EYEWITNESS TESTIMONY IN RELATION TO BIASES ASSOCIATED WITH AGE

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ABSTRACT

Studies have shown there are several factors which influence eyewitness memory, such as cognitive biases and age. This study involved young adults (18-35 years) and older adults (60 and over) to look at their eyewitness memory performance after witnessing a crime. Participants watched a video of a nonviolent crime (i.e., theft). Then, identified the suspect in a simultaneous, photographic lineup. The purpose of this study was to examine how cognitive biases help or hinder the memory performance for young and older adults. While we predicted to see an own-age bias in both younger and older adults, there was no significant finding, which may be due to the difficulty of the suspect lineup. While there were no significant results from this study, the lack of significant results does have some implications. The first being witnesses of all ages make inaccurate identifications, not just older witnesses. The second being the use of off grainy video footage, such as CCTV (i.e., security cameras) as evidence to use for witness identifications can negatively impact the witness's ability to accurately encode personal characteristics and later recognize those features during a lineup. Future studies could look at whether witness confidence plays a role in their accuracy when making an identification or whether individuals of different age groups rely on differing processing methods to encode facial features when witnessing a crime.

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From the day I discovered the field of Forensic Psychology, I knew it was what I wanted to study. The further into my undergraduate and graduate degree programs, the more I knew this was where I was meant to be, working within this area of psychology was what I was meant to do with my life. However, I would not be where I am without the support and guidance of several individuals. First, I would like to thank my mentor, Dr. Nora Gayzur. Thank you for investing so much time and energy into helping me grow as a student and aspiring forensic psychologist. I would also like to thank my thesis committee for helping to better me as a researcher and helping me troubleshoot when technical issues arose. Next, I would like to think my family for supporting me as I further my education and always listening to me ramble about what new psychology facts I have learned, you all are very much appreciated. And lastly, thank you to my friends who have kept me grounded, spent countless hours studying with me, and helping keep me motivated when the going got rough.

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INTRODUCTION

Formation of Cognitive Schemas

Cognitive schemas are a type of categorization and are created due to familiarity with events, organizations, groups, and individuals. Schemas are used as mental groupings, or categories, to quickly process and sort through any incoming information in order to be more efficient (Goldstone et al., 2012). This allows for an individual to make rapid decisions or judgments about a group or individual, while preserving cognitive resources in case they are needed at a later time. While efficient, this can cause problems when an individual needs to retrieve complex memories, such as facial recognition. In general, schemas help individuals process information quickly and efficiently. However, they can be error prone in some contexts.

The link between schemas tend to rely heavily on heuristics. Heuristics are cognitive shortcuts used to conserve cognitive resources. These shortcuts are useful in navigating both familiar and unfamiliar situations and rely heavily on the automated cognitive system (Kahneman, 2011). Findings suggest there are two cognitive systems for processing information and executing daily tasks. Both systems are used regularly to help us process incoming information, interact with others, navigate situations, as well as complete important chores, work, or other responsibilities. System 1 is considered to be the automatic system, or the system which uses little to no cognitive resources. System 2, on the other hand, is a slower, more effortful process. This system is responsible for monitoring and regulating thoughts, emotions, and impulses, along with decision making, thinking critically, and self-regulating behaviors (Kahneman, 2011).

While the judgments based off minimal information can lead to bad heuristics, System 2 also plays an equally important role in the creation of these cognitive shortcuts, as this system is

responsible for monitoring and regulating the output from the other system. Thus, when System 2 is busy or being taxed, it is not as thorough in monitoring the activities of System 1 and inadvertently contributes to the creation of potentially incorrect heuristics, biases, and judgments. Research has shown when this happens, individuals are more likely to make self-centered decisions, use inappropriate language, as well as create and use inaccurate stereotypes to navigate situations (Kahneman, 2011). Once these cognitive shortcuts are created, no matter how accurate or inaccurate, we tend to rely on them to help make future decisions, especially when we are on a time crunch or low on cognitive resources. This leads us to rely on developed biases and stereotypes to navigate both familiar and unfamiliar situations.

Cognitive Schemas and Biases

While the decision-making process can be cognitively intensive, many judgments are made using implicit processes. Banaji et al., (1993) theorized that heuristics, such as stereotypes and attitudes, often operate implicitly (outside of conscious awareness) and influence one's behavior, as well as one's conscious thoughts and decision-making. Simply being exposed to stereotypical information can unconsciously influence one's judgments and attitudes towards an individual, a group, an object, or even a place. The strength of these implicit stereotypes and attitudes play an important role on conscious thought, decision-making, and behaviors.

