Identification Accuracy of Adolescent Eyewitnesses: The Role of Familiarity and Lineup Procedure

by

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A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs in partial

fulfillment of the requirements for the degree of

Doctorate of Philosophy

in

Psychology

Carleton University
Ottawa, Ontario

Abstract

The purpose of the current study was to examine the role of familiarity and lineup procedure on eyewitness identification accuracy. Familiarity was manipulated wherein adolescent participants (*N* = 623): (1) met with and directly interacted with a confederate, (2) indirectly interacted with a confederate, or (3) did not meet a confederate, before they viewed a crime video in which the confederate was the perpetrator. Three commonly used lineup procedures (i.e., simultaneous, sequential, and elimination-plus) were used, and the presence of the target also was manipulated. Overall, familiarity and lineup procedure impacted identification accuracy, such that in target-present lineups, witnesses were more likely to make a correct identification when they were more familiar (i.e., had direct interaction) with the perpetrator and the sequential procedure was used. Furthermore, in target-absent lineups, witnesses were more likely to make a correct rejection when they were more familiar (i.e., had direct interaction) with the perpetrator and the simultaneous or elimination-plus procedure was used. Taken together, these findings suggest that familiarity, in terms of having a direct interaction with a perpetrator before the commission of a crime, positively influences identification accuracy. Furthermore, these findings provide new, important information regarding the simultaneous-sequential debate and the utility of commonly used lineup procedures when the witness is familiar with the perpetrator.

Acknowledgements

I would like to thank a number of people who have assisted with the completion of this project. First, I would like to thank my supervisor, Dr. Joanna Pozzulo for your unwavering support, guidance, and feedback throughout this process and my time at Carleton University. I am extremely grateful for all of the hours you have spent mentoring me and providing valuable feedback. You have provided me with a number of amazing opportunities to learn how to be a researcher, teacher, and mentor. Without your support, encouragement, and enthusiasm for research, the completion of this project would not have been possible.

I would also like to thank and acknowledge the members of my committee, Dr. Craig Bennell and Dr. Shelley Brown. Thank you for all of your guidance, support, and feedback on this project. I would also like to thank Dr. Diana Majury and Dr. Brian Cutler for taking time from their busy schedules to sit on my committee. A thank you is also necessary to June Callendar, as Departmental Advisor and Etelle Bourassa, as Graduate Studies Administer. You both have been vital in my journey as a PhD student and I could not have completed this without your help.

I would also like to thank and acknowledge all of the members of the research team for the assistance they have provided over the past few years and towards the completion of this project. I thank you for taking time out of your busy schedules to assist with the many data collections all over the city. To the graduate students in the lab, both past and present, I thank you for your endless support, advice, and encouragement. A special thank you is reserved for my friend and colleague, Emily Pica. You have been

one of the biggest supports I have had while finishing this degree and I can never thank you enough.

Thank you to the schools, students, teachers, and parents who participated in this study and for your enthusiasm.

Thank you to my friends, who provided me with endless advice, distractions, and encouragement when they were (frequently) needed. You are the strongest women I know, and I learn from you all every day.

Finally, I would like to thank my family. You have always encouraged me to pursue my dreams. I have received nothing but unwavering support, love, and encouragement from you. I would have never gotten here if it was not for you all. Thank you for always believing in me.

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Identification Accuracy of Adolescent Eyewitnesses: The Role of Familiarity and Lineup Procedure

Eyewitness identification evidence is one of the most critical and persuasive pieces of evidence used in the investigation and prosecution of defendants in criminal cases (Devenport, Penrod, & Cutler, 1997; Malpass & Devine, 1981; Wells, 1993; Wells & Olson, 2003). Eyewitness evidence is often considered to be one of the most convincing pieces of evidence for jurors (Wells & Olson, 2003). Despite the reliance on eyewitness evidence in the justice system, the limitations of eyewitness memory, as well as the consequences of inaccurate eyewitness identification, have been emphasized by researchers (e.g., Devenport et al., 1997; Pezdek, 2012; Wells, Memon, & Penrod, 2006) and organizations within the criminal justice system (e.g., Innocence Canada; The Innocence Project). Erroneous eyewitness identification is frequently cited as the leading cause of wrongful conviction in cases where the defendant was later exonerated (The Innocence Project, 2016). For example, the Innocence Project in the U.S. (2016) reports that eyewitness misidentification was present in approximately 70% of the 343 cases exonerated due to DNA evidence. As a result, there have been a number of recommendations outlining the best practices when collecting eyewitness evidence (e.g., National Academy of Sciences (NAS), 2014; Technical Working Group for Eyewitness Evidence, 1999; 2003).

The majority of eyewitness research, and thus the recommendations based on this research, have focused primarily on stranger identifications. In other words, most eyewitness identification research examines an eyewitness' ability to identify a *stranger* (i.e., someone who was seen for the first time during the commission of the crime) from a

lineup; whereas far less research has focused on the identification of a familiar person, termed '*familiar stranger'* (i.e., someone they previously met, knew, or had contact with; Pozzulo, 2016). Understanding the role of familiarity in eyewitness identification accuracy is vital, as in a majority of cases the perpetrator is "known" to the eyewitness (Flowe, Mehta, & Ebbesen, 2011) or had some prior contact with (e.g., an acquaintance; Pozzulo, 2016). For example, Flowe and colleagues (2011) examined 725 felony cases in the United States. They found that in the majority (67%) of the sampled cases, the suspect was familiar (i.e., acquainted) with at least one eyewitness involved in the case. Similarly, Memon, Havard, Clifford, Gabbert, & Watt (2008) found that a substantial portion (37%) of eyewitness in sampled cases in Scotland reported being familiar with the suspect before the commission of the crime.

The role of familiarity is also important to consider when decisions are being made to prosecute or convict a suspect. It is possible that prosecutors will view identifications of familiar strangers as more credible and as a result they may be more likely to pursue a conviction with this evidence alone. Similarly, it is possible that jurors and judges may view eyewitness evidence as more accurate, reliable, and/or credible when the eyewitness is described as familiar with the defendant before the time of the crime. Furthermore, as the majority of eyewitness research has been based on stranger identifications, it is possible that the commonly used methodology and procedures (e.g., the type of lineup procedure used to make an identification) may not be effective when an eyewitness is identifying someone who they are familiar with.

Notwithstanding the issues above, most eyewitness research and resulting policy recommendations have been based on adult eyewitnesses. There are few studies that

examine the ability of adolescent eyewitnesses to accurately identify a perpetrator from a lineup (Pozzulo, Dempsey, & Pettalia, 2013). Instead, the expected performance of adolescent eyewitnesses is extrapolated from research focusing on adult or child eyewitnesses (Fitzgerald & Price, 2015; Havard, Memon, Clifford, & Gabbert, 2010; Pozzulo et al., 2013). As a result, best practice recommendations may not be applicable to adolescent eyewitnesses. Given that adolescents are at an increased likelihood to become a victim or eyewitness to a crime when compared to their older or younger counterparts (Statistics Canada, 2008; US Department of Justice, 2012), it is critical to conduct research with this population. For example, in 2009 the rate of violent victimization against Canadian adolescents and young adults (i.e., aged 15- to 24-years-old) was approximately 15 times higher than the reported rate against older adults (i.e., 65-years-old or older; Perreault & Brennan, 2010). Reports from the United States also find that older adolescents are more likely to be victims of serious violent crime when compared to younger adolescents (i.e., 15- to 17-year-olds versus 12-to14-year-olds, respectively; US Department of Justice, 2012). Similarly, in an archival analysis of 295 real-life cases, Horry, Halford, Brewer, Milne, and Bull (2014) reported that witnesses to violent crimes are more likely to be under 20 years of age. Furthermore, research in the United States indicates that adolescents are more likely to be victimized by someone they know compared to strangers (Sickmund & Puzzanchera, 2014). Clearly, adolescents are likely to be both victim and bystander witnesses to general and serious criminal offences.

The primary purpose of this dissertation is to examine the identification accuracy of familiar individuals compared to strangers (i.e., someone previously unseen before the commission of the crime). In this study, familiarity with a perpetrator will be defined as

"previous contact to the perpetrator before the commission of the crime". This will be operationalized by the type of contact that occurs between the perpetrator and the witness. Furthermore, this study will examine the utility of three common lineup procedures that are currently used in the criminal justice system and/or research. This is the first known study that will examine the effectiveness of different lineup procedures on the identification of familiar-strangers. Finally, the current study will examine the role of familiarity and lineup procedure in a sample of eyewitnesses that have been largely overlooked in the eyewitness literature – adolescent eyewitnesses. This study is the only known study that has examined both familiarity and the influence of lineup procedure on adolescent eyewitness identification accuracy.

The following sections of this dissertation will begin with an overview of the eyewitness identification literature, including the common methodology and procedures used to examine eyewitness identification accuracy. Specifically, literature pertaining to the utility of common lineup procedures will be discussed and considered in regard to familiar stranger identifications with adolescent samples. Next, an overview of available literature on familiar stranger identifications will be discussed. Next, the relationship between eyewitness confidence and identification accuracy will be considered. Finally, the method, results, and discussion of findings will be presented. As the majority of research thus far focuses on adult eyewitness identification of familiar-strangers, the literature presented is used as a framework to understand the current program of research.

Eyewitness Identification

The identification of a perpetrator is primarily determined through a lineup task in which an eyewitness is asked to examine several photographs and make a decision

regarding the presence of the perpetrator. Although photo-lineups are most frequently used due to their ease of administration (e.g., it is easier to find acceptable foils; Lindsay & Wells, 1985), eyewitnesses may be exposed to the suspect through live lineups or video lineups (Humphries, Holliday, & Flowe; 2012; Pozzulo, 2016). A lineup will contain the suspect, who may or may not be guilty, and up to eleven fillers/foils. Fillers are photographs of individuals who are known by police to be innocent of the crime in question and are 'matched' to the description of the suspect (e.g., ethnicity, hair colour; Luus & Wells, 1991; Fitzgerald, Price, Oriet, & Charman, 2013). An eyewitness can be presented with one of two types of lineups: a target-present (TP) or target-absent (TA) lineup. A target-present lineup occurs when the guilty suspect is present in the lineup (i.e., the suspect in the lineup is the guilty perpetrator); whereas a target-absent lineup occurs when the guilty perpetrator is absent from the lineup (i.e., the suspect in the lineup is innocent). In the real world, police are unaware when they apprehend an innocent suspect (i.e., they show a target-absent lineup), and as a result, it is important to determine how eyewitnesses perform under each of these conditions, thus, both conditions are manipulated in laboratory research.

When presented with a lineup, there are different correct and incorrect decisions that an eyewitness can make. There are three types of decisions that can be made when presented with a target-present lineup. First, an eyewitness can make a correct identification in which they correctly choose the guilty suspect as the perpetrator. This is the only correct decision that can be made when shown a target-present lineup. Second, an eyewitness can make a foil identification in which they incorrectly identify a foil/filler (i.e., a known innocent) as the perpetrator. During real investigations, a foil identification

is the only incorrect decision that police are aware of (Lindsay & Wells, 1980; 1985) and the identification of a foil may indicate to police that the eyewitness has a poor memory of the perpetrator or that the eyewitness is unreliable or lacks credibility (Pozzulo & Lindsay, 1999). As a result, the identification of a foil will not lead to a charge or conviction. Finally, in a target-present lineup an eyewitness may incorrectly reject the lineup such that they mistakenly overlook the guilty suspect, stating that the perpetrator is not there (when in fact he/she is present). An incorrect rejection of a target-present lineup may lead to the guilty perpetrator remaining in the community.

There also are three possible decisions an eyewitness can make when shown a target-absent lineup. First, an eyewitness may make a correct rejection in which the eyewitness examines the lineup and correctly determines that none of the individuals in the lineup are the perpetrator (Beal et al., 1995). Similar to target-present lineups, an eyewitness also may make a foil identification in which they incorrectly identify a known-innocent as the perpetrator. Again, this would indicate to police that the eyewitness may not be reliable and will not be pursued further (Pozzulo & Lindsay, 1999). Last, the eyewitness may make a false identification in which they mistakenly identify an innocent suspect as the perpetrator. A false identification in a target-absent lineup is arguably the most serious incorrect decision an eyewitness can make, as the identification of an innocent suspect may lead to a wrongful conviction of an innocent person (Beal et al., 1995) and furthermore, the guilty perpetrator may never be caught (Malpass & Devine, 1981). Given that police never know which type of lineup they are presenting to an eyewitness (i.e., target-present versus target-absent) it is vital for

researchers to consider how both types of lineups influence eyewitness identification accuracy.

