory distortion indirectly, through the mediating impact of the amount of trauma experienced? Recall our prediction that the relationship between police identification and memory distortion would be fully mediated by the amount of trauma experienced.

To investigate our question, we conducted a simple mediation analysis using PROCESS. The outcome variable for the analysis was memory distortion (measured as the proportion of *Missing* clips the participants identified as coming from the original film). The predictor variable for the analysis was police identification, measured by the IPS. The mediator variable for the analysis was the amount of trauma experienced from watching the BWC footage, measured by the Time 1 IES-R total average scores. The indirect effect of police identification on memory distortion was not statistically significant [Effect =  $-7.09e-4$ , 95% CI ( $-0.002, 5.34e-4$ ); (see also Figure 6)].

**Figure 6***Mediation Results*

*Note.* Mediation results, revealing an insignificant indirect effect of police identification on memory distortion.

### General Discussion

The overall purpose of this study was to examine the combined impact of bias and trauma on one's memory for an emotionally disturbing police-civilian encounter. In addition, we wanted to test if context information, meant to justify the officer's actions, would impact memory distortion. We hypothesized that the relationship between police identification and memory distortion would be fully mediated by the amount of trauma experienced, and that context information would reduce memory distortion.

Unfortunately, we did not find statistically significant support for our hypothesis: the relationship between police identification and memory distortion was not mediated by the amount of trauma experienced. Relatedly, when examining the impact of external and internal influences on memory distortion, we found no significant effect. As previously mentioned, a methodological error in the survey flow led all participants, regardless of condition, to receive the context

information that justified the officer's actions. This error barred us from being able to test the impact of context information on memory distortion. However, when examining the impact of internal influences on memory distortion, such as participants' identification with the police levels, we also found no significant effect.

We did, however, find some results worthy of discussion. For context, recall the diverging findings from studies investigating people's memories for recorded events. Gerrie et al. (2006) and Gerrie and Gary (2007) found that people were most likely to falsely remember the *least* critical parts of a *benign* event. When the event being remembered was *traumatic*, however, Strange and Takarangi (2012) found the opposite pattern: people were most likely to falsely remember the *cruxes*, or the more crucial aspects of the film. Our results mimicked the pattern found by Strange and Takarangi (2012); twenty-four hours after watching the emotionally disturbing footage, participants were very good at identifying the *Old* clips and rejecting the *New* clips, but they also falsely claimed to have seen 61% of the *Missing* clips, or an additional 34.5 seconds of the footage, exhibiting significant levels of memory distortion. Importantly, the direction of that distortion was towards the more traumatic details of the film.

Although our results revealed a similar pattern to those of Strange and Takarangi (2012) the degree of that distortion was more than two times greater in our study (61%) than in Strange and Takarangi's (2012, 26%). The exact reasoning for this significant difference is unclear. However, there are at least three different possibilities. The first two possibilities draw on the Source Monitoring Framework (Johnson et al., 1993; Lindsay, 2008). First, it is possible that, like Strange & Takarangi (2012), the participants engaged in intentional recall during the delay period. In other words, it is possible that the participants recognized that there were *Missing* clips and generated content to fill in those gaps in an effort to create a complete storyline. However, unlike

Strange and Takarangi (2012), this study included a basic facts memory test, which asked the participants to answer basic questions about the footage (Appendix D). It is possible that this additional test encouraged participants to rehearse the footage to an even greater degree. Although one might believe that increased rehearsal leads to more accurate recall, if the participants had generated content to fill the gaps in the film during the delay period, it is possible that this additional test helped solidify that generated content. At test, the *Missing* clips might have felt familiar, particularly if they aligned with the generated content, and participants could have mistaken that sense of familiarity for an actual feeling of remembering (Strange & Takarangi, 2012). Therefore, it is possible that the additional test is responsible for the increased degree of memory distortion, and future studies should investigate if additional tests influence memory distortion, and, if so, to what degree, and if counter-balancing the tests reduces the amount of memory distortion experienced.