Cognitive schemas can be activated in several ways, both implicitly and explicitly. Implicit schema activation is often the most common type of schema activation and can occur through several methods, such as semantic priming and implicit stereotyping (Levy, 1996). Implicit stereotyping is defined as activating an individual's stereotypes without them being conscious of it. This can be done by various tasks, such as an implicit association task, sentence completion tasks, or word fragment tasks. While an individual may be unaware of their implicit

stereotypes and biases, once activated, these beliefs can influence one's abilities, such as memory in older adults. For example, Levy (1996) found that activating negative stereotypes regarding memory in older adults may contribute to more noticeable declines in the memory abilities of older adults not otherwise seen. Additionally, Levy found implicit stereotypes can be primed without an individual's knowledge and, that once activated, these implicit stereotypes had a significant impact on an individuals' memory performance. This finding occurred across a wide age range and suggested that simply being a member of a group, older adult for instance, rather than having to be the "typical" member can allow activation of these implicit self-stereotypes. This finding shows group membership not only influences familiarity but also the production and use of cognitive schemas.

Biases are important influencers on facial recognition memory. Several studies have shown factors, such as race and age, can impact one's ability to make an accurate identification (Wells & Olson, 2003). Research on the *own-race bias*, also known as the *other-race effect*, has shown individuals are better at recognizing faces of individuals who are the same race as themselves, while being less accurate at recognizing or identifying faces of different races (Wells & Olson, 2001). The own-race bias impacts facial recognition abilities primarily due to the concept of familiarity. Familiarity is a largely rapid and unconscious cognitive process which heavily influences the encoding of incoming information (Yonelinas, 2002). Research has shown this concept is related to recognition and remains mostly unaffected by age. However, other processes such as recollection and source memory, see declines with age. Familiarity occurs when an individual has an increased amount of experience with something, in this case recognizing faces more similar to their own. Familiarity influences an individual's ability to recognize faces, both familiar and unfamiliar, as this concept plays an important role in the

creation and maintenance of cognitive heuristics (Fulton & Bartlett, 1991). Therefore, due to familiarity and heuristics, the own-race bias occurs because individuals of one race may have more frequent contact with those members of the same race as themselves. This leads to an "in-group" versus "out-group" mentality. Understanding own-race bias is important in understanding how a similar concept, *own-age bias*, has the potential to impact memory and as a result identification ability. With the own-age bias, individuals would have better memory for and better identification abilities for the individuals within their "in group" than individuals within their "out group."

While there is evidence suggesting own-age bias exists, there is little research suggesting how this bias impacts one's memory. There are a few studies suggesting both younger and older adults are equally biased in their ability to recognize faces depending on their age. Wright and Stroud (2002) studied the influence of age bias on facial recognition abilities through the use of a suspect line-up using younger (age 18-33) and middle-aged (age 33-55) participants. They found younger adults were more accurate when identifying younger faces, while being less accurate when identifying middle-aged faces. They also found that while middle-aged adults were not as accurate in identifying younger faces, they performed better when they were asked to identify a middle-aged face. These findings have been demonstrated with younger age groups as well. Anastasi and Rhodes (2005) examined both children (age 5-8) and older adults (age 55-89) to see how own-age bias impacts facial recognition abilities. They found both children and older adults were much more accurate in recognizing faces similar in age to their own. The results support the concept of own-age bias, suggesting we are in fact better at recognizing those faces more similar in age to our own.

In contrast, Anastasi and Rhodes (2006) found older adults had a stronger own-age bias

by having both younger and older adults study a series of photographs of faces with varying ages and having them determine their estimated age and whether or not they were photographs they had seen previously. They found younger adults were more accurate than older adults in recognizing both younger and middle-aged faces, while being just as accurate in recognizing older faces as the older adults. Older adults, on the other hand, were significantly better at recognizing faces similar in age to their own than they were younger ones. Lamont et al., (2005) looked at how age and memory load impact an individual's facial recognition abilities. They found facial recognition abilities declined with age and this decline impacted the memory for younger faces more so than older ones. Together, these studies show that older adults may demonstrate stronger own-age biases or may even rely on those biases more strongly than younger individuals.