Target-Present versus Target-Absent Lineups

Eyewitnesses are usually more accurate in their identification decisions when they are shown a target-present compared to a target-absent lineup (Wells & Olson, 2003). Although eyewitnesses tend to underperform when shown a target-absent lineup, the implementation of system variables (i.e., variables under control of the criminal justice system that affect eyewitness accuracy; Wells 1978), can increase an eyewitness' performance. For example, using instructions that inform the eyewitness that the guilty perpetrator 'may or may not be' present in the lineup has been found to significantly increase eyewitness accuracy in target-absent lineups (Malpass & Devine, 1981; Steblay, 1997).

Target-presence and age. The age of the eyewitness is an estimator variable (i.e., a variable that influences eyewitness accuracy that is not controlled by the justice system; Wells 1978) that has been found to influence eyewitness identification accuracy. Researchers have found that although child eyewitnesses can be as accurate as adult eyewitnesses when shown a target-present lineup, child eyewitnesses tend to be less accurate than older eyewitnesses when shown a target-absent lineup (Beal, et al., 1995; Pozzulo & Lindsay, 1998; Wells & Olson, 2003). For example, Parker and Ryan (1993) found that young children (i.e., aged 5- to 6-years-old) were substantially less accurate in their identification decisions when shown a target-absent lineup compared to a target-present lineup, regardless of the length of exposure they had to the target (i.e., one hour versus a few minutes). Similarly, Beal and colleagues (1995) found that although 53% of

5-year-old children could correctly identify a perpetrator from a target-present lineup, few were able to correctly reject a target-absent lineup. Pozzulo and Balfour (2006) found that adults were more accurate in target-absent lineups when compared to older children (i.e., 9- to 10-year-olds).

Lindsay and colleagues (Experiment 1, 1997) examined identification accuracy in target-present and target-absent lineups with a sample of older children and adults. They found that adults were more accurate in their identification decisions overall when compared to both older children (8- to 10-year-olds) and pre-adolescent children (11- to 15-year-olds). When examining the type of lineup, both child age groups were more likely to be accurate in their decisions when shown a target-present lineup compared to a target-absent lineup. Specifically, older children were more accurate in target-present (.68) compared to target-absent (.36) conditions, and pre-adolescent children were more accurate when the target was present versus absent (.74 versus .38, respectively). Adults, on the other hand, were more accurate in target-absent compared to target-present lineups (.78 versus .54, respectively).

Humphries, Holliday, and Flowe (2012) examined identification accuracy in younger children (i.e., 5- to 6-year-olds), older children (i.e., 9- to 10-year-olds) and adults. Although they found no overall difference in the rate of correct identifications, they found that adults were more likely to make a correct rejection from a target-absent video lineup than both older and younger children. Furthermore, the odds that older children made a correct rejection was 1.72 times higher than that of younger children. These findings suggest that there may be a developmental improvement in children's abilities to correctly reject target-absent lineups.

Pozzulo and Lindsay (1998) conducted a meta-analysis comparing children and adult's identification accuracy. They found that children aged 5-years-old up to 14-years-old produced similar rates of correct identifications compared to adults when shown a target-present lineup. However, children of all ages were found to be less accurate when shown a target-absent lineup.

More recently, Fitzgerald and Price (2015) conducted a meta-analysis examining identification accuracy across the lifespan. In their meta-analysis, they called into question the general acceptance in the literature that children are as accurate as adults when shown a target-present lineup. They argue that due to methodological issues that were commonplace in research at the time (e.g., small sample sizes, forced-choice paradigms, and few available studies) these conclusions may not be valid. Furthermore, they suggest that children's accuracy in target-present lineups may be due to children's propensity to guess (i.e., a more liberal response bias), more so than their ability to recognize a face. In their meta-analysis, Fitzgerald and Price (2015) confirmed the original finding reported by Pozzulo and Lindsay (1998) – that children (i.e., 4- to 17-year-olds) were less likely to correctly reject target-absent lineups when compared to adults. However, when examining performance on target-present lineups, Fitzgerald and Price (2015) found that children also were less likely to correctly identify a target from target-present lineups, thus contradicting the findings of Pozzulo and Lindsay (1998).

It is unclear why children may perform less accurately than adult eyewitnesses when shown a target-present lineup. According to Fitzgerald and Price (2015), children's comparable performance with target-present lineups may be less to do with actual ability and more to do with specific performance on lineup tasks. Specifically, they suggest that

the notion that children "can" be comparatively accurate as adults when making an identification from a target-present lineup may be due to the fact that children have an increased propensity to guess when making lineup identifications. In other words, children are more likely than adults to guess when they are unsure. This guessing behaviour can occur in *both* target-present and target-absent lineups, however, in target-present lineups this may lead to an increase in correct identifications, whereas it leads to an increase in false positive identifications in target-absent lineups (Fitzgerald & Price, 2015; Pozzulo & Lindsay, 1998).

In terms of target-absent lineups, several explanations for children's decreased accuracy have been proposed. One explanation is that children have a propensity to guess when shown a target-absent lineup (e.g., Beal et al., 1995). Specifically, the mere presence of a lineup may suggest to a child that he/she must make a choice, whether or not he/she sees the perpetrator (Beal et al., 1995; Dekle, Beal, Elliot, & Huneycutt, 1996). Research has indeed found that children are more likely to choose from a lineup when compared to adults (Humphries et al., 2012; Lindsay et al., 1997; Parker & Ryan, 1993). For example, Humphries and colleagues (2012) found that younger children (i.e., 5- to 6-year-olds) were 1.44 times more likely than adults to choose from a lineup, and 1.25 times more likely to choose from a lineup than older children (i.e., 9- to 10-year-olds)

An alternative explanation is that target-present and target-absent lineup decisions are driven by different processes. Specifically, researchers have suggested that eyewitnesses may rely more heavily on cognitive processes (i.e., memory for the perpetrator) when making decisions in a target-present lineup and rely on a combination of cognitive and social processes when making decision in target-absent lineups

(Pozzulo, Dempsey, Bruer, & Sheahan, 2012; Pozzulo & Lindsay, 1998). For example, Pozzulo and colleagues (2012) conducted a study comparing children's (*Mage* = 4.98 years) and adults' (*Mage* = 20.54 years) performance on target-present and target-absent lineups. The main goal of this study was to examine the extent to which cognitive and/or social factors are driving children's false positive responding. To accomplish this, the researchers manipulated the cognitive load of the task, such that a lower cognitive demand lineup would result in a correct identification rate nearing perfect (i.e., a ceiling effect of 100% accuracy). Participants were therefore asked to identify previously seen cartoon faces (low cognitive demand) versus human faces (high cognitive demand). Pozzulo and colleagues (2012) hypothesized that false positive responding in lower cognitive demand tasks would suggest that social processes more so than cognitive processes were driving children's false identification rates. The researchers' predictions were correct – they found that although children and adults produced a correct identification rate of almost 100% when identifying previously seen cartoon faces (i.e., low cognitive demand), children were still significantly worse than adults when shown a cartoon, target-absent lineup – they continued to produce a lower correct rejection rate when compared to adult witnesses. These findings suggest that social demands may be responsible, in part, for children's false positive responding to a greater extent in target-absent lineups than target-present lineups (Pozzulo et al., 2012).

Overall, research examining children's identification accuracy depicts children as less desirable witnesses than adults such that they are more likely to make incorrect identification decisions in both target-present (Fitzgerald & Price, 2015) and target-absent lineups (Pozzulo & Lindsay, 1998). Despite extensive research on children's and

adults' identification performance, there are still gaps within the literature that need to be addressed. First, almost all research examining eyewitness identification accuracy is based on stranger identifications. It is unclear whether the same developmental differences in accuracy will occur when witnesses are asked to identify a "familiar-stranger". Second, there is very limited research examining adolescent eyewitnesses; instead with most eyewitness research typically using adult university student samples. In their meta-analysis, Fitzgerald and Price (2015) found that correct identification and rejection rates appear to increase with age – however, they also noted the lack of research that included adolescent witnesses. With few studies examining adolescent witnesses, it is difficult to draw firm conclusions about their performance relative to either children or adults. As a result, developmental trajectories in identification accuracy are not fully understood. Both issues are addressed in the current study.

Lineup Procedure

Lineup procedures are used to confirm the identity of a perpetrator (Wells, 1993; Wells & Olson, 2003). The type of lineup procedure that is used to expose the eyewitness to the suspect can have a significant impact on an eyewitness' identification accuracy (Gross & Hayne, 1996; Pozzulo & Lindsay, 1998; Wells, 1993; Wells & Olson, 2003). Specifically, the type of lineup procedure employed can impact a witness' ability to accurately identify a perpetrator, or correctly state that the perpetrator is not present in the lineup (Wells et al., 1998). There are three main lineup procedures that have been developed to be used with eyewitnesses: the simultaneous lineup, the sequential lineup, and the elimination lineup.

Simultaneous lineup. The simultaneous lineup is the most commonly used lineup procedure (Wells, 1993) and involves presenting all lineup members to the witness at one time (i.e., simultaneously; Pozzulo & Lindsay, 1998). The simultaneous lineup procedure is thought to encourage a *relative judgment* such that the witness will compare the lineup members to each other and select the person who most closely resembles their memory of the perpetrator (Wells, 1984; Wells, 1993). The use of a relative judgment is advantageous when the guilty suspect is present in the lineup because the guilty suspect is most likely to resemble the witness' memory of the perpetrator relative to all other lineup members (Lindsay, Pozzulo, Craig, Lee, & Corber, 1997). In these cases, the eyewitness is most likely to select the guilty suspect. However, the use of a relative judgment may be problematic when the eyewitness is presented with a target-absent lineup (i.e., the suspect is innocent) because the witness may still choose the person who most closely matches his/her memory of the perpetrator (Lindsay et al., 1997; Wells et al., 1998). In this case, selecting the person who most closely resembles their memory of the perpetrator may lead to a foil or false identification (i.e., identification of the innocent suspect). Although foil identifications would not be prosecuted (the foil is known to be innocent), a false identification may lead to the prosecution and eventual conviction of an innocent suspect.

The 'removal without replacement procedure' is a technique that can be used to examine whether eyewitnesses engage in a relative judgment process when shown a simultaneous lineup (Wells, 1993). The 'removal without replacement procedure' involves exposing participants to a staged crime and later showing them a target-present lineup. Following this, the guilty suspect is removed from the simultaneous lineup and his/her photograph is not replaced. In his study, Wells (1993) exposed two hundred

participants to a staged crime, and later showed half of the eyewitnesses a target-present lineup and the remaining viewed a lineup in which the guilty suspect was removed. All participants were given the instruction that the guilty perpetrator may or may not be present in the lineup. Wells (1993) argued that if the eyewitnesses were identifying the guilty suspect based on recognition memory alone (i.e., they were not engaging in the relative judgment process), then the number of identifications in the target-absent (i.e., removal without replacement) lineup would be equivalent to the number of lineup rejections *plus* the number of identifications of the guilty suspect. Instead, Wells (1993) found that the pattern of responses reflected a relative judgment process, such that the removal of the guilty suspect's photograph lead a significant portion of eyewitnesses to identify the 'next best' lineup member.

Sequential lineup. The sequential lineup was created as an alternative to the simultaneous lineup with an attempt to reduce the reliance on the relative judgment (Lindsay & Wells, 1985). The sequential lineup involves presenting each lineup member to the witness serially. With this procedure, the witness is only permitted to view one lineup member at a time and is required to make a decision for each photograph (i.e., reject or identify the lineup member as the perpetrator). The witness is not permitted to 'go back' and view photographs after deciding and the witness is unaware of the number of photographs in the lineup. The sequential procedure is thought to elicit an *absolute judgment* because the witness compares each individual photograph to his/her memory of the perpetrator to make a selection, as opposed to comparing all photographs at once (Lindsay & Wells, 1985). Early research examining the effectiveness of the sequential lineup procedure suggested that the sequential lineup reduced the rate of incorrect

identifications in target-absent lineups while maintaining a high rate of correct identifications in target-present lineups (Lindsay, Mansour, Beaudry, Leach, & Bertrand, 2009; Steblay, Dysart, Fulero, & Lindsay, 2001). For example, Lindsay and Wells (1985) compared the effectiveness of the sequential lineup compared to the simultaneous lineup after witnesses viewed a mock crime. The researchers found that witnesses were less likely to make a false identification when the sequential lineup was used compared to the simultaneous lineup. Furthermore, the rate of correct identification was similar across lineup type.