Relatedly, it is also possible that our participants unintentionally recalled the footage during the delay period, by experiencing the intrusive symptoms associated with PTSD (Ehlers & Clark, 2000; Strange & Takarangi, 2012). Indeed, total scores on the Impact of Events-Scale Revised – used to measure psychological impact – were much higher in our study ( $M = 24.2$ , 95% CI [21.19, 27.19],  $SE=1.52$ ) compared to Strange and Takarangi (2012;  $M = 18.72$ , 95% CI [15.86, 21.61],  $SE=.1.45$ ). Although we did not find a statistically significant relationship between analogue intrusive symptoms and memory distortion, this may be an issue with our sample size. Importantly, the degree to which the participants were impacted by the film cannot be ignored, as it may be an important factor in explaining the increased level of memory distortion found in our study, and should be examined further with larger samples.

The third possibility might have something to do with how people view and interpret BWC footage in particular. Recall that Strange and Takarangi (2012), showed their participants a video of a fatal car crash. A fatal car crash is an extremely traumatic event, though it may not provoke as many biases in its viewers as BWC footage may. Indeed, research shows that BWC footage cannot be viewed objectively, and both internal and external influences impact how people view and interpret BWC footage (Jones et al., 2017). Moreover, our participants knew that they were about to watch BWC footage before they even started the study. We told them about the BWC footage on the consent form, and even asked them to fill out the Identification with Police Scale – used to measure the extent to which people view the police like themselves – prior to viewing the film. It is possible that these materials primed the respondents into watching the film in a specific manner. Although we did not find a significant mediating effect of trauma in our mediation analysis, this lack of significance may be an issue with our sample size, and it is possible an effect does, in fact, exist. Future research should replicate this study with larger samples to more accurately determine the impact of bias and trauma on memory distortion.

### **Limitations**

Our study had several limitations. The largest limitation of this study, namely, was sample size. We had a small sample size, as many participants needed to be excluded because they stated they had already seen the footage before participating in the study, or they did not return after 24-hours to complete the second part of the study. As such, many of our statistical analyses, particularly the mediation analysis, lacked the power necessary to detect an effect if one exists. In addition, most of our sample self-identified as white, highly educated, and female, and overall levels of identification with police were moderately high, meaning our sample may not have adequately represented individuals with strongly negative or with strongly positive views of the

police. For our mediation analysis to reach significance, it is possible that we needed more variation in our sample – or more people on either side of the identification with police spectrum.

In addition, it is possible that the context information (Appendix C) – which presented the backstory of the BWC footage to justify the officer’s actions and was mistakenly given to all participants regardless of condition – reduced the degree to which participants were impacted by the film. Although all participants were impacted by the film, as indicated by their scores on the Impact of Events Scale-Revised (IES-R), their trauma response, or their experience of analogue PTSD symptoms, could have been muffled by exposure to the context information.

With both the sample limitations and the methodological errors in mind, it would be interesting to see how the results would look with a larger sample with more variability, and a true control group that does not receive context information at all. Perhaps with these limitations and errors addressed, we may be able to more confidently determine the combined impact of bias and trauma on one’s memory for an emotionally disturbing police-civilian encounter.

### **Implications**

In summary, our results indicate that people can come to remember BWC footage as more traumatic than their initial experience. What is important to remember is that the high degree of memory distortion found in this study occurred in a controlled, systematic environment. Indeed, research has found that even in a controlled environment with no explicit suggestive influences, memories for emotionally disturbing events are often flawed (Oulton, Takarangi, & Strange, 2016). In the real world, by contrast, exposure to BWC footage is not controlled; in fact, in the real world, exposure to BWC footage is often manipulated. There is a danger then, that one’s memory for the BWC footage could be manipulated as well. For example, it is well known that we often learn about and view recorded police-civilian encounters on the news, and, as stated



previously, media coverage of BWC footage often highlights the conflict of traumatic police-civilian interactions (Naoroz & Clearly, 2021). The associated impact of this coverage by the media could have devastating consequences on the public and its view of the police. Imagine, for example, a scenario in which most of the population watches an emotionally disturbing police-civilian encounter on the news and walks away remembering the footage as more traumatic – as a result of police officer behavior – than what they actually saw. The opposite could be true for a civilian who is thought to have committed an act of aggression towards a police officer. Suppose the consequences that could occur if a jury that views the BWC footage of the encounter – in which the civilian is the primary aggressor – remembers the footage as more traumatic than what they actually saw. It could result in increased bias against the citizen. In either case, it is quite possible that media coverage of BWC footage could elicit memory distortion from viewers, in the direction of the more traumatic details.