Other research suggesting one age group has a stronger own-age bias did so utilizing a gaze following task (Slessor et al., 2010). The results demonstrated younger adults are better at following gaze cues from a face similar in age to their own. Older adults on the other hand showed no significant difference in performance in gaze following between younger and older faces. In support of this study, Wiese et al., (2008) found the own-age bias in young adult participants but not in older participants. Participants were shown a series of younger and older faces, asked to decide whether the faces were young or old, and told to memorize the faces as there would be a memory test at the end of the study. When brain activation was measured, younger adults showed greater activity when looking at younger faces than older ones. However, there was no significant difference in the brain activity of older adults when looking at younger or older faces. Additionally, Nicholls and colleagues (2018) studied own-age bias through the use of ambiguous images. This study used participants who ranged from 18-68 years of age and

split them into two groups, those younger than 30 years of age and those older than 30. Participants were then asked to look at an ambiguous photograph and estimate the age of the face. While the results showed that as the participant's age increased the estimated age of the ambiguous face also increased, the research shows this effect was stronger for the younger adult participants. This finding may have to do with the general youth bias. This bias shows both younger and older adults prefer concepts associated with youth and being young (Nosek et al., 2007). Considering this series of studies, it seems that older adults do not demonstrate a strong own-age bias, compared to young adults. It calls into question how younger and older adults group themselves according to age.

Group membership acts as a cognitive shortcut which helps individuals process incoming information quickly and efficiently. Research has shown younger adults are more likely to classify younger people as being a part of their "in-group", while older adults are more likely to categorize both younger and older individuals as part of their "in-group" (Slessor et al., 2010). This categorization of both young and older individuals as part of one's in-group may mean the heuristics used by older adults aid them in their abilities to accurately recognize both younger and older faces. Because heuristics, such as group membership, influence the way an individual encodes incoming information (i.e., more detailed information regarding in-group members and more general features about out-group members) it is important to remember how these will impact their ability to make an identification on an "out group" member. The initial information encoded about the "out group" member will influence the individual's ability to recognize the face at a later time. Therefore, this leads us to investigate the way familiarity and cognitive schemas influence and are influenced by age and age-related expectations in order to learn how these expectations impact facial recognition abilities.

Eyewitness Memory and Biases

Eyewitness testimony, while commonly used, is a very problematic form of evidence. Eyewitness memory and testimony have received a lot of attention by researchers since the 1970s (Wells, 1993; Wells & Olson, 2003). The interest in eyewitness memory and identifications continues as researchers try to find ways to increase the number of true, or accurate, suspect identifications while reducing the frequency of false, or incorrect, identifications. Years of research have shown eyewitness memory to be overwhelmingly unreliable. Eyewitness misidentification is responsible for nearly 70% of all wrongful convictions and occurs in approximately 71% of cases in the United States alone (The Innocence Project, 2020). These misidentifications can occur through an in-person suspect line-up, a photographic suspect line-up, and even through composite sketches. This may be due to the fact eyewitnesses often assume the perpetrator must be one of the individuals present in the line-up or the administrator of the line-up unintentionally cues the witness to who they know or expect the suspect to be. However, these misidentifications could also be due to personal characteristics of both the witness and the perpetrator, such as cognitive bias like own-age bias, which have the ability to influence an individual's facial recognition abilities. This is demonstrated through research on DNA exonerations, which have shown that other-race misidentifications are the largest contributing factor in wrongful convictions (Wells & Olson, 2001). Even knowing these facts and the unreliability of eyewitness memory, eyewitness testimony is one of the most common and most compelling types of evidence used in a criminal or civil trial.

Within eyewitness testimony research, the examination of cognitive biases has strong implications for the validity of testimony. Research regarding schemas has found that when experiences or individuals are more consistent with their expectations and existing mental

representations, they are able to recall more information about them (Shapiro, 2009). This is because when schema-consistent information is perceived, the existing schema is activated. This allows more relevant information to be encoded, processed, and stored quickly. Whenever schema-inconsistent information is perceived, the individual has to create a new category to place the information in, thus distracting from one's ability to deeply encode and process this information. As a result, when asked to recall the details of an event and when an individual's cognitive schemas are activated, schema-consistent information is used to fill in any gaps in memory.

When examining how schema consistency impacts memory for crimes, Shapiro and Brooks (2018) found supporting evidence when child witnesses recalled information more accurately when presented with gender-schema consistent stimuli compared to gender-schema inconsistent stimuli. This implies that individuals, regardless of age, provide a more detailed and accurate account of personal and situational characteristics, when the characteristics are consistent with one's preexisting cognitive schemas and can have negative impacts on memory and recollection if the information is inconsistent with one's cognitive schema.