Following the development of the sequential lineup procedure, many studies have been conducted that report a sequential-superiority effect over the simultaneous lineup. These studies have found that the sequential lineup increases the rate of correct rejection while maintaining the rate of correct identification when compared to the simultaneous lineup (e.g., Cutler & Penrod, 1988; Kneller, Memon, & Stevenage, 2001; Lindsay et al., 1997; Parker & Ryan, 1993; Sporer, 1993). For example, Sporer (1993) conducted a study in which participants watched a video of a robbery and one day later were asked to make an identification from either a simultaneous or sequential lineup. He found that when the target was present in the lineup, the rate of correct identification was similar across simultaneous and sequential lineup procedures (44.4% versus 38.9%, respectively). However, when the target was absent from the lineup, the sequential procedure resulted in an increase in correct rejections when compared to the simultaneous procedure (61.1% versus 27.8%, respectively).

Cutler and Penrod (1988) compared the use of the simultaneous and sequential procedures across two studies. In both studies they found that participants made

significantly more false identifications when shown a target-absent simultaneous lineup compared to a sequential lineup. Furthermore, no differences in the rate of correct identifications were found in target-present conditions due to lineup type. Similar to Cutler and Penrod, Kneller and colleagues (2001) reported that participants were more likely to make a correct rejection when shown a sequential lineup (77.8%) compared to a simultaneous lineup (38.9%) after viewing a sixty second video. Participants made slightly more correct identifications when shown a simultaneous lineup compared to the sequential lineup (61.1% versus 50.0%, respectively), however the difference was not statistically significant. Parker and Ryan (1993) examined the sequential and simultaneous lineup procedures with a sample of children (*Mage* = 9 years, 2 months) and adults (*Mage* = 24 years). Although they found no differences in accuracy due to lineup type for children, they found a sequential-superiority effect for adults.

The utility of the sequential lineup has also been tested in field experiments. Wells, Steblay, and Dysart (2015a) examined the use of the sequential and simultaneous lineup procedures with a sample of real eyewitnesses (*N* = 494) across four jurisdictions. The researchers found no difference in the rate of suspect identifications across lineup type; however, eyewitnesses were less likely to identify a filler (i.e., a known innocent) from the sequential lineup compared to the simultaneous lineup. The researchers argue that the rate of filler identifications for each procedure are informative of the 'riskiness of a procedure' (p. 12). Specifically, high rates of filler identifications suggest an increased propensity for misidentifications of innocent suspects. In other words, innocent suspects may be more susceptible to being incorrectly identified by an eyewitness when the simultaneous lineup is used.

Steblay and colleagues (2001) conducted the first meta-analysis to compare the utility of the simultaneous and sequential lineup procedures. In their meta-analysis, they found support for the sequential-superiority effect, such that the sequential lineup resulted in higher rates of correct rejection in target-absent lineups and comparable rates of correct identification in target-present lineups after considering a number of real-world moderator variables (e.g., unbiased lineup instructions). More recently, Steblay, Dysart, and Wells (2011b) conducted an updated meta-analysis examining 72 tests of the sequential versus simultaneous lineup procedure. Similar to their original findings (i.e., Steblay et al., 2001), Steblay and colleagues again reported a sequential-superiority effect, such that the sequential lineup procedure resulted in fewer incorrect identifications when the target was absent from the lineup. However, they found that the simultaneous procedure resulted in more correct identifications when the target was present in the lineup. Still, Steblay and colleagues (2011b) maintain the sequential-superiority effect, as the sequential lineup procedure resulted in a higher diagnosticity ratio when compared to the simultaneous lineup. A diagnosticity ratio can be understood as the ratio of identifications of the guilty suspect in target-present lineups to the rate of identifications of an innocent suspect in target-absent lineups (i.e., posterior odds of guilt; Steblay et al., 2011b). A higher diagnosticity ratio suggests that decisions from that lineup are more confirming of guilt. In other words, one can be more certain that an identified suspect is the guilty perpetrator when using the sequential lineup procedure that has a higher diagnosticity ratio, compared to the simultaneous procedure that has a lower diagnosticity ratio (Steblay et al., 2011b).

Simultaneous-sequential debate. As mentioned above, there have been a number of studies that have reported a sequential-superiority effect over the simultaneous lineup. Based on this research, many eyewitness experts recommend the use of the sequential lineup procedure instead of the simultaneous procedure (Lindsay et al., 2009; Malpass, 2006). Despite the general support for the sequential procedure, there are some researchers who suggest that the recommendation of the sequential lineup procedure as 'best practice' was premature (e.g., McQuinston-Surrett, Malpass, & Tredoux, 2006; Memon & Gabbert, 2003). In fact, there is currently a controversy within the literature as to whether the sequential procedure truly is more effective than the traditional simultaneous lineup (see Amendola & Wixted, 2015a; Amendola & Wixted, 2015b; Gronlund, Carlson, Dailey, & Goodsell, 2009; Steblay, Dysart, & Wells, 2015; Wells, Dysart, & Steblay, 2015b). This argument is largely based on the fact that the sequential lineup procedure not only leads to a decrease in false identifications but may also lead to a decrease in correct identifications in target-present lineups (Wells et al., 2015b). It is argued that the sequential lineup may lead to a more conservative choosing criteria as opposed to an increase in accuracy, per se (Meissner, Tredoux, Parker, & MacLin, 2005; Palmer & Brewer, 2012).

McQuinston-Surrett and colleagues (2006) presented one of the first studies to critique the sequential superiority effect. In their article, they argued that any policy recommendations supporting the use of the sequential lineup over the simultaneous lineup was hasty due to methodological and data interpretation issues, as well as a lack of theoretical understanding present within the literature at the time. Specifically, they argued that the absolute judgment process might not be the only (or most important)

element of the sequential lineup responsible for the so-called “sequential advantage”. Instead, they suggest that the procedure contains many, untested elements (e.g., the backloading of photographs in the sequential but not the simultaneous procedure) that confounds any comparisons between the two procedures. Furthermore, they argued that the sequential superiority effect is largely driven by methodological differences across studies (McQuinston-Surrett et al., 2006). Moderator analyses found that the presence of the sequential superiority effect was indeed impacted by varying methodology. Specifically, they reported that the sequential-superiority effect disappeared when studies did not counterbalance the order of the photographs used in the sequential procedure. Similarly, another methodological factor that influenced the sequential-superiority effect was whether the lineup procedure stopped after the witness made an identification, such that the sequential procedure was comparable to the simultaneous procedure when the lineup was stopped after an identification (McQuintson-Surrett et al., 2006).

One concern that has been persistently raised by critics of the sequential-superiority effect is that the sequential lineup advantage may not be robust, specifically that methodological similarities across studies may be the real explanation for the sequential advantage (Carlson, Gronlund, & Clark, 2008; Gronlund, Carlson, Dailey, & Goodsell, 2009; Malpass, Tredoux, & McQuinston-Surrett, 2009). In other words, the sequential advantage may only be found when specific methodologies are employed. If these methodologies are removed, it is unlikely the sequential advantage remains.

Gronlund and colleagues (2009) addressed the methodological argument by examining the robustness of the sequential advantage as a function of a number methodological factors: the quality of the video and the match of the suspect photograph

to the perpetrator (i.e., good versus poor), the fairness of the lineup (i.e., fair versus medium versus biased) and the position of the suspect in the lineup (i.e., 2nd versus 5th). Participants (*N* = 2,529) were exposed to a mock crime video and after a distractor task they were shown a simultaneous or sequential lineup. Overall, Gronlund and colleagues (2009) found little support for the sequential-superiority effect such that there were no significant differences across lineup type overall. Across 24 comparisons considering the manipulated variables, the researchers found only two cases where there was a sequential advantage, compared to three cases in which the simultaneous lineup was superior. Furthermore, when more conservative statistical criteria were used (e.g., an alpha that is adjusted by dividing by the number of comparisons) the sequential advantages also disappeared. Gronlund and colleagues (2009) argued that the sequential superiority effect is not robust, but instead may be a unique finding that is dependent on the position of the suspect (i.e., the suspect is near the end of the lineup) and the quality of match between the suspects' photograph and the perpetrator is high. (i.e., good quality).

Carlson and colleagues (2008) also examined the robustness of the sequential-superiority effect across two studies. In their first study, Carlson and colleagues (2008) attempted to replicate the original study conducted by Lindsay and Wells (1985). Contrary to the original study, Carlson and colleagues failed to find a sequential-superiority effect, such that there was a similar rate of correct rejection across simultaneous and sequential lineup procedures. Similar to Lindsay and Wells (1985), the target (i.e., target-present lineups) was selected at a similar rate in both procedures.

In a second study, Carlson and colleagues (2008) investigated the sequential advantage as a function of lineup fairness. Lineup fairness was categorized as fair (i.e.,

unbiased; foils resembled the suspect and matched the perpetrator description), intermediate (i.e., the lineup consisted of two good foils and three bad foils), or unfair (i.e., biased; none of the foils resembled the suspect). Participants were then exposed to a mock carjacking and were subsequently shown a simultaneous or sequential lineup to make an identification. Carlson and colleagues (2008) found that eyewitnesses were 1.6 times more likely to make a correct identification when the simultaneous lineup was used compared to the sequential lineup. When the lineup was biased, they found that the simultaneous lineup resulted in more correct identifications than the sequential procedure. However, when the lineups were fair or intermediately fair, the two procedures were comparable in the rate of correct identifications. Contrary to past research, Carlson et al. (2008) failed to find a sequential superiority effect when examining the overall rate of false identification. When examining the rate of false identification across lineup fairness, they found evidence for a sequential advantage only when the lineups were biased. The false identification rate was comparable across lineup type when the lineups were intermediate or fair. These findings suggest that the sequential lineup may only be superior to the simultaneous lineup when a lineup is biased (i.e., the suspect stands out relative to the other lineup members).

The sequential advantage has also been scrutinized using a sample of real eyewitnesses. Amendola and Wixted (2015a) examined the diagnosticity of the sequential and simultaneous lineup using data from Phase 2 of the American Judicature Society (AJS) field study. In their study, Amendola and Wixted (2015a) challenged conclusions originally made by Wells and colleagues (2015a) in Phase 1 of the same field study. Specifically, they argued that Wells and colleagues erred in one of their

conclusions – that a high rate of filler identifications with the simultaneous lineup procedure suggests that innocent suspects may also be selected at a high rate when compared to the sequential procedure. As such, the purpose of Amendola and Wixted's (2015a) study was to directly assess which procedure may lead to an increase in correct identifications and a reduction in false identifications. They did this by examining different measures of ground truth (e.g., corroborating evidence) of suspect innocence or guilt. In their analyses, Amendola and Wixted (2015a) found evidence for a simultaneous superiority effect, such that simultaneous lineup procedure resulted in fewer false identifications and more correct identifications when compared to the sequential procedure[1].

Mickes, Flowe, and Wixted (2012) compared the sequential and simultaneous lineup using a receiver operating characteristic (ROC). They argue that ROC analyses are a more appropriate way to examine which lineup procedure is diagnostically superior, specifically, that ROC analyses can provide a clearer picture of superiority under ambiguous conditions when compared to traditional assessment methods (i.e., diagnosticity ratios). In their study, Mickes and colleagues (2012) employed a confidence-based ROC analysis in which the rate of correct identifications of the guilty suspect are plotted against the rate of false identifications of the innocent suspect across the full range of eyewitness confidence (i.e., confidence is used as a proxy for the diagnosticity of the suspect's guilt). This generates an ROC curve, where the more conservative response criterion is represented by the lower ends of the curve, and the more diagnostic information regarding the suspect's guilt is represented at the upper ends

[1] Note that these conclusions have been subsequently challenged by Wells and his colleagues supporting the sequential-superiority effect. Please see Wells and colleagues 2015(b), Amendola and Wixted (2015b), and Steblay and colleagues (2015) for a discussion on these findings.

of the curve. The diagnosticity of each procedure is compared by calculating an area under the curve (AUC) for each lineup procedure, where the better procedure has a greater area below the ROC curve (Gronlund et al., 2012; Mickes et al., 2012).

Mickes and colleagues (2012) conducted two experiments to examine the diagnostic superiority of the sequential versus simultaneous lineup. In their first experiment, participants were exposed to a mock theft and after a brief delay, were subsequently shown a target-present or target-absent simultaneous or sequential lineup. Each lineup was considered fair (i.e., unbiased foil similarity) and they had no designated innocent suspect. Contrary to past research, the use of ROC analysis found no evidence of a sequential advantage, but instead found a simultaneous-superiority effect. In a second experiment, Mickes and colleagues (2012) compared the two procedures in target-absent, unfair lineups (i.e., the innocent suspect resembled the perpetrator more closely than the remaining foils), as prior research has suggested that the sequential procedure may be more effective than the simultaneous lineup when the lineup is biased. In this experiment, participants were again exposed to a mock theft and were later shown a simultaneous or sequential lineup. They found that although the use of biased lineups resulted in more false identifications than in the first experiment overall, the sequential lineup was found to be inferior to the simultaneous lineup in reducing false identifications. Instead, ROC analysis again suggested a (non-significant) simultaneous advantage. These findings suggest that the simultaneous procedure may be diagnostically more accurate in discriminating between guilty and innocent suspects when compared to the sequential procedure (Mickes et al., 2012).