The consequences of memory distortion for traumatic BWC footage could be even more critical if the person in question is in a high-stakes position. Take, for example, a jury member. The dramatic increase of BWC use throughout the country also means that jurors may be more likely to watch the footage in the courtroom. Indeed, acting as a juror can be a stressful and even traumatic endeavor, and research has shown that viewing traumatic evidence is one of the top stressors for jurors (NCSC, 1998; Robertson, Davies & Nettleingham, 2009). This stress can sometimes be severe, and jurors have reported a wide range of physiological and psychological symptoms stemming from their time in the courtroom, including sleep problems, physical complaints, such as stomach aches and headaches, emotional distress, such as feelings of anger and guilt, and intrusive thoughts and images – indicative of PTSD symptoms (Chesterman et al, 2001; Kaplan and Wignet, 1992; National Center for State Courts, U.S.A., 1998; Robertson,

Davies & Nettleingham, 2009). Exposure to traumatic BWC footage could leave jurors at risk for a multitude of source monitoring errors, particularly if they are under extreme stress. For example, jurors are often exposed to a variety of conflicting evidence and are even required to deliberate with other jurors (Bienen, 1992; Kaplan & Wignet, 1992; McGrath & Ryan, 2004). When asked to recall the BWC footage, details from these external sources of information could be included in the juror's reconstruction of the event, causing the juror to remember the footage incorrectly.

In addition, if the juror is one of the many that experiences intrusive thoughts and images after his/her time in the courtroom, details from those thoughts and images could be confused with actual details from the BWC footage, and those intrusive thoughts could be included in memory reconstruction. (Strange & Takarangi, 2014). Although this study did not investigate the impact of exposure to traumatic BWC footage on jurors in the courtroom, the results of this study can help inform future research that does. We know, for example, that jurors form verdicts based on ideological values (Narby, Cutler, & Moran, 1993), and that people often deny their biases and have a difficult time setting aside their biases to make decisions (Jones et al., 2018). Complicating the picture further is the finding in the literature that people assume that BWC footage is irrefutable evidence, lacking in ambiguity (Jones et al., 2018). Suppose a scenario in which a juror who experiences memory amplification after watching traumatic BWC footage needs to make a critical sentencing decision. The consequences could be significant.

### **Future Directions**

As previously stated, BWCs were created to be objective tools for increasing police legitimacy and transparency, thereby improving police/community relations (BJA, 2015). As a result, police departments throughout the country have enacted quickly and efficiently to equip all officers with BWCs, with overwhelming support from Congress and the Department of Justice

(James et. al., 2020). Indeed, early evaluations of BWCs found a number of beneficial outcomes for law enforcement agencies (White, 2014), including a reduction in use-of-force incidents (Ariel, Farrar, & Sutherland, 2015) and civilian complaints (Sutherland et al., 2017), as well as an increase in self-initiated contacts with community residents (Ready & Young, 2015). Despite the identified benefits of BWCs, it is also important to recognize their limitations. For example, recent reviews on BWC research have noted that there is still much we do not know about the efficacy of BWCs, as the existing literature has had conflicting results (Lum et al., 2019; see also Lum et al., 2015).

In the context of memory, we know that mental imagery plays a role in memory distortion (Strange & Takarangi, 2012; Strange & Takarangi, 2015), and that manipulating source monitoring strategies can increase the degree of memory distortion one experiences (Strange & Takarangi, 2014). The results of this study tell us that people can come to remember traumatic BWC footage as more traumatic than their initial experience. Although troubling at its base, memory distortion could be exacerbated further if the footage is viewed more than once, which, given the wide availability of BWC footage on news outlets and various social media sites, is highly likely. Of further concern is if the officer turns off his/her BWC, or if media outlets show only some of the footage, leaving viewers to fill in the blanks about what they saw. This would leave viewers to depend on their own mental imagery to fill in the blanks, which, depending on the information they were provided by the news outlet, could increase their level of memory distortion for the footage even further. Future research, then, should continue to examine these unknowns in relation to memory distortion for emotionally disturbing police-civilian encounters.