While schemas can improve memory when the information is consistent with one's expectations, it can negatively impact memory if the information is inconsistent with one's expectations (List, 1986). Research found schema consistency influences memory, regardless of age, through the use of various age groups, such as children, college-aged adults, and older adults. While older adults demonstrated some age-related differences in memory, all age groups were impacted by schema consistency. Both younger and older adults showed more accurate recall of schema consistent information over schema inconsistent information. This research also suggested younger and older adults use schemas in different ways. Older adults tend to use more

self-referencing information and may use a more conceptually driven processing style, while younger adults are more likely to be more analytical and use a data-driven processing style (List, 1986; Rousseau & Rogers, 2002). Thus, schema consistency seems to regulate potential age differences in memory. The use of schemas may help alleviate age-related declines in memory. However, it is unclear how schema consistency and own-age bias interact with one another to either enhance or reduce facial recognition memory for young and older adults.

Eyewitness Memory and Suspect Lineups

Suspect lineups have the potential to influence eyewitness memory. This is due to several factors such as lineup instructions, the content of the lineup, and how the lineup is presented (Wells & Olson, 2003). Research has shown instructions given to a witness prior to making a suspect identification can impact the number of false, or inaccurate, identifications made. Simply telling a witness the suspect may or may not be present in the current lineup reduces the likelihood of misidentifications. This relates back to how expectations and biases influence memory. If a witness goes into a lineup expecting the suspect to be present, they are more likely to choose an innocent individual as they feel as though they must make an identification, even when the suspect is absent from the lineup. However, witnesses who go into a suspect lineup knowing there is a chance the suspect may be absent are less likely to make that same mistake.

The content of the lineup can impact a witness's accuracy in several ways. The first being if the suspect is present or absent. Research has shown witnesses are more likely to make a misidentification when the suspect is absent from the lineup. This is likely due to witness expectations and biases making them feel as though they must select an individual from the lineup. The last being whether the innocent fillers, or individuals who are not the suspect, resemble the suspect. While law enforcement officials do not want the suspect to stick out,

lineups that contain fillers who closely resemble the suspect can lead to misidentifications. In an ideal lineup, the fillers will resemble the witness' description of the suspect rather than purposely creating a lineup of individuals who look like the suspect. While this may lead to a lineup of individuals who resemble one another, it is based off the witness' recollection instead of the suspected culprit. By giving the witness clear instructions and properly creating a lineup based off a witness's description of a perpetrator, law enforcement officials can reduce the likelihood of false identifications.

Present Study

Taken together, these findings would suggest that eyewitness memory would be better if the perpetrator was similar to the witness in terms of physical features, as well as the witness' cognitive expectations based on schemas. Essentially, I investigated how own-age bias and schema consistency influenced one another to impact eyewitness memory. As one can see, the research on own-age bias in regard to facial recognition is conflicting. Some researchers have found younger adults have a stronger age bias than older adults, while other research has found the opposite (Slessor et al., 2010; Wiese et al., 2008; Anastasi & Rhodes, 2006). Schema consistency may interact with own-age bias through familiarity. Familiarity describes how more experience with a particular group may override purely physical characteristics of a group. It could mean that when perpetrators act in a schema consistent manner that it would activate the heuristics for schema expectations but also group membership expectations (e.g., stereotypes and attitudes). With the conflicting findings in terms of the own-age bias and group membership, schema consistency may interact with existing biases differently between age groups.

The purpose of this study was to add to the existing research and clarify which age group experiences a stronger age bias when required to make facial recognition identifications. This is

important as individuals are now living longer life spans; therefore, older adults are likely to be witness to or victims of crimes more frequently than they have been in the past (Garcia-Bajos et al., 2012). With this being said, many experts and workers within the criminal justice system consider older witnesses to be less accurate and less credible than younger witnesses. Therefore, because it is likely we will see an increase in older witnesses to and victims of crime, we need to know if they can be considered reliable and credible witnesses. If the results show older adults can be as accurate, if not more so, than younger adult witnesses, it may lend credence to the credibility and reliability of older adult witnesses.

There are several hypotheses for this study. First, older adults tend to show age-related declines in memory performance compared to young adults (Salthouse, 2003). Therefore, it was hypothesized older adults would overall be less accurate at choosing the perpetrator from a line-up compared to young adults. Additionally, the recall of crime features, and other details is better for schema consistent than schema inconsistent information (Shapiro & Brooks, 2018). Therefore, I expected to see both young and older participants to have a better recall for schema consistent information than schema inconsistent information (i.e., be more accurate in the schema consistent conditions compared to the schema inconsistent conditions).