Gronlund and colleagues (2012) also used ROC analysis to examine the effectiveness of the sequential, simultaneous, and showup (i.e., only one photograph of a suspect is shown) procedures. The data from the sequential and simultaneous procedures were reanalyzed from another study (i.e., Gronlund et al., 2009) and compared to new data collected on the showup procedure. In this study, participants viewed a video of a mock theft and were later shown a lineup or showup. The researchers found that the simultaneous procedure resulted in more accurate decisions when compared to the showup procedure; whereas the sequential procedure was no better than either the simultaneous or the showup procedures in increasing identification accuracy. ROC analysis also provided new information regarding suspect position effects. Specifically, they found that the simultaneous procedure was diagnostically superior to the sequential lineup if the suspect was placed early in the lineup (i.e., the 2nd position) and when the suspect was placed later in the lineup (i.e., the 5th position), the sequential and simultaneous lineup were equivalent. Taken together, these findings suggest that the use of ROC analyses result in vastly different conclusions regarding the appropriateness of sequential lineup procedures – specifically, that the use of a sequential lineup procedure may not be "superior" over the simultaneous procedure.

Some researchers, however, disagree with the use of ROC analysis to examine eyewitness identification accuracy. For example, Wells, Smith, and Smalarz (2015) argue that ROC analysis fails to consider all types of responses that are possible when an eyewitness views a lineup (e.g., suspect identifications, filler identifications, and rejections), as filler identifications are considered equivalent to rejections. Wells and colleagues (2015) argue that by ignoring the distinction of filler identifications, ROC

disregards important diagnostic information about the effectiveness of different lineup procedures.

Overall, it appears that one of the underlying issues within the sequential-simultaneous debate focuses on a trade-off between correct identifications and false identifications in target-present and target-absent lineups, respectively. Witnesses are more likely to make a choice from a simultaneous lineup, which will increase the rate of correct identifications when the perpetrator is present in the lineup (target-present), but also leads to an increase in false positive identifications when the lineup contains an innocent suspect (target-absent; Lindsay et al., 1997; Steblay et al., 2011b; Wells et al., 1998). Alternatively, witnesses are less likely to make a choice when shown a sequential lineup (i.e., the sequential procedure promotes a more conservative choice criterion; Clark, 2012; Gronlund et al., 2012; Palmer & Brewer, 2012) and this results in fewer false positive identifications in target-absent lineups, but also reduces the rate of correct identifications in target-present lineups (Lindsay & Wells, 1985; Steblay et al., 2001). In the real world, this trade-off could be understood as the choice between letting more guilty people go free using the sequential procedure, or possibly convicting more innocent suspects with the simultaneous lineup.

Currently, the sequential procedure is the most commonly used procedure in Canada (Beaudry & Lindsay, 2006), however both the simultaneous and sequential procedures are used in Canada and the United States (Beaudry & Lindsay, 2006; Beaudry, Lindsay, Leach, Mansour, Bertrand, & Kamlet, 2015; Wells & Olson, 2003). Given that there is no consensus in the literature regarding the use of one procedure over the other, the current study included both the sequential and simultaneous lineup

procedures. Furthermore, since there is limited research examining familiar-stranger identifications and very little research with adolescent witnesses, it is possible that one procedure may be more advantageous than the other in these circumstances.

Eyewitness age and lineup procedure. Although debate remains on the sequential-superiority effect with adult eyewitness, some research has suggested that the sequential procedure may be detrimental to child eyewitnesses (e.g., Humphries, et al., 2012; Lindsay et al., 1997; Pozzulo & Lindsay, 1998). Specifically, the use of the sequential procedure may in fact increase children's propensity to guess as opposed to reducing false identifications. For example, Lindsay and colleagues (Experiment 1, 1997) found that adults were more accurate overall (considering target-present and target-absent lineups) in their identification decisions (.68) than 8- to 10-year-old children (.43) and 11- to 15-year-old children (.46) when shown a sequential lineup. The researchers suggested that children are more likely to choose from a sequential lineup when compared to adults, reducing the benefits of the sequential lineup that are generally seen with adult samples. Other research suggests that children also are more likely to make multiple selections from sequential lineups (e.g., Parker & Ryan, 1993).

Children's reduced accuracy in sequential lineups may be due to an inability for children to effectively make an absolute judgment, as opposed to a relative judgment (Pozzulo & Lindsay, 1998; Pozzulo & Lindsay, 1999). Despite children's apparent disadvantage when shown a sequential lineup, it is unclear how adolescents will perform when shown a sequential compared to simultaneous lineup procedure – will adolescents perform more comparably to children or to adults? As there are only a handful of studies that include adolescent eyewitnesses, specifically older adolescents (i.e., aged 15-years-

old to18-years-old), the present study examined both the sequential and simultaneous lineup procedures with an adolescent sample. Given that this study focuses on a younger age group than what is normally examined when determining the appropriate lineup procedure (i.e., adults), it is also important to compare how this age group performs on a lineup procedure that was developed for children.

Elimination lineup. The elimination lineup procedure was developed by Pozzulo and Lindsay (1999) for child eyewitnesses. Pozzulo and Lindsay (1999) proposed a Two-Judgment Theory of lineup identification to argue that the simultaneous lineup procedure involves two judgments: First, a relative judgment where the witness decides which of the photographs looks most like the perpetrator; followed by an absolute judgment, where the witness must determine whether the most similar lineup member is the perpetrator. The researchers argued that when a witness is presented with a target-present lineup, the importance of the second judgment is diminished as the relative judgment often produces a correct identification of the perpetrator. However, the second judgment is vital when an eyewitness is shown a target-absent lineup, because the most similar looking lineup member is not the perpetrator (Pozzulo & Lindsay, 1999). In other words, the witness must employ the absolute judgment strategy to correctly reject the most similar looking lineup member as the perpetrator. Pozzulo and Lindsay (1999) argue that the high rates of false positive identification that are typically found in target-absent lineups are due to the witness failing to employ the absolute judgment. As a result, Pozzulo and Lindsay created two versions of what they called the elimination procedure – the fast elimination and the slow elimination procedure to make the decision-making more explicit for child eyewitnesses.

The fast elimination procedure involves two steps. First, the witness is presented with all photographs simultaneously and is asked to make a relative judgment whereby they select the person who looks most like the perpetrator. Once a decision has been made, all remaining photographs are removed, and the witness is then asked to make an absolute judgment whereby they determine whether the photograph they selected (i.e., the "survivor") is or is not the perpetrator. Finally, the witness is often asked to provide a confidence rating regarding their decision. Alternatively, the slow elimination procedure requires that the eyewitness removes lineup members by selecting the person who looks *least* like the criminal until only one photograph remains (Judgment 1). Next, the witness is then asked to determine whether the surviving lineup member is or is not the perpetrator (Judgment 2).

In their original study, Pozzulo and Lindsay (1999) found that the elimination procedures resulted in fewer false identifications in target-absent lineups compared to the simultaneous lineup in a sample of children (i.e., ages 10- to 14-years-old). Correct identification rates were comparable across the elimination and simultaneous procedures. Although the elimination procedures reduced the rate of false identifications in children, it was less effective with adult witnesses such that the elimination procedures reduced the rate of correct identifications compared to the simultaneous procedure. The researchers suggested that the elimination lineup may be less effective with adults because it contradicts their expectations of what a lineup identification entails (i.e., making one judgment only). Pozzulo and Lindsay (1999) hypothesized that adults may have perceived the second judgment as an indication that they were incorrect in their first decision (i.e., they selected the wrong person). Since this original study, the elimination

procedure has been tested alongside the most commonly used identification procedures, specifically the sequential and simultaneous lineups. As the fast elimination procedure is the most commonly used elimination procedure it will be referred to hereafter as the 'elimination lineup'.

Since its' development, the utility of the (fast) elimination lineup has been tested with a number of different ages including preschool aged children (Pozzulo, Dempsey, & Crescini; 2009), older children (Pozzulo & Lindsay, 1999), adolescents (Sheahan, Pica, Pozzulo, & Nastasa, 2017), adults (Sheahan et al., 2017; Pozzulo & Lindsay, 1999) and the elderly (Pica & Pozzulo, 2017b). Results from these studies have generally found that the elimination lineup is effective in reducing false positive responding in target-absent lineups. The elimination lineup also has found to be effective in reducing false identifications under a number of conditions, such as the presence of bias (e.g., clothing bias; Pozzulo, Dempsey, & Clarke, 2010) and when there are multiple perpetrators (e.g., Dempsey & Pozzulo, 2013).

Pozzulo and colleagues (2009) compared the simultaneous and elimination lineup with a sample of preschool aged children (i.e., age 3- to 6-years-old). In their study, children participated in a twenty-minute mask-making activity with a female researcher. After a brief delay (i.e., 20-30 minutes), children were asked to identify the female researcher from a simultaneous or elimination lineup. The researchers found that when children were presented with a target-absent lineup, the elimination procedure resulted in higher rates of correct rejection compared to the simultaneous lineup, with similar rates of correct identifications for target-present lineups across lineup procedure.

Pozzulo and Balfour (2006) compared the simultaneous and elimination procedures when the perpetrator changed his appearance following the commission of the crime. In their study, older children (8- to 13-year-olds) and adults viewed a video of a staged theft in which the perpetrator had either long or short hair. Following a brief delay, participants were shown a lineup in which the perpetrator either changed his appearance (e.g., long hair in video, short hair in lineup) or his appearance remained the same (e.g., short hair in video, short hair in lineup). The researchers found the elimination procedure to be effective in increasing the rate of correct rejections with a sample of older children (i.e., ages 8- to 13-years-old) and adults when compared to the simultaneous procedure. However, the improved accuracy with the elimination lineup was negated if the lineup members did not match the perpetrator's appearance, nor was the simultaneous procedure useful under this condition. This finding suggests that the elimination and simultaneous procedures may be comparable when the perpetrator undergoes an appearance change from the commission of the crime to the identification.

Humphries and colleagues (2012) compared identification accuracy of children (5- to 6-year-olds and 9- to 10-year-olds) and adults using simultaneous, sequential, and elimination video lineups. In this study, witnesses were presented with a mock nonviolent theft in which the perpetrator stole a purse from a clothing store. After a brief delay, participants were then shown a target-present or target-absent video lineup. The video lineups consisted of moving images such that each lineup photo was shown before a selection was made. When examining witness performance in target-absent lineups, Humphries and colleagues found that adults and children produced comparable rates of correct identification across the simultaneous and elimination lineups. However, children

of both age groups were significantly less likely than adults to make a correct identification from a sequential lineup procedure. When examining lineup procedure, they found that young children (5- to 6-year-olds) were twice as likely to correctly identify the target if a simultaneous procedure was employed and 1.89 times more likely to correctly identify the target if an elimination procedure was used compared to the sequential procedure. Considering the target-absent lineup conditions, Humphries et al. (2012) found that adults were more accurate than children at correctly rejecting the lineup, however no significant differences emerged due to lineup type. However, there was a trend in which adults had a higher rate of correct rejection with the elimination lineup compared to the simultaneous lineup procedure, suggesting that the elimination lineup may also be effective at increasing correct rejections with adult witnesses.

A number of other studies have examined the elimination lineup with younger adults, with mixed findings on its' effectiveness. Pozzulo and colleagues (2008) conducted one of the first studies to directly assess the effectiveness of the elimination procedure with an adult-only sample. In this study, the researchers compared the simultaneous, sequential, and elimination procedures with younger adults (*Mag*e = 22.4 years). Participants viewed a video of a mock theft and were then shown a target-present or target-absent lineup. Pozzulo and colleagues (2008) found no differences in the rate of correct identification across the three lineup procedures, however there was a difference in the rate of correct rejection. Specifically, the researchers found that the sequential and elimination lineups were superior to the simultaneous lineup procedure, however the sequential and elimination lineup procedures elicited comparable rates of correct rejection. The findings in this study suggest that the elimination lineup may be effective

with adult eyewitnesses, such that it can reduce false positive responding while maintaining a high rate of correct identifications (Pozzulo et al., 2008).