### **Acknowledgements**

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**Appendix A**

**THE CITY UNIVERSITY OF NEW YORK**  
*John Jay College*  
*Psychology and Law*  
**CONSENT TO PARTICIPATE IN A RESEARCH STUDY**

**Title of Research Study:** UNDERSTANDING POLICE CITIZEN INTERACTIONS

**Principal Investigator:** DERYN STRANGE, Ph.D.  
Psychology Professor, John Jay College

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**You are being asked to participate in a research study because** you are a John Jay student enrolled in a Psychology course and are 18 years of age or older. Research is an important part of gaining scientific knowledge, and it is one of the only ways to research the topic we are investigating.

**Purpose:** The purpose of this research study is to understand interactions between police officers and citizens.

**Procedures:**

If you volunteer to participate in this research study, we will ask you to do the following:

- Learn about a police citizen interaction
- Answer questions about the interaction

**Time Commitment:** Your participation in this research study is expected to last for a total of 60 minutes.

**Potential Risks or Discomforts:**

- Potential risks include distress associated with participating in this research study.
- If you wish to withdraw from the research study, you will not be penalized. Your participation is completely voluntary.

**Potential Benefits:**

- You may learn about the area of psychology under study in this research experiment.
- You may learn about the research process itself and what it is like to be a participant in psychological research.

**Alternatives to Participation:** You do not have to participate in this research study. You can choose to participate in a different research study, or you can complete an alternative assignment as part of the Research Experience Program.

**Payment for Participation:** You will receive 2 course credits.

**New Information:** You will be notified about any new information regarding this study that may affect your willingness to participate in a timely manner.

**Confidentiality:** We will make our best efforts to maintain confidentiality of any information that is collected during this research study, and that can identify you. We will disclose this information only with your permission or as required by law.

We will protect your confidentiality by referring to your individual data solely by participant numbers. Data will be stored using a code list that will be stored separately and accessible only to the principal investigator and co-investigator. Any published reports will only include information about the data as a whole, and your data will never be referred to individually. Research records will be kept in a locked file and only the researchers will have access to these records.

The research team, authorized CUNY staff and government agencies that oversee this type of research may have access to research data and records in order to monitor the research. Research records provided to authorized, non-CUNY individuals will not contain identifiable information about you. Publications and/or presentations that result from this study will not identify you by name.

**Participants' Rights:**

- Your participation in this research study is entirely **voluntary**. If you decide not to participate, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled.
- Your participation or non-participation in this study will in no way affect your grades or academic standing with CUNY
- You can decide to withdraw your consent and stop participating in the research at any time, without any penalty.

**Questions, Comments or Concerns:**

If you have any questions, comments or concerns about the research, you can talk to:

Deryn Strange, Ph.D. (Principal Investigator and Faculty Advisor)  
Professor of Psychology  
dstrange@jjay.cuny.edu

Eric Korzun  
M.A. Student  
eric.korzun@jjay.cuny.edu

If you have questions about your rights as a research participant, or you have comments or concerns that you would like to discuss with someone other than the researchers, please call the CUNY Research Compliance Administrator at 646-664-8918. Alternately, you can write to:

CUNY Office of the Vice Chancellor for Research  
Attn: Research Compliance Administrator  
205 East 42<sup>nd</sup> Street  
New York, NY 10017

**If you consent to participate in this research study, please click the “I consent” bubble.**

**Appendix B**

**THE CITY UNIVERSITY OF NEW YORK**  
*John Jay College*  
*Psychology and Law*  
**CONSENT TO PARTICIPATE IN A RESEARCH STUDY**

**Title of Research Study:** UNDERSTANDING POLICE CITIZEN INTERACTIONS

**Principal Investigator:** DERYN STRANGE, Ph.D.  
Psychology Professor, John Jay College

You are being asked to participate in a research study because you are over the age of 18.

**Purpose:** The purpose of this research study is to understand interactions between police officers and citizens.

**Procedure:**

If you volunteer to participate in this research study, we will ask you to do the following:

- Learn about a police citizen interaction
- Answer questions about the interaction

**Time Commitment:** This research study will be done in two parts, with a **24-hour delay** in between. We anticipate that each part should take no longer than 30 minutes each. **Please do not participate in this study if you cannot devote time to both parts.**

**Potential Risks or Discomforts:** Some of the content in this study is graphic and contains violent information that may adversely affect some participants. However, the content is similar in nature to what is reported on the news.