In addition, there were several interactive processes that could come into play with the complexity of eyewitness memory. For instance, the own-age bias demonstrates that individuals tend to have better memory for individuals that belong to their group compared to when outside of their group. If the findings on Anastasi and Rhodes (2005) are accurate and older adults demonstrate an own-age bias, older adults would have better memory for perpetrators who are also older compared to young perpetrators. The same pattern would be demonstrated for young adults for young perpetrators. Thus, older adults would have higher accuracy for older

perpetrators compared to young perpetrators, while young adults would have higher accuracy for young perpetrators compared to old perpetrators.

Schema consistency may be a factor that moderates the own-age bias, meaning the more schema consistent a crime, the stronger the own age bias would be. However, if the findings from Slessor et al. (2010) are accurate, then schema consistency and own-age bias would interact with one another, but only for young adult witnesses. For older witnesses, they would not demonstrate an own-age bias. Therefore, the schema consistency would be the only resource which could be relied on by older adult witnesses. Thus, young witnesses would show higher accuracy in recall for young perpetrators compared to older perpetrators, but the magnitude of the effect would be greater for schema consistent information than the schema inconsistent. Older adults would show only an increase in recall based on schema consistency. Therefore, they would demonstrate no own-age bias (higher accuracy for perpetrator their own age, rather than not) but would demonstrate schema consistency effects regardless of the perpetrator's age.

METHOD

Participants

A total of 84 individuals participated in this study. A total of 42 young adults (18-35 years) completed the study. They were from the University of Central Oklahoma General Psychology Subject Pool, as well as from the community. The young adults from the University of Central Oklahoma completed the study for partial course credit, while those from the community were asked if they wanted to be entered into a drawing for a $25 Amazon gift card. A total of 42 older adults (60 – 75 years) completed the study. At the end of the study, the older adults were also asked if they wanted to be entered into a drawing for a $25 Amazon gift card. A self-report health screening questionnaire (Christensen et al.,1992) was used to ensure that all

participants were free of serious medical conditions that could impair cognitive functioning (e.g., heart disease, stroke, neurological diseases such as Parkinson's disease, and drug or alcohol abuse).

Materials

Sentence Completion Task: All participants completed a sentence completion task to target implicit stereotyping. This task specifically targeted the priming of stereotypes of older adults in both younger and older adult participants. Levy (1996) found that when primed, older adults were impacted by their own group stereotypes. Research has shown the sentence completion task implicitly primed those stereotypes (DeMarree et al., 2016). This task included ten sets of five words. Participants were instructed to create a grammatically correct sentence using only four of the five words (e.g., paper easily hands crumble shoe – hands easily crumble paper). Each of the ten sets of words included an aging stereotypical word, not specifically referencing the aging process. For instance, in hands easily crumble paper, the word "crumble" was meant to prime the idea of frailty in older adults.

Videos - The four separate pre-recorded crime videos consisted of a young adult male (age 24) and older adult male (age 70) stealing a package off a front porch. For each perpetrator video, there was a schema consistent and schema inconsistent version. The schema primed in the sentence completion task was age. Schema consistency was related to age stereotypes for the purpose of this study. For instance, for young perpetrators, schema consistency would be a younger person running away from the crime scene (schema consistent) rather than walking slowly away from the crime scene (schema inconsistent). This was based on the expectation that young individuals are more likely to locomote faster than an older individual (Salthouse, 1996). For older perpetrators, schema consistency would be walking away from the crime scene

(schema consistent) rather than running away from the crime scene (schema inconsistent). This was based on the expectation that older adults move slower in the world compared to a younger person (Salthouse, 1996). Each video was approximately 40 seconds in length. In each pre-recorded video, a delivery man delivered a package to the house, and then the perpetrator was observed stealing the package off the front porch. Two individuals (witnesses) walked past the house in the background, and that promoted the perpetrator to leave the scene. The perpetrator either ran away when noticing the witnesses or walked away calmly after seeing the witnesses.

Distractor Task – The distractor task was a word search. The word search consisted of items related to school life (e.g., books, pencils, backpack). The word search was generated at TheWordSearch.com (https://thewordsearch.com/puzzle/37/school-life/).

Lineup – Two suspect lineups were created. One consisted of older adult male suspects and the other consisted of younger adult male suspects. Both lineups contained only the one suspect and nine innocent fillers (i.e., the single-suspect lineup model), as well as a "suspect not present" option (Wells, 1993). All suspect photographs were taken in the same manner. Photographs were in black and white, showed the suspect from the shoulders up, standing in front of a blank, light-colored wall. Prior to making their identifications, participants were given instructions that advised "the individual may or may not be present in the images below." This was to minimize the influence expectations may play in eyewitness identifications (Wells & Olson, 2003). The lineups were presented as a traditional, or simultaneous, lineup due to the online nature of the survey which prevented the photographs from being shown sequentially. Photographs were presented in a random order.