In a similar study, Pozzulo, Reed, Pettalia, and Dempsey (2015) compared the sequential, simultaneous, elimination, and the wildcard lineup procedures with a sample of young adults (*M age* = 20.17). The wildcard procedure is a modified simultaneous lineup procedure that includes a graphical representation of a 'not here' option (i.e., a blackened silhouette often with a superimposed question mark; Zajac & Karageorge, 2009). In this study, undergraduate students were shown a video of a non-violent theft and, after a brief delay, participants made an identification decision from a target-present or target-absent lineup. Pozzulo and colleagues (2015) found comparable rates of correct identifications across all four lineup procedures when participants were shown a target-present lineup. This finding was similar to past research (e.g., Pozzulo et al., 2008). When participants were shown a target-absent lineup, the elimination lineup resulted in a higher rate of correct rejection (.77) in comparison to the simultaneous lineup (.46). However, the rate of correct rejection when shown the elimination lineup was comparable to the sequential and wildcard procedures. Again, these results were similar to the findings by Pozzulo and colleagues (2008), suggesting that the elimination lineup is able to reduce false positive responding in adult eyewitnesses.

In one of the first studies examining lineup procedures with adolescent eyewitnesses, Pozzulo, Dempsey, and Pettalia (2013) examined the sequential, simultaneous, and elimination lineup procedures. Included in this sample were adolescents (*Mage* = 16.49 years) and young adults (*Mage* = 20.06 years). Adolescents were tested in their classrooms, while young adults were tested in small groups in a

laboratory. Participants watched a 90-second video of a non-violent theft and were then asked to complete a free-recall description form. Participants then completed a delay task in which they were asked to read a mock trial transcript and render a verdict. Following the delay task, lasting approximately 25 minutes, participants were then shown a target-present or target-absent sequential, simultaneous, or elimination lineup. Pozzulo and colleagues (2013) found no differences in identification accuracy due to the age of the eyewitnesses, however, there were significant differences in identification due to the type of lineup procedure employed. Specifically, when examining identification accuracy in target-present lineups, the researchers found that both adult and adolescent eyewitnesses were more likely to make a correct identification when a simultaneous lineup (compared to the other procedures) was employed. The elimination and sequential lineup procedures resulted in comparable rates of correct rejection.

Taken together, these findings suggest that in some cases, the elimination lineup can elicit rates of correct identifications that are comparable to the simultaneous procedure (e.g., Pozzulo et al., 2008; Pozzulo et al., 2015), however this is not consistently the case (e.g., Pozzulo et al., 2013). Furthermore, the elimination lineup procedure produces comparable rates of correct rejection when compared to the sequential procedure, and often is more effective at reducing false positive identifications when evaluated against the simultaneous lineup (Pozzulo et al., 2008; Pozzulo et al., 2013; Pozzulo et al., 2015). Currently, it is unclear why the elimination lineup does not consistently produce comparable rates of correct identification when compared to the simultaneous procedure, as was found in Pozzulo et al. (2008). It is possible that this decrease in accuracy may be in part due to the nature of the elimination task. Pozzulo and

Lindsay (1999) argued that the elimination procedure may be less effective with adults in some cases because adults may already have a preconceived idea of what it means to make an identification from a lineup (i.e., you make one judgment). As stated above, it is possible that by asking adult witnesses to make two judgments, the witness may view the second judgment as an indication that they were incorrect in their first choice. This assumption may then cause witnesses to change their mind and erroneously reject the lineup (Pozzulo & Lindsay, 1999). Clearly, more research is needed on the effectiveness of the elimination lineup for both adult and adolescent eyewitnesses.

Elimination-plus lineup. The elimination-plus lineup is a newly developed procedure that includes a modification to the first judgment in the traditional elimination procedure (Pica & Pozzulo, 2017b). The elimination-plus is the 'next stage' in the advancement of the elimination lineup family. In this procedure, witnesses are shown all photographs simultaneously and are asked to choose the person who looks most like the perpetrator. Once the selection is made, the elimination-plus procedure asks the witness to provide a confidence rating that the person they chose as looking most like the perpetrator actually is the perpetrator on a scale of zero (not at all confident) to 100 (very confident). Following the confidence rating at judgment one, the procedure follows that of the traditional elimination procedure. Specifically, all remaining photographs are removed, and the witness is asked to make an absolute judgment and provide a confidence rating in their decision. There have been two studies thus far that have examined the elimination-plus lineup. First, Pica and Pozzulo (2017b) examined the elimination-plus lineup with a sample of young adults (*Mage* = 21.13 years). In their study, undergraduate students were presented with a video of a staged theft, and after a

brief delay, participants were asked to make an identification from a target-present or target-absent simultaneous, sequential, elimination, or elimination-plus lineup. When examining performance in target-present lineups, the researchers found that the simultaneous lineup elicited significantly more correct identifications when compared to the elimination procedure and the elimination-plus procedure. The simultaneous had significantly fewer false rejections in target-present lineups than the elimination-plus procedure. However, the diagnosticity ratios across all lineup procedures were found to be comparable.

Although the elimination procedure has been extensively tested with child and adult samples, few studies have considered adolescent samples. A recent study by Sheahan and colleagues (2017) is one of the first studies to examine the elimination procedure and the new elimination-plus procedure with an older adolescent sample. In their study, they examined high school aged students' (N = 319; *Mage* = 16.41 years) and young adults' (N = 301; *Mage* = 20.03 years) identification accuracy. In their study participants were exposed to a videotaped, staged theft by a stranger. After a brief delay, participants were asked to make an identification from a simultaneous, wildcard, elimination, elimination-plus, or elimination plus wildcard (i.e., step two of the elimination lineup also included a silhouette) lineup. The target was either present or absent from the lineup. Although there were no differences in identification accuracy due to age, they found that when compared to the simultaneous lineup, the elimination lineup and the elimination-plus lineup resulted in fewer correct identifications (and more false rejections) when the target was present in the lineup. Conversely, when the target was absent from the lineups, the elimination procedure (but not the elimination-plus) was

found to elicit higher rates of correct rejections and fewer false identifications when compared to the simultaneous lineup. These findings suggest that the elimination procedures may be beneficial to adolescent witnesses when the police have apprehended an innocent suspect at the cost of lower correct identifications when the suspect is guilty.

Overall, the elimination procedures have been found to be effective in reducing the rate of false positive identifications with child witnesses, and arguably, effective with adult witnesses as well. However, it is unclear how effective the elimination lineup is for use with adolescent eyewitnesses. Furthermore, the elimination lineup and elimination-plus has thus far only been tested when the witness and the perpetrator are previously unknown to each other. As the elimination-plus lineup is the newest advancement in the elimination lineup procedures, it was examined in the current study.

Survival status. The elimination lineup and the elimination-plus lineup procedures provide an additional piece of evidence that can shed light on the possible guilt of the suspect – the "survival status" – and can be used as an investigative tool. The survival status is unique to the elimination procedures because of the explicit two-judgements that the eyewitness provides. With other identification procedures such as the sequential and simultaneous, the survival status is equivalent to the rate of identification. In the elimination procedures, survival status can be understood as the rate at which the guilty suspect survives the first judgment (Pozzulo & Lindsay, 1999). If the suspect in the lineup is the guilty perpetrator, the perpetrator is more likely to look like him/herself relative to the remaining lineup members. If the suspect survives judgment one (i.e., the suspect is selected as looking *most* like the perpetrator), the likelihood that the suspect is the guilty perpetrator increases. Conversely, if the suspect does not survive the first

judgment (i.e., the suspect is not selected as looking most like the perpetrator), the likelihood of the suspect being guilty decreases. Assuming a fairly constructed lineup (i.e., the suspect does not stand out from the other lineup members), there is no reason to believe an innocent suspect would look more like the guilty perpetrator than any other lineup member. The survival status information provided by the elimination procedures may be useful as an investigative tool, providing incremental evidence of potential guilt, as it provides additional information in regard to the guilt of the suspect, in addition to the identification decision.

Researchers examining the survival status of the guilty suspect in the elimination lineup have consistently found that the guilty suspect survives the first judgment at a higher rate than any other lineup member (e.g., Humphries et al., 2012; Pozzulo & Lindsay, 1999; Pozzulo et al., 2009; Pozzulo et al., 2013; Pozzulo et al., 2015; Sheahan et al., 2017). For example, Humphries and colleagues (2012) found that the target survived the first judgment of the elimination lineup at a significantly higher rate than any other lineup member across three age groups (i.e., younger children, older children, and adults). However, the target survived judgment one at a higher rate than he was identified. Similarly, Pozzulo and colleagues (2013) found that the guilty suspect survived judgment 1 of the elimination lineup at a higher rate than any other lineup member for both adult (.78) and adolescent (.72) eyewitnesses. Furthermore, the survival rate of the guilty suspect was higher than the identification rate in the elimination lineup for adolescent age groups (.44) and adults (.47). The survival status was, however, comparable to the simultaneous identification rate for both adolescents (.69) and adults (.59). More recently, Sheahan and colleagues (2017) found that the guilty suspect survived the first judgment

of the elimination procedure and the elimination-plus procedure at a higher rate (.46 and .62, respectively) than any other lineup member. Evidently, survival status of the suspect is a critical piece of information for police to pursue. At a minimum, the survivor suggests some physical similarity to the perpetrator and may have utility in other formats, such as in descriptions, composites, and sketches (although police sketches/composites may be problematic for a variety of reasons; Frowd et al., 2002), the survivor provides a pictorial representation of some "similarity to the perpetrator".

Lineup procedure and the familiar stranger. As mentioned previously, the type of lineup procedure employed may significantly impact a witness' ability to correctly identify a perpetrator or correctly reject a lineup (Wells, 1984). Thus far, most research examining lineup procedures focuses on the identification of strangers. However, it is also possible that the type of lineup procedure employed may differentially impact an eyewitness' ability to identify a perpetrator if the perpetrator is casually familiar to them (i.e., termed familiar- stranger). For example, eyewitnesses may be more accurate in their identification decisions if investigators use lineups that promote familiarity-based decisions when the guilty suspect is in the lineup (i.e., target-present lineups). Arguably, the simultaneous lineup is a procedure that prompts familiarity-based decisions. Specifically, the relative judgment that is employed during the simultaneous lineup can be viewed as a type of familiarity judgment. In this case, the eyewitness examines the lineup and selects the person who looks most like the criminal (i.e., who looks most familiar) relative to the other lineup members (Wells, 1984; Wells, 1993). Because the witness is already making a familiarity judgment in the simultaneous lineup, the use of this lineup should result in increased accuracy when the witness is identifying a

"familiar-stranger" compared to a stranger. However, if the suspect is innocent, relying on a familiarity judgement could also be problematic. In this case, a procedure that promotes the use of a relative judgment may lead the eyewitness to erroneously choose an innocent suspect, as the person who looks *most* familiar may pass the necessary 'threshold' required to make an identification. Lineups that promote familiarity-based decisions then may help or may hinder identification accuracy, depending on whether the lineup contains a guilty suspect or an innocent suspect.

Given that familiarity-based decisions (i.e., relative judgments) may be detrimental when an innocent suspect is apprehended, lineups that promote an absolute judgment may be more appropriate when the perpetrator is a familiar stranger. An absolute judgment requires that the eyewitness compare one photograph to their memory of the perpetrator, and thus is thought to minimize an eyewitness' reliance on a relative judgment (Lindsay & Wells, 1985). In the case of familiar-stranger identifications, a lineup procedure such as the sequential procedure may reduce the likelihood of a false identification in target-absent lineups. Specifically, the use of an absolute judgment will likely mean that the photographs that are 'close matches' to the perpetrator will not pass the threshold required to make an identification (i.e., the photograph is not familiar *enough*). The sequential lineup is already thought to increase the response criterion when eyewitnesses make an identification– specifically, that when compared to the simultaneous lineup, the sequential lineup may cause eyewitnesses to increase their threshold when deciding whether a face has been seen previously (Meissner, Tredoux, Parker, & Maclin, 2005). This decision contrasts with the *most familiar* judgment that is made in the simultaneous lineup procedures. The sequential lineup, therefore, should

promote more correct rejections when an innocent suspect is in the lineup, but maintain the increase in correct identifications that are associated with identifying someone who is familiar (i.e., compared to a stranger).

It is possible that the use of a relative judgment (target-present lineups) and an absolute judgment (target-absent lineups) may both work to increase identification accuracy when the eyewitness is familiar with the perpetrator. Given that both types of judgments may elicit accurate responses, the elimination lineup may be the most effective lineup to use when the perpetrator is a familiar stranger, as it promotes both a relative judgment (Judgment 1) and an absolute judgment (Judgment 2). Specifically, the elimination lineup allows for an instinctive, familiarity judgment (i.e., who looks *most familiar* or *similar* to the perpetrator?) but also includes the 'protection' against false identifications with the absolute judgment (i.e., is the person who is *most familiar* actually the perpetrator?). Given that different lineup procedures may differentially influence identification accuracy when the perpetrator is thought to be a familiar stranger, the current study will examine the simultaneous, sequential, and elimination-plus lineup.