**Potential Benefits**

- You will have the opportunity to learn about how some research in psychology is completed.
- You will have the opportunity to gain insight to how important real world topics are studied in a research setting.

**Payment for Participation:** You will receive \$0.75 for your participation in Part A and \$1.00 for your participation in Part B.

**Confidentiality:** We will make our best efforts to maintain confidentiality of any information that is collected during this research study, and that can identify you. We will disclose this information only with your permission or as required by law.

The data obtained from you will be collected as written data. Once you begin the study, you will be provided a participant code in order to store your responses accordingly. Your participation in this online survey involves risks similar to a person's everyday use of the Internet, and



confidentiality will be maintained to the degree permitted by the technology used. We will ask you to record your MTurk ID so that you can receive compensation, but your name will not be linked directly to your survey responses. When we download the data set, we will store it on a password-protected computer accessible only to the PI and trained research assistants as well as the Institutional Review Board. You will never be identified in our research project or in any other presentation or publication and only aggregate data will be presented. All of your data will be stored in a password-protected file in a secured and locked laboratory. We will ask you to record your SONA ID so that you can receive credit, but your name will not be linked directly to your survey responses.

The research team, authorized CUNY staff, and government agencies that oversee this type of research may have access to research data and records in order to monitor the research. Research records provided to authorized, non-CUNY individuals will not contain identifiable information about you. Publications and/or presentations that result from this study will not identify you by name.

**Participants' Rights:** Your participation in this research study is entirely **voluntary**. If you decide not to participate, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. You can decide to withdraw your consent and stop participating in the research at any time, without any penalty.

**Questions, Comments or Concerns:** If you have any questions, comments or concerns about the research, you can talk to one the following researchers:

Deryn Strange, Ph.D. (Principal Investigator and Faculty Advisor)  
Professor of Psychology  
dstrange@jjay.cuny.edu

Eric Korzun (Co-Principal Investigator)  
M.A. Student  
eric.korzun@jjay.cuny.edu

If you have questions about your rights as a research participant, or you have comments or concerns that you would like to discuss with someone other than the researchers, please call the CUNY Research Compliance Administrator at 646-664-8918. Alternately, you can write to:

CUNY Office of the Vice Chancellor for Research  
Attn: Research Compliance Administrator  
205 East 42nd Street  
New York, NY 10017

## **Appendix C**

### **Context Information**

In this study, you will watch body worn camera footage of a police/citizen interaction. Before watching the footage, there are three things you should know about the interaction that occurred before the interaction was recorded:

- A witness called the police about a suspicious car.
- The witness also said that the man in the suspicious car was carrying a gun.
- The police pulled over a man driving a car that matched the description given by the witness.

After pulling over the man driving the vehicle, the officer's body camera starts recording.

## Appendix D

### Basic Facts Memory Task

The next set of questions concerns the events of the body worn camera footage you saw yesterday. Please answer each question to the best of your abilities.

1. Why did the police officers pull the car over?
2. Where was the man in the clip sitting when the police arrived?
3. What color was the car?
4. What did the officer ask the man in the film for?
5. Why did the officers put the woman in handcuffs?
6. How many police officers were there at the beginning of the film?
7. Why did the officer pull the taser on the passenger of the car?
8. How many passengers were in the car (in total)?

## Appendix E

### Perceptions of Officer Questions

1. How warranted do you think the officer's use of force on civilian was?
2. How responsible was the officer for escalating the situation? (Reverse scored)
3. Overall, how forceful was the officer? (Reverse scored)
4. Overall, how professional was the officer?
5. Overall, how appropriate were the officer's actions?

### Perceptions of Civilian Questions

1. How responsible was the civilian for escalating the situation? (Reverse scored)
2. How violent was the civilian in resisting arrest? (Reverse scored)
3. Overall, how cooperative was the civilian?
4. Overall, how threatening was civilian? (Reverse scored)

## Appendix F

**IMPACT OF EVENTS SCALE-Revised (IES-R)**

**INSTRUCTIONS:** Yesterday you watched an unpleasant film depicting police body worn camera footage. Below is a list of difficulties people sometimes have after witnessing stressful life events. Please read each item, and then indicate how frequently these comments are true for you, in relation to the body worn camera footage you watched, DURING THE PAST 24 HOURS. If these difficulties have not occurred, please mark the "not at all" column.