Procedure

The study lasted approximately 15 minutes. After completing informed consent and

health assessments, participants then completed an implicit sentence completion task at their own pace. Afterwards, participants were randomly assigned to one of four groups: young perpetrator video (schema consistent), young perpetrator video (schema inconsistent), older perpetrator video (schema consistent), or older perpetrator video (schema inconsistent). Based on the group, participants watched the corresponding video. After viewing the crime video, participants partook in a distractor task, which was a word search puzzle. Participants had 90 seconds to find as many school-related words as they could. Upon the completion of the distractor task, participants then looked at a series of suspect photographs and were asked to make an identification of the perpetrator they saw in the video.

Design

A 2 × 2 × 2 between-subjects design was utilized for this study. There was a quasi-independent variable with witness age (young or older participant). The other two variables were assigned randomly to participants. Those between-subjects independent variables were perpetrator age (young or older perpetrator) and schema consistency (consistent or inconsistent). The dependent variable in this study was accuracy, measured by proportion of correct responses.

RESULTS

Mean accuracy scores were submitted to a 2 × 2 × 2 independent samples analysis of variance (ANOVA), with witness age (young or older), perpetrator age (young or older), and schema consistency (consistent or inconsistent) as the between-subjects factors. A main effect of witness age was predicted but not observed, $F(1, 84) = 0.247$, $p = .621$, meaning accuracy did not vary for young adults and older adults ($M = 0.12$, $SD = 0.324$; $M = 0.10$, $SD = 0.297$, respectively). No other main effects were observed, all p's > .05

Two interactions were predicted. A Witness Age × Perpetrator Age interaction was

predicted as a reflection of the own age bias. The interaction was not significant, $F(1, 84) = 0.11$, $p = .75$. A Witness Age × Perpetrator Age × Schema Consistency interaction was predicted to suggest an interaction between age bias and schema consistency; however, this was not significant, $F(1, 84) = 0.34$, $p = .56$ (See Figure 2).

Figure 1. Mean accuracy scores for the age of witness (young vs. old) and perpetrator age (young vs. old). Perp means perpetrator. Error bars represent the standard error of the mean.

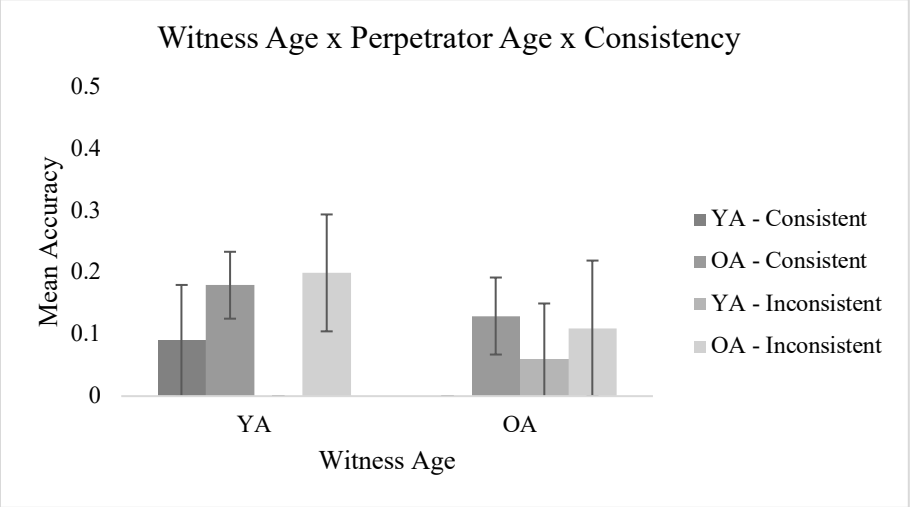

Figure 2. Mean accuracy scores for witness age, (young vs. old), perpetrator age (younger adult vs. older adult), and schema consistencies (consistent vs. inconsistent). Error bars represent the standard error of the mean.

DISCUSSION

The purpose of the present study was to examine the influences of cognitive bias on eyewitness memory and how those effects are moderated by age. First, I predicted that overall older adults would be less accurate at choosing the perpetrator from a lineup compared to young adults. That effect was not demonstrated in the present study. This means that young adults and older adults performed similarly, in term of accuracy of perpetrator identification. At first glance, this would seem to go against decades of research into age-related memory declines (see Salthouse, 2003 for review). However, when examining the accuracy scores overall, the scores were low for all groups. This would imply a floor effect, meaning that the eyewitness identification task was too difficult for both young and older adults. This could explain why the age groups did not differ in memory performance.