Theoretical implications. Dual-process theories of recognition may be useful in understanding how familiarity with a perpetrator may influence eyewitness identification accuracy, specifically in combination with the type of lineup procedure utilized when making an identification. Dual-process theories of recognition posit that there are two independent processes involved in recognition memory: recollection and familiarity (Jacoby, 1991; Mandler, 1980; Yonelinas, 2002). Recollection can be conceptualized as conscious, intentional remembering in which the individual can identify specific details or episodic information regarding when the target information (e.g., a face) was encoded

(Jacoby, 1991; Tulving, 1985). Recollection (i.e., remembering) is associated with episodic memory and is thought to be slower than familiarity. Familiarity, on the other hand, is considered to be a more automatic, less conscious form of memory (Jacoby, 1991; Tulving, 1985). As opposed to recollection, familiarity is thought to be associated with semantic memory such that individuals are aware that they have encountered the target information (e.g., that they have seen a face), but they are unable to consciously report any episodic details about the encoding event. This type of recognition memory can be conceptualized as a 'continuous index of memory strength' (Yonelinas, 2002, p. 447). In other words, it can be understood as an individual 'knowing' that target-information has been encoded previously. In terms of eyewitness identification, 'familiarity' would refer to when an eyewitness recognizes a perpetrator as familiar but is unable to remember any specific detailed information regarding who the perpetrator is, or where they had encountered the perpetrator before. This vague feeling of 'knowing' someone without being able to recall any specific details provides a conceptualization of a '*familiar stranger*' in an eyewitness context.

Dual-process theories of recognition memory can be measured by utilizing the 'remember-know' paradigm originally proposed by Tulving (1985) and that was later updated to include 'guess responses' (i.e., when decisions are made independent of memory; Gardiner, Java, & Richardson-Klavehn, 1996). Researchers have examined the remember-know-guess measure of recognition memory across a variety of stimuli (e.g., musical melodies, words, faces). Researchers examining recognition memory through this paradigm have found that remember and know responses may be associated with different forms of recognition memory. For example, Gardiner, Ramponi, and

Richardson-Klavehn (1998) explored participants' explanations of their 'remember', 'know', and 'guess' responses provided after a word recognition task. In this study, participants were presented with several test words on a computer screen and completed a yes/no word recognition task in which they selected "yes" if they recognized the word or "no" if they did not. If the participant selected 'yes', they then were asked to make a remember-know-guess judgment. Following these decisions, a number of recognition decisions were chosen arbitrarily, and participants were then asked to explain the rationale behind their recognition (i.e., remember, know, or guess) decision. Gardiner and colleagues (1998) found that overall, participants' subjective reports of 'remember' responses were associated with reports of recollection, such that participants could recollect upon episodic, personal, or associative information of when the stimuli was encoded. Reports of 'know' decisions, however, were associated with reports of familiarity or a 'feeling' of knowing or seeing the item before and lacked any episodic or recollected reports (Gardiner et al., 1998).

In a similar vein, Gardiner, Ramponi, and Richardson-Klavehn (2002) conducted a meta-analysis examining remember, know, and guess responses across 23 recognition memory experiments. The researchers found that remember and know responses were associated with memory for the test item, whereas 'guess' responses had no association with test item memory. This finding suggests that guess responses do not measure recognition memory. Furthermore, they found that 'remember' and 'know' responses were uncorrelated, suggesting that remember and know responses elicited during a recognition task are associated with different forms of recognition memory (Gardiner et al., 2002). Taken together, studies examining the remember-know-guess task suggest that

recognition memory can be understood using the dual-process model of recollection and familiarity.

The remember-know-guess paradigm also has been applied to eyewitness identification judgments to help understand underlying cognitive factors that may influence identification accuracy, specifically in regard to different types of lineup procedures. For example, Meissner and colleagues (2005, Experiment 4) examined lineup identification decisions using the remember-know-guess paradigm. In this study, participants were exposed to multiple targets and were later asked to make identification decisions. Participants also were required to make judgments regarding whether they 'remembered', 'know', or 'guessed' after the identification. The researchers found that presenting faces in a sequential format reduced participants' reliance on familiarity-based judgments (e.g., know responses) however there were no reductions in the use of recollection-based judgments (e.g., remember responses). These findings give support for the idea that simultaneous lineups promote the use of familiarity-based decisions. Although there are few studies examining the remember-know-guess paradigm in an eyewitness context, this study gives insight into how different lineup procedures drive different types of recognition judgments. Based on this research, it appears that simultaneous lineup procedures may promote 'know' responses, whereas sequential lineup procedures may promote 'remember' responses.

Given that different types of lineup procedures may promote different types of recognition decisions, and that these decisions may interact with identification accuracy when the perpetrator is thought to be a 'familiar stranger', the current study also examined 'remember-know-guess' judgments. Specifically, participants who made a

positive identification from a simultaneous, sequential, or elimination lineup were asked to identify whether they 'know', 'remember' or 'guessed' that the face they selected was the perpetrator. Providing the 'remember-know-guess' judgment allows for a self-report measurement of recognition memory and gives insight into which types of lineup procedures may be driving different types of recognition decisions.

Familiarity Recognition versus Identification Paradigms

Most eyewitness identification research involves exposing an individual to a target and later asking him/her to identify the target from a lineup. Usually, the eyewitness does not know that he or she will be asked to identify the target before exposure. In addition, the target is usually unknown to the participant (i.e., the eyewitness has never been exposed to the target before the study began). Although most eyewitness studies focus on the abilities of eyewitnesses to identify a stranger (Pezdek & Stolzenberg, 2014), the majority of real eyewitnesses to a crime involve a perpetrator they know or have previously been exposed to (i.e., someone they are familiar with; Flowe et al., 2011). Familiarity with another person can be understood on a continuum that can range from being completely unfamiliar (i.e., a stranger) to being extremely familiar (i.e., someone well known such as a family member; Pezdek & Stolzenberg, 2014). Often, eyewitnesses may be asked to make an identification of someone who falls into the middle of this spectrum – the *familiar stranger*. The familiar stranger can be understood as someone an eyewitness briefly met or interacted with but does not know on a personal level (i.e., they are not well known; Pozzulo, 2016).

Although there is a plethora of research that has examined stranger identifications, there are only a handful of studies that have considered the role of familiarity judgments.

In particular, these studies focus on face recognition more so than eyewitness identification as they do not employ an eyewitness paradigm (as described above). Often, these face recognition studies test familiarity by exposing participants to a yearbook photograph and asking them to classify the face as familiar or unfamiliar. For example, Bahrick, Bahrick, and Wittlinger (1975) conducted one of the first studies examining the role of familiarity on face recognition. The researchers used a cross-sectional design to test participants' (N = 392) memory for their high school classmates after three months to approximately 47 years following high school graduation. Participants were exposed to lineup photographs (i.e., pictures from their high school yearbook) and were asked to recognize the photograph, the person's name, and match the appropriate name to the photograph. The researchers found that participants were highly accurate at recognizing the faces of their former classmates even decades after graduation, as the mean accuracy on the face recognition task was 71% for those who graduated 47 years earlier. However, this accuracy rate may be inflated due to a number of methodological limitations associated with the study (i.e., lineup photographs were recovered from the participants own yearbooks, the participants may have had exposure to their high school classmates after graduation, etc.).

Vokey and Read (1988) were interested in the relationship between face typicality (i.e., distinctiveness) and familiarity on face recognition; specifically, the relationship between typicality and familiarity on false positive identifications. Participants were shown a series of yearbook photos and were asked to make (a) a recognition judgment (e.g., has the face appeared previously in the sequence), (b) a typicality judgment (i.e., is the face distinct), and (c) a familiarity judgment (e.g., is the face confusable with

someone you know). Contrary to their hypotheses, Vokey and Read (1988) found no relationship between familiarity and the rate of false positive responding. However, given the broad definition of familiarity and the lack of experimental control, it is difficult to draw any firm conclusions on the relation between prior familiarity and identification accuracy from this study alone.

Pezdek and Stolzenberg (2014) also examined eyewitness familiarity judgments on pictures of stranger and casually familiar individuals. In their study, participants were exposed to 40 photographs of individuals who were either familiar (20 photographs) or unfamiliar (20 photographs) and were asked to rate how 'familiar' each face was to them. In the familiar condition, sophomore students viewed yearbook photographs of students who had graduated from their school one year previously (i.e., students who were seniors when the participants were freshman). In the unfamiliar condition, sophomore students viewed yearbook photographs of unknown students from another school (i.e., strangers). Pezdek and Stolzenberg (2014) found that overall, 42% of the familiar photographs were correctly rated as familiar, whereas 23% of the stranger (i.e., unfamiliar) photographs were incorrectly rated as familiar. Furthermore, Pezdek and Stolzenberg reported that familiar photographs were significantly more likely to be rated as familiar when compared to photographs of strangers; however, they note that a high diagnostic error rate restricts the forensic utility of familiarity judgments.

Despite the presence of methodological limitations (e.g., familiarity is not experimentally controlled), familiarity recognition studies such as those described above can provide valuable information with regards to how eyewitnesses may perform when asked to identify someone they are familiar with. Specifically, these studies begin to

show that eyewitnesses can classify familiar versus unfamiliar faces with relative accuracy. It is possible that this will also relate to increases in identification accuracy during lineup identifications.

There is also some research employing an eyewitness paradigm that can be considered. Steblay, Dietrich, Ryan, Raczynski, and James (2011a) conducted a study (Experiment 1) to examine the influence of viewing a sequential lineup twice on identification accuracy. Although not the main purpose of the study, the researchers were able to measure familiarity post-hoc as the confederate in the study was a recent graduate of the college in which the study took place. As a result, just over a third of participants (35%) reported having previous exposure to the confederate. In this study, Steblay and colleagues (2011a) found that familiar witnesses were significantly more accurate in their identification decisions compared to stranger witnesses. Specifically, familiar witnesses were more likely to correctly identify the confederate after the first viewing of the lineup when compared to stranger witnesses (60% vs. 7.6%, respectively), a finding that was repeated upon additional viewing (65.7% vs. 13.6%, respectively). When examining identification accuracy in target-absent lineups, familiar witnesses were significantly more likely to correctly reject the lineup when compared to stranger eyewitnesses after the first (87.5% vs. 68%, respectively) and repeated viewing (68% vs. 45%, respectively). Moreover, Steblay and colleagues (2011a) found familiarity impacted choosing rates, such that familiar witnesses had the highest choosing rate in target-present lineups (71%) and the lowest choosing rate in target-absent lineups (10.5%). Finally, the diagnosticity of identification decisions were found to be higher for familiar witnesses when compared to stranger witnesses. The findings presented by Steblay and colleagues (2011a) suggest

that prior familiarity with a suspect is beneficial in increasing identification accuracy. However, as is the issue with Vokey and Read (1988), familiarity was not experimentally controlled (e.g., the amount of prior exposure to the target was unknown), thus limiting the applicability of the study.

Cain, Baker-Ward, and Eaton (2005) conducted one study that examined recognition accuracy of familiar individuals with a child sample. Cain and colleagues (2005) examined the ability of preschoolers to recognize a familiar caregiver (i.e., a caregiver who volunteered and interacted in their preschool over 6-8 weeks). In their study, children were asked to identify the faces of their former caregivers from photographic lineups both one week and three months later. Cain and colleagues (2005) found that after a one-week delay, recognition accuracy ranged from approximately 28% to 75% depending on the age of the child. Specifically, older preschoolers were more accurate in the recognition task than younger preschoolers or older toddlers (75% vs. 41% vs. 28%, respectively), the youngest children did not significantly differ from chance in their recognition accuracy. A similar pattern of results was found after a three-month delay such that older children were more likely to identify familiar caregivers than younger children.

Taken together, these studies provide valuable insight into the familiarity judgments made by eyewitnesses. However, given that none of these studies experimentally controlled familiarity, it is premature to make any conclusions on the role that familiarity plays in identification accuracy, specifically.

Exposure duration. Although there are few studies that explicitly examine familiarity on eyewitness identification accuracy, there have been a number of studies

that have examined the role of exposure duration on identification accuracy. The exposure duration literature may supplement our understanding of familiar-stranger identifications as they experimentally manipulate the length of exposure an eyewitness has when viewing a target (i.e., the longer I see someone, the more familiar I am with you). Given that prior exposure is undoubtedly an important aspect of familiarity (Mandler, 2008), a review of this research is necessary.