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Any reminder brought back feelings about it	0	1	2	3	4
2. Other things kept making me think about it.	0	1	2	3	4
3. I felt irritable and angry	0	1	2	3	4
4. I avoided letting myself get upset when I thought about it or was reminded of it.	0	1	2	3	4
5. I thought about it when I didn't mean to	0	1	2	3	4
6. I felt as if it hadn't happened or wasn't real.	0	1	2	3	4
7. I stayed away from reminders of it.	0	1	2	3	4
8. Pictures about it popped into my mind.	0	1	2	3	4
9. I was jumpy and easily startled.	0	1	2	3	4
10. I tried not to think about it.	0	1	2	3	4
11. I was aware that I still had a lot of feelings about it, but I didn't deal with them.	0	1	2	3	4
12. My feelings about it were kind of numb.	0	1	2	3	4
13. I found myself acting or feeling like I was back at that time.	0	1	2	3	4
14. I had waves of strong feelings about it.	0	1	2	3	4
15. I tried to remove it from my memory.	0	1	2	3	4
16. I had trouble concentrating.	0	1	2	3	4
17. Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.	0	1	2	3	4
18. I felt watchful and on-guard.	0	1	2	3	4
19. I tried not to talk about it.	0	1	2	3	4

Note: We removed three items from the IES-R that related to sleep not applicable to our study sample (Strange & Takarangi, 2012): 1) I had trouble saying asleep (Intrusions Subscale); 2) I had trouble falling asleep (Hyperarousal Subscale); 3) I had dreams about it (Intrusions Subscale).

Total IES-R Score: \_\_\_\_\_

INT: 1, 2, 5, 8, 13, 14

AVD: 5, 6, 7, 10, 11, 12, 15, 19

HYP: 3, 9, 16, 17, 18

## **Appendix G**

### **Identification with Police Scale (IPS)**

1. If you talked to most police officers, you think you would find that they have similar views to your own on many issues
2. Your background is similar to that of most police officers
3. You can usually understand why police officers, in general, are acting as they are in a particular situation.
4. You generally like most police officers that you encounter.
5. Most police officers would approve of how you live your life.
6. If most officers knew you, they would respect your values.
7. Most police officers would value what you contribute to your community.

**Appendix H****CITY UNIVERSITY OF NEW YORK****John Jay College of Criminal Justice***Department of Psychology***DEBRIEFING STATEMENT****Project Title***Understanding Police and Citizen Interactions***Principal Investigator**

DERYN STRANGE, PHD

Associate Professor

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Thank you for your participation in this study. This debriefing process is an opportunity for you to learn more about the research you participated in, how your participation plays a part in this research, and why this research may be of importance to society. First, it is important that you do not discuss this study with anyone else that might also participate in this research in the future. Knowledge about the study may influence and skew responses and essentially, invalidate the information obtained from participants with prior information. (For this same reason, it is important that you inform the experimenter if you knew details about this study before you participated.)

The purpose of this study was to investigate the mediating effect of trauma on the relationship between police identification and memory distortion when viewing police body worn camera footage. To clarify, studies have shown that when viewing body worn camera footage, people interpret the footage in accordance with their personal biases and experiences. Likewise, studies of memory distortion reveal that people tend to remember traumatic events as worse than they originally were (Strange & Takarangi, 2015; Engelhard, van den Hout, & McNally, 2008; Southwick, Morgan, Nicolaou, & Charney, 1997). Taken together, then, when viewing traumatic BWC footage, it is possible that viewers will not have a clear memory of what they witnessed. What is not clear, however, is how bias and trauma interact to create memory distortion. The present study aimed to test a model in which police identification (independent variable) effects memory distortion (dependent variable) indirectly, through the mediating effect of trauma. The results of this study will impact our current knowledge of body worn camera footage, and how people perceive and remember that footage, particularly when it is traumatic.

It is likely that the results of this research will be presented at academic conferences and/or published as an article in a journal. Again, your individual responses will be kept confidential during this process. If you are interested in the results of this study or if you have any additional questions or comments, please email Eric Korzun at [eric.korzun@jjay.cuny.edu](mailto:eric.korzun@jjay.cuny.edu).