As previously mentioned, the nonsignificant findings could be due to what is known as a floor effect. A floor effect occurs when there is a bunching of values towards the lower limit (Simkovic & Trauble, 2019). In this case, participants overwhelmingly chose the wrong suspect. Due to the high number of incorrect identifications, the data is negatively skewed towards zero, or the lower score limit (Taku et al., 2018). There are several reasons a floor effect may occur. The most likely reason for a floor effect in this study is the difficult nature of the recognition task, the suspect lineup (Liu & Wang, 2021). The difficulty of the recognition task could be due to two things. The first being the video quality was too poor or grainy for the participants to be able to properly encode the perpetrator's physical characteristics. This could have led to misidentifications as none of the suspects would have been familiar to the witnesses if they were unable to properly encode features and characteristics of the perpetrator. The second being the lineup was too difficult meaning the innocent fillers all looked too much like the perpetrator

making it difficult for participants to accurately distinguish between the perpetrator and the innocent fillers. Another potential explanation for the floor effect is witnesses were too focused on identifying features (i.e., the long, white beard of the older perpetrator) rather than encoding other facial or physical characteristics. This could explain why participants were unable to accurately identify the perpetrator in the lineup when those striking, identifying features were no longer present.

Cognitive Biases, Aging, and Eyewitness Testimony

To explore cognitive biases associated with age (own-age bias), it was predicted that young adults would be more accurate at identifying young perpetrators, while older adults would be more accurate for older perpetrators. Additionally, schema consistency would moderate the own-age bias, meaning the more schema consistent a crime (e.g., a young perpetrator running or an older perpetrator walking away from the scene), the stronger the own age bias effect. It was predicted that this effect would be stronger in the young adults compared to older adults based on research by Slessor and colleagues (2010). Neither of the interactions were demonstrated. Again, this was most likely due to the low overall performance.

One additional explanation could be due to the implicit priming task participants completed at the beginning of the study, which was meant to prime aging stereotypes. This suggests by priming aging stereotypes, the cognitive schemas associated with aging may have been activated and, in turn, impact eyewitness identification. However, neither group demonstrated that they responded in line with an aging stereotype. This could mean that the prime was not efficient in activating age-related stereotype schemas.

While there were no significant findings, the results of this study do not argue that the own-age bias does not exist. Rather these findings suggest witness identifications, when using

video evidence, can be inaccurate, which supports past research suggesting witnesses, regardless of age, can make misidentifications during suspect lineups (Wells & Olson, 2003). Due to the high number of misidentifications for both age groups, it is difficult to determine whether age and age biases influenced participant performance. Additionally, the results of this study also suggest the use of CCTV (i.e., security cameras) may not provide clear enough footage for participants to properly encode and later retrieve features from the crime or the perpetrator.

Schema consistency and own-age bias can influence the way in which individuals recognize faces. When a schema is activated, it can enhance eyewitness identification (List, 1986; Shapiro, 2009). It is argued to be due to greater efficiency in access to categories in order to retrieve information. These categories are formed from experience with certain events, groups, and individuals (Goldstone et al., 2012). The experiences build upon each other through development to lead us to a sense of familiarity with stimuli. Familiarity impacts the cognitive processes of perception, information encoding, storage, and retrieval from long-term memory, and it also influences an individual's ability to recognize faces (Fulton & Bartlett, 1991). The influence of consistency on memory could be a result of familiarity.

Familiarity can impact several cognitive influences, including an individual's ability to recognize faces as well as playing a role in the development of cognitive schemas and biases. As it has to do with the way an individual, or witness, encodes more detailed information regarding in-group members, as they are more familiar with their physical characteristics, while encoding more general features about out-group members. The information encoded, processed, and retrieved from a witness's in-group/out-group schemas can impact their ability to make an identification, especially when the perpetrator is from an out-group. Additionally, familiarity can influence and be influenced by schema consistency. It stands to reason, people and objects that

are more familiar would contribute to the information used to build one's schemas. Therefore, more familiar information would also likely be more schema consistent while unfamiliar information would be more inconsistent with established schemas.