The majority of these studies have examined the role of exposure duration (i.e., length of viewing time) on an eyewitness' ability to correctly identify a previously seen target. For example, Gross and Hayne (1996) examined the role of previous exposure to a target (i.e., short versus long exposure) and lineup type (i.e., target-present versus target-absent) on children's (age 5- to 6-year-olds) identification accuracy. In their study, child participants were exposed to four different actors; two actors the children interacted with for a long period of time (i.e., an hour) and two actors they were exposed to briefly (i.e., a matter of minutes). They found that when shown a target-present lineup, children could correctly identify the two long-exposure actors, and one of the short-exposure actors. However, when presented with a target-absent lineup, children's performance decreased substantially, regardless of the length of exposure to the target. This may be due to the fact that different memory processes may be involved in deciding to reject a lineup or may be due to the demand characteristics associated with presenting a lineup (Gross & Hayne, 1996). Familiarity (in terms of exposure) may not be enough to increase identification accuracy in target-absent lineups with young children. However, Gross and Hayne (1996) suggested that increased exposure to a previously unfamiliar individual does increase children's accuracy in target-present lineups, suggesting that children may

be more accurate in their identifications of familiar individuals – but this may be specific to target-present lineups.

In a similar study, Leippe, Romanczyk, and Manion (1991) examined children's (i.e., 5- to 6-year-olds and 9- to 10-year-olds) and adults' identification accuracy after being exposed to two confederates. The aim of this study was to mimic situations in which interpersonal touching was involved by having a confederate administer a mock skin sensitivity test. The confederate who administered the test interacted with the participants for approximately six minutes, whereas the second confederate interacted with the participants briefly (i.e., nine seconds) when they interrupted the test. Leippe and colleagues (1991) found that adults (93.3%) were more likely to make a correct identification of the primary confederate when compared to both younger (78.6%) and older children (62.5%). Similarly, adults were more likely to correctly reject target-absent lineups than younger and older children (91.7% vs. 66.7% vs. 86.7%, respectively). Although adults were more accurate in their identifications than children in the longer exposure condition, this difference was more pronounced when participants were asked to identify the confederate who briefly interrupted the test (i.e., short exposure of nine seconds). Specifically, younger children and older children made fewer correct identifications when compared to adults (38.5% vs. 45.2% vs. 81.5%, respectively) and were more likely to make false identifications when compared to adults (23% vs. 22.6% vs. 0%, respectively). This study suggests that although longer exposure to a confederate increases performance on identification tasks when compared to shorter exposures, children still underperform when compared to adults.

Memon, Hope, and Bull (2003) conducted a study in which younger (*Mage* = 19 years) and older adults (*Mage* = 68 years) were exposed to a perpetrator for 12 seconds (short exposure) or 45 seconds (long exposure). They found that regardless of age, participants were more accurate in their identification decisions when they saw a longer exposure of the target's face compared to the short exposure condition. In particular, participants were more likely to correctly identify the perpetrator when they were shown a long exposure, whereas more false identifications were made under the short exposure conditions.

The role of exposure duration also has been considered in a meta-analysis conducted by Bornstein, Deffenbacher, Penrod, and McGorty (2012). In their meta-analysis, they included 25 face recognition studies, extending the work of a previous meta-analysis conducted by Shapiro and Penrod (1986). Overall, they found that longer exposure to a target was associated with increased identification accuracy when compared to shorter exposure durations (differences in exposure times ranged from 0.7 – 3570 seconds, with a median difference exposure time of 4.7 seconds). However, they note that increases in exposure duration may have the most influence when the exposure time is already short, and that increasing longer exposures may add little benefit (i.e., the relation is nonlinear).

Using a different approach to examine exposure and identification, Horry and colleagues (2014) conducted an archival analysis to examine factors that influence real world identification outcomes. Their analysis included 295 case files, including 833 lineups. They found that longer exposure to a criminal (i.e., 60 seconds or more) resulted in a higher rate of suspect identifications than shorter exposure duration crimes (i.e., less

than 60 seconds). This was true for both corroborated and uncorroborated cases. Similarly, Valentine, Pickering, and Darling (2003) examined the eyewitness identification attempts of 640 real life witnesses including 314 administered lineups. They found that witnesses were more likely to identify the suspect from a lineup if they were exposed to the perpetrator for longer than one minute, compared to those who were exposed to the perpetrator for less than a minute.

Overall, research examining exposure duration suggests that longer exposures generally result in increased recognition accuracy than shorter exposures (Bornstein et al., 2012). Although exposure to a target may be only one aspect of 'familiarity', extrapolating from the exposure duration literature suggests that eyewitnesses may be more accurate in their identification decisions when they are familiar with the perpetrator.

Confidence-Accuracy Relationship

The relation between eyewitness confidence and identification accuracy has been extensively examined in eyewitness research (Cutler & Penrod, 1989) and eyewitness confidence is one of the most common ways to assess identification accuracy (Sporer, Penrod, Read, & Cutler, 1995). An eyewitness' confidence is an important factor to consider as it has been found to be highly persuasive to jurors (Brewer & Burke, 2002; Sauer & Brewer, 2015). Furthermore, eyewitness confidence has been recognized in the criminal justice system as an indicator of eyewitness accuracy (i.e., Supreme Court of the United States; *Neil v Biggers,* 1972).

An eyewitness' confidence can be assessed immediately after a crime but before an identification from a lineup (i.e., pre-identification or prospective confidence), or it can be assessed immediately after an eyewitness makes an identification (i.e., post-

identification or retrospective confidence; Busey, Tunnicliff, Loftus, & Loftus, 2000; Cutler & Penrod, 1989). As it has been suggested that post-identification confidence is a stronger indicator of eyewitness accuracy (e.g., Cutler & Penrod, 1989), post-identification confidence will be considered from this point forward.

Eyewitness confidence can be conceptualized as the degree of certainty (i.e., how sure the eyewitness is) that he/she made the correct decision in the lineup identification task (e.g., how confident are you that the person you chose is the criminal; Wells & Murray, 1984). Alternatively, eyewitness confidence can also be understood as the degree of match between the person selected from the lineup and the eyewitness' memory of the perpetrator.

Early reviews and meta-analyses examining eyewitness confidence suggested that the relationship between eyewitness confidence and accuracy is weak to moderate (e.g., Bothwell, Deffenbacher, & 1987; Deffenbacher, 1980; Leippe, Wells, & Ostrom, 1978; Sporer et al., 1995; Wells & Murray, 1983). This led some eyewitness researchers to conclude that eyewitness confidence is a poor indicator of eyewitness accuracy (e.g., Wells, et al., 1978; Wells & Murray, 1983). For example, Leippe and colleagues (1978) examined eyewitness accuracy when participants were: (a) exposed to a serious or non-serious theft and (b) whether they had prior knowledge of what the stolen object was before the crime. Although they found that participants were more accurate in their identification decisions when the theft was serious, and they had prior knowledge, they found no relation between eyewitness confidence and identification accuracy. Also, in an early review, Bothwell and colleagues (1987) examined 35 studies and found a moderate confidence and accuracy (CA) relationship (r = .25), although the authors note that this

was a conservative estimate and a stronger relationship may have been found (i.e., higher *r*) when correcting for measurement error across studies.

Similarly, Malpass and Devine (1981) examined confidence, target-presence, and lineup instruction on identification accuracy. In their study, participants were exposed to a staged vandalism and were later asked to make an identification from a target-present or target-absent lineup and were provided with biased (i.e., the witness was not told the guilty person may be absent from the lineup) or unbiased lineup instructions (i.e., the witness was told the guilty person may be absent from the lineup). Participants were then asked to provide a confidence rating. Malpass and Devine (1981) found that participants who choose from a lineup were more likely to report confidence in their decision, however, confidence ratings were found to be unrelated to identification accuracy. Specifically, they found a strong, positive relationship between identification accuracy and confidence when the perpetrator was present in the lineup. However, when the perpetrator was absent, they found a strong, negative correlation between confidence and accuracy. In other words, eyewitnesses who made an incorrect choice from a target-absent lineup were equally as confident as eyewitnesses who made a correct choice from a target-present lineup. Malpass and Devine (1981) argue that eyewitness confidence, therefore, is not an indicator of accuracy but only an indicator that a choice has been made.

Sporer and colleagues (1995) conducted a meta-analysis to examine the CA relationship and considered possible moderators. Their meta-analysis included 30 studies involving a staged-event and included both target-present and target-absent lineups. When examining the data as a whole, Sporer and colleagues (1995) found a small

positive relationship between confidence and accuracy (r = .29). However, a stronger relation was found between confidence and accuracy when they considered only choosers (i.e., eyewitnesses who selected someone from a lineup). Specifically, when examining choosers only, Sporer and colleagues (1995) found a moderate, positive relationship between confidence and accuracy (r = .41). The authors suggest that a stronger confidence accuracy relationship may only be found when limited to eyewitnesses who choose from a lineup.

Brewer and Day (2005) examined the CA relationship with a sample of children (*M*age = 10 years) and adolescents (*M*age = 15 years, 9 months). In their study, participants were shown a lineup and were asked to rate their confidence in their decision by selecting a button ranging from 0 (really unsure, 0%) to 4 (really sure, 100%). When examining choosers (i.e., those who made a positive identification), the researchers found a weak-moderate confidence-accuracy relationship for both children (r = .26) and adolescents (r = .33). Although the relation did not differ between children and adolescents, child eyewitnesses were more likely to be over-confident in their identification decisions and less accurate when compared to adolescent eyewitnesses. As a result, Brewer and Day (2005) suggest that confidence may be a poor indicator of accuracy for child eyewitnesses.

More recent research examining the CA relationship posits a more optimistic view of the utility of confidence as a postdictor of accuracy. Specifically, some researchers suggest that the small to moderate confidence-accuracy relationship that is often cited by researchers may be due to the type of analyses being used to assess the relationship (i.e., point-biserial correlation; Brewer & Wells, 2011). Specifically, some

researchers suggest that a correlation approach to examining the relationship between confidence and accuracy fails to provide a complete or accurate picture of the relationship (Brewer & Wells, 2011; Wixted, Mickes, Clark, Gronlund, & Roediger, 2015). Instead, they recommend the use of the calibration approach to understanding the CA relationship. Researchers utilizing the calibration approach, that plots the proportion of accurate identification responses across each level of confidence (e.g., 80%), report a stronger confidence-accuracy relationship that what is generally found when a correlation approach is used (Brewer & Wells, 2011; Wixted et al., 2015). The calibration statistic (*C* statistic) can range from 0 (perfect calibration) to 1 (no calibration); Brewer & Wells, 2006). If the confidence-accuracy relationship has perfect calibration, for example, eyewitnesses who make decisions with 70% confidence are likely to be correct 70% of the time. The calibration approach is considered to be more informative than the correlation approach, as it provides additional information on the reliability of identifications across the different categorical levels of confidence (Brewer & Wells, 2006; Carlson et al., 2016). As a result, the calibration approach can provide information on the likelihood that the identification is reliable at each level of confidence, which is not possible using the correlation approach. However, the calibration approach often requires large sample sizes (e.g., in the thousands; Brewer & Wells, 2006). Researchers using the calibration approach to analyse the confidence accuracy relationship has found it to be a reliable indicator of accuracy when used with adult eyewitnesses and assessed immediately after an identification (Brewer & Wells, 2011; Sauer, Brewer, Zwek, & Weber, 2010). Additionally, the calibration approach has been found to find a meaningful

confidence-accuracy relationship, even when the correlation approach does not (e.g., Brewer & Wells, 2006; Keast, Brewer, & Wells, 2007).

Brewer and Wells (2006), for example, examined the CA relationship and compared the correlation and calibration approach. In their study, participants were shown a video of a non-violent theft and were later shown a target-present or target-absent lineup. The researchers also manipulated the type of lineup instructions given (biased vs. unbiased) and foil similarity (high vs. low). Participants were asked to make an identification for both the criminal in the video, and an additional person in the video (i.e., a waiter). When examining the confidence-accuracy relationship, Brewer and Wells (2011) found significant, moderate CA relationships across all conditions when participants were asked to identify both the criminal and the waiter. The calibration approach found evidence of a stronger confidence-accuracy relationship. Specifically, Brewer and Wells (2006) found that confidence and accuracy calibrated for choosers, but not for non-choosers, across all conditions and for both targets (i.e., the criminal and the waiter), with the *C* statistic ranging from .01 to .02.

Keast and colleagues (2007, Experiment 1) examined the confidence-accuracy relationship with a sample of children (*M*age = 11 years, 10 months) and adults (*M*age = 24 years, 8 months). In their study, participants watched a mock crime and were subsequently asked to attempt two lineup identifications (i.e., one of the target, one of a peripheral person in the video) from a target-present or target-absent lineup. The researchers also manipulated the type of lineup instructions (e.g., biased vs. unbiased). The calibration approach was used to assess the data. Keast and colleagues (2007, Experiment 1) found evidence for a significant relationship between confidence and

identification accuracy for adult choosers (overall *C* statistic = .02 for both targets). This was not found for adult non-choosers or for child participants.

Sauer and colleagues (2010) examined the CA relationship by manipulating the retention interval between encoding and the identification task. Participants who gave consent to participate were exposed to a live target (e.g., in public places) by a research assistant. Participants were told to watch the target for 10 seconds and following the 10 seconds the target disappeared from view. Next, participants were either immediately shown a lineup, or they were shown a lineup 20- to 50-days following the exposure. Sauer and colleagues (2010) found that participants who were shown a lineup immediately were more accurate than those who were shown the lineup after a delay. Furthermore, Sauer and colleagues found a significant relationship between confidence and accuracy for choosers, regardless of the retention interval. Taken together, the findings of these studies suggest that eyewitness confidence may be a more reliable postdictor of accuracy than was previously thought. However, this relationship may only be present for eyewitnesses who make an identification from a lineup.

Confidence and the familiar stranger. Although most research examines the reliability of the CA relationship in the context of strangers, some consideration should be given to eyewitness confidence when the perpetrator is a familiar stranger. There are no studies to date examining confidence in combination with familiarity; however, research examining moderator effects suggest that the amount of exposure one has to a target (i.e., exposure duration) moderates the CA relationship (Bothwell et al., 1989). These studies have found support for the *optimality hypothesis*, which suggests that optimal encoding conditions (e.g., longer exposure time) allows for better face

processing, which in turn should lead to a stronger relationship between confidence and accuracy (Deffenbacher, 1980). Early studies examining the confidence-accuracy relationship with point-biserial correlations suggest that longer exposure duration increases the strength of the CA relationship (e.g., Bothwell et al., 1987; Read et al., 1990). For example, as mentioned above, Bothwell and colleagues (1987) conducted a meta-analysis including 35 studies and included exposure duration as a potential moderator. They found that an overall moderate relationship between confidence and accuracy (r = .25) and reported a correlation of r = .36 between confidence-accuracy and exposure duration. Similarly, Read and colleagues (1990) found that the strength of the confidence-accuracy relationship increases with increases in exposure duration (e.g., 5 seconds to 12 seconds to 20 seconds).

The role that exposure duration plays on the CA relationship has recently been examined using the calibration approach. For example, Palmer, Brewer, Weber, and Nagesh (2013) examined the role of exposure duration (5 seconds vs. 90 seconds) and other factors on the CA relationship across two studies. Study 1 examined the role of exposure duration and retention interval on the confidence-accuracy relationship. In this study, participants were approached in public places (e.g., parks, campus, and city streets) by a researcher. Upon giving consent, the researcher signaled to a hidden confederate to move into the participants' view for either 5 seconds (short exposure) or 90 seconds (long exposure) before the confederate moved out of view. Participants were then shown a lineup immediately or were contacted approximately one week (e.g., 6 to 8 days) later. In the delayed retention interval, the majority of the participants (60.3%) completed a lineup within 8 or 14 (92.9%) days. Palmer and colleagues found that increased confidence was

associated with an increase in identification accuracy for those who made a positive identification from a lineup (i.e., choosers) across both exposure and retention intervals. Specifically, they found that this relationship was the most evident near the upper ends of the confidence scale (i.e., 90%-100%), suggesting that confidence is a valuable indicator of identification accuracy for choosers (Palmer et al., 2013). Interestingly, however, the researchers found that the resolution was higher for choosers in the short versus long exposure conditions. In other words, confidence was better able to discriminate between accurate and inaccurate eyewitnesses when exposure to the target was short.

In Study 2, Palmer and colleagues (2013) examined the role of exposure duration (14 seconds vs. 32 seconds) and attention at time of encoding (divided vs. full). Participants were exposure to a video in which the target was completing everyday activities (e.g., drinking coffee). During the video, the participants were either exposed to a tone monitoring task in which they were asked to press buttons to respond to certain high or low-pitched tones (i.e., divided attention) or were told to ignore the tones (i.e., full attention). Following the video, participants were then shown a target-present or target-absent lineup. Similar to study 1, Palmer and colleagues found that increased confidence was associated with increased identification accuracy (i.e., reached calibration) for choosers – specifically in the upper tails of confidence. Taken together, these two studies suggest that the CA relationship is robust under a number of conditions.

Recently, Carlson and colleagues (2016) examined the role of exposure time and weapon presence on eyewitness confidence and accuracy. In their study, participants were exposed to a video of a purse theft in which the criminal was exposed for either 3 or 10 seconds (short versus long exposure, respectively), and the presence of a gun was also

manipulated (present for the whole video, visible for 8 seconds, visible for 3 seconds). After a brief delay, participants were shown a target-present or target-absent lineup. Using the calibration approach, Carlson and colleagues (2016) found that increased exposure time resulted in better calibration (i.e., C values closer to 0) for choosers, however the differences were not statistically significant. These findings suggest that the CA relationship can be robust across a number of estimator variables (e.g., exposure time and presence of a weapon; Carlson et al., 2016).

Overall, recent research examining the CA relationship has found that confidence is a good postdictor of accuracy for those who make a positive identification from a lineup. Contrary to the optimality hypothesis, the relation between CA remains strong across both short and longer exposure times (Carlson et al., 2016; Palmer et al., 2013). However, given that many of these studies use very short exposure times (i.e., less than 90 seconds long), it is possible that longer exposure with a target will influence the CA relationship. Furthermore, it is possible that the *type* of exposure (e.g., interacting with a criminal versus watching a criminal) may influence the CA relationship. As such, the current study examined the relationship between eyewitness confidence and identification accuracy where the quality of interaction between the eyewitness and the criminal is manipulated.

Overview of the Current Study

Understanding the impact of familiarity on adolescents' eyewitness identification accuracy is critical given the likelihood of witnessing a crime in which the eyewitness is familiar with the perpetrator. For example, research shows that youth who are victimized are likely to be victimized by a peer or acquaintance (e.g., 61% of assault cases; Aucoin,

2005). To date, there is a lack of empirical research that utilizes an eyewitness paradigm to directly assess the role of familiarity on eyewitness identification accuracy and, as a result, there is a disconnect between the field of eyewitness research and the events that are likely to occur in the criminal justice system.

The purpose of the current study was therefore to determine how prior familiarity influences identification accuracy with adolescent eyewitnesses by experimentally manipulating the familiarity between the participants and the target. Moreover, it was of interest to determine how different types of lineup procedures can influence an eyewitness' identification of familiar-strangers. Therefore, this study involved the manipulation of two stimuli – the familiarity of the eyewitness to the perpetrator (i.e., target) and the type of lineup procedure used during the identification task.

Familiarity is a subjective concept (Mandler, 2008), and as a result there is no overarching definition of familiarity that has been used by eyewitness researchers. Broadly, familiarity can be understood as any prior exposure to a perpetrator before the commission of a crime (Pozzulo, 2016). However, this definition of familiarity is extremely broad and can encompass anything from a virtual stranger you passed by once on the street to someone who is extremely familiar (i.e., parent; Pozzulo, 2016). Given that feelings of familiarity are subjective, there are likely to be other key components that are important in the definition of familiarity besides pure exposure (e.g., quality of interaction, knowledge of personal information). For example, researchers in social psychology suggest that social interaction between individuals (i.e., completing a task; disclosing personal information) can increase feelings of 'closeness' when compared to small talk only (e.g., Aron, Melinat, Aron, Vallone, & Bator, 1997). Moreover, broad

definitions of familiarity may not be forensically useful when applied to the criminal justice system. Therefore, for this study, familiarity was operationalized as the 'quality of interaction' between an eyewitness and a perpetrator. Quality of interaction was manipulated such that participants had no interaction with the target (i.e., stranger condition), indirect interaction with the target (i.e., less familiar condition), or direct interaction with the target (i.e., more familiar condition) before the commission of a mock crime to determine its' impact on eyewitness identification accuracy.

The present study also manipulated the type of lineup procedure used in the eyewitness identification task. Past research has indicated that some types of lineup procedures may be more effective than others (e.g., sequential lineup compared to simultaneous lineup; Lindsay et al., 2009; Lindsay & Wells, 1985; Malpass, 2006) although there is currently a debate in the literature (e.g., Amendola & Wixted, 2015a; Amendola & Wixted, 2015b; Gronlund, Carlson, Dailey, & Goodsell, 2009; Steblay, Dysart, & Wells, 2015; Wells, Dysart, & Steblay, 2015b). There has been no research thus far that has tested the utility of different lineup procedures when the perpetrator is familiar to the witness, specifically with an adolescent sample. It is possible that different lineup procedures may be more effective than others in familiar witness contexts. Therefore, this study examined three common lineup procedures on adolescent eyewitness identification accuracy, specifically the simultaneous, sequential, and elimination-plus lineup.

Hypotheses

1. Adolescents will be more accurate in target-present lineups compared to target-absent lineups.

2. Adolescents will be more accurate when the lineup includes a familiar-target compared to a stranger-target.
3. With the simultaneous lineup procedure, there will be a higher rate of correct identifications for familiar compared to unfamiliar targets.
4. With the sequential and elimination-plus procedure, there will be a higher rate of correct rejections for familiar compared to unfamiliar targets.
5. The guilty suspect will survive the first judgment in the elimination-plus procedure at a higher rate than any lineup member.
6. The elimination-plus procedure will produce the highest diagnosticity ratio (compared to the simultaneous and sequential procedures) for both familiar and unfamiliar targets.
7. There will be more 'know' responses when the target is familiar and a simultaneous lineup procedure is used compared to when the target is unfamiliar and the sequential or elimination lineup procedure is used.
8. There will be a relationship between confidence and accuracy across all lineup procedures.
9. There will be a stronger confidence accuracy relationship for choosers compared to non-choosers.
10. Confidence ratings after Judgment 1 in the elimination-plus procedure will predict identification accuracy in Judgment 2.

Method

Participants

Adolescents (*N* = 623) were recruited from high schools in Eastern Ontario, Canada. Participants' ages ranged from 15-years-old to 19-years-old (*M* = 16.54), were in grades 10 to 12, and most of the sample were females (59%). Most of the sample identified as Caucasian (61%), with small numbers of Black/African-American/African-Canadian (10%), West Asian (7.2%), South Asian (2.9%), Southeast Asian (2.9%), East Asian (2.7%), Latin American/Canadian (1.3%), Aboriginal (0.8%), Mixed race (9.5%), and other not listed (1.6%).

Design

A 3 (Familiarity: Stranger vs. Less Familiar vs. More Familiar) x 2 (Target Presence: Target-Present vs. Target Absent) x 3 (Lineup Procedure: Simultaneous vs. Sequential vs. Elimination-Plus) between-subjects factorial design was used. The dependent variables were correct identifications in target-present lineups and correct rejections in target-absent lineups, as well as post-identification confidence ratings.

Materials.

Parental consent. After approval was provided by the school board, schools/teachers that were interested in participating contacted the lead researcher. The lead researcher then distributed informed consents, to adolescents in grades 10 through 12 (age range from approximately 15-years-old to 19-years-old). The parental consent included a description of the purpose of the study and the nature of their child's participation (i.e., the tasks they will be asked to complete). Additionally, the parental consent form stated that the research study was approved by Carleton University and that

the Ottawa-Carleton Research and Evaluation Advisory Committee (OCREAC) and by the principal and teachers of their child's school. The informed consent form also outlined the timeline for data collection (i.e., approximately two weeks after the consent forms have been distributed), that the researchers involved had up-to-date police records checks, and that students may participate only with parent/guardian consent (Appendix A).

Familiarity activity. The familiarity activity was used to manipulate the familiarity variable. The lead researcher began by dividing the classroom into two groups. Participants were informed that they would be given information about a criminal case and asked to reach a guilty or not guilty verdict as a group. This activity was timed to last 10 minutes. In the 'more familiar' condition, the lead researcher introduced a confederate as an assistant to act as the 'head juror' for half of the class, ensuring that the confederate had an adequate amount of time to interact with a portion of the participants. In the less familiar condition, the lead researcher provided a cover story that the other assistant who usually acts as a second 'head juror' for the rest of the class was unable to attend that day. Therefore, a student was appointed to act as the 'head juror' for the remaining participants. In the stranger condition, the confederate was not present and two participating students were appointed as a 'head juror' for each group. As a 'head juror', the confederate or chosen participant were responsible for discussing a short trial summary (note: this trial summary is based on a real-life case, however some information provided in the case was altered for the activity). The 'head juror' received three different pieces of evidence (i.e., eyewitness description, alibi, false confession) in the case. The head juror presented each piece of evidence to their group sequentially. After each piece

of evidence was given, the group was asked to reach a verdict (guilty/not guilty). While acting as the 'head juror', the confederate followed a detailed script/guideline to ensure adequate interaction between the confederate and the group. The remaining student 'head jurors' received the same script to maintain consistency across groups (Appendix B). The head juror recorded the groups answers throughout the activity (Note: these answers were not analyzed but rather used to facilitate group discussion; Appendix