Implications

As previously mentioned, eyewitness identifications are responsible for nearly 70% of wrongful convictions (The Innocence Project, 2020). That is a large number of innocent people ending up incarcerated due to eyewitness error. By furthering our knowledge of the influences of eyewitness memory, we can help reduce the overall number of witness misidentifications per year and prevent more innocent individuals from winding up within the criminal justice system. Additionally, as individuals are living longer lifespans, more research needs to be conducted to know how age impacts an individual's ability to recall a witnessed crime or event. While age-related declines in memory, specifically source memory, have been well-documented, it stands to reason the results of this study could suggest older adult witnesses to be credible, or at the very least not anymore unreliable or less credible than their younger counterparts. Thus, these findings could have important implications in how law enforcement officials and other forensic experts interact with older adult victims and witnesses.

Limitations and Future Research

One potential limitation to the study could be not knowing what features participants focus on when witnessing a crime. This information is critical to knowing if the participant even viewed the video. Due to COVID-19, the study had to be conducted via the internet. While the progression of the video was restricted to participants, there is no evidence if they viewed the video. Eye tracking could help two-fold. First, we would know the participant viewed the video. Second, we would be able to know what features the participants looked at. This can help

understand what information the participant used to make an identification. With this information, we may also be able to see why the floor effect was in the present study.

Additionally, the confidence rating of witnesses was not measured. This could also help with investigating the cause of the floor effect. This could help us gauge how confident participants are in their identification. This metacognitive judgment could shed light on if participants did not view the video or if the suspects in the lineup photos were too similar for participants to differentiate. Further research should be done to explore whether witness confidence in their identifications correlates to witness accuracy. There have been studies which suggest a positive correlation between confidence and accuracy (Wixted et al., 2018). These studies suggest when a witness is highly confident in their identification in a recognition task or their perpetrator description in a recall task, they are more likely to be accurate in those perpetrator identifications or descriptions.

Lastly, the study used a simultaneous lineup due to the online survey not allowing for a sequential lineup to be used. Research has shown the best method of presenting a lineup is sequentially (Wells & Olson, 2003). This requires a witness to determine whether the individual in the photograph or in person is the suspect or not before they are allowed to move on to the next individual. The sequential lineup is designed to prevent the witness from comparing the faces of the individuals to one another and choosing the one that best fits their memory, which can occur during a simultaneous lineup when all suspects are shown to the witness at the same time. Sequential lineups force the witness to only compare each individual person or photograph to their memory of the suspect, thus leading to a more accurate identification.

Conclusion

In conclusion, older adults performed similarly to their younger counterparts in the

eyewitness identification. This suggests older adults could potentially be credible eyewitnesses, as long as there is no extended delay from witnessing a crime to making an identification. While further research will have to be conducted to confirm this, these findings could impact both the forensic science and criminal justice fields. As individuals are living longer, it will become more relevant to know what it takes to activate implicit biases and how they influence behavior once activated. It is especially important to know how they influence memory and decision making, regardless of age. This knowledge could aid law enforcement officials in better understanding the circumstances in which eyewitness memory is more likely to be a reliable form of evidence and instances in which it may be less reliable. However, further research is needed in order to study how significant a role concepts such as biases and heuristics play in witness memory.

Overall, the results of this study suggest for the own-age bias to occur, individuals need to be able to properly encode the features of a perpetrator. If a witness is unable to properly encode the physical features of a perpetrator, such as a result of poor video quality, it may prevent them from being able to make group membership associations. Group membership acts as a cognitive short-cut which helps individuals process incoming information quickly and efficiently, however, if these short-cuts are not activated because the witness is unable to encode facial features or because the perpetrator is not a stereotypical member, it could negatively influence witness accuracy when asked to make an identification. Thus, suggesting more explicit methods of priming must be used to activate the own-age bias. Like biases, the results suggest cognitive schemas will not be activated without enriched information. Therefore, if a person or situation does not meet the stereotypical criteria of an existing schema, it may prevent the activation of these cognitive short-cuts. It appears without the activation of schemas, witness memory could be negatively impacted as individuals often rely on schematic information to

make decisions. This further suggests, stronger activation measures may be required in order to study the influence cognitive biases and schemas play in witness memory and facial recognition.

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APPENDIX

Sentence Completion Task Stimuli

1. Rocks slowly ants food carry
2. Paper easily hands crumble shoe
3. Clothes dryer shrink high temperatures
4. Wrinkle shirts worn when cold
5. The silver appears moonlight night
6. Everything wise see owls dark
7. Mature in plants sunlight soil
8. Ancient often kingdoms fall night
9. Day the retires nighttime sun
10. Collapse pressure roofs under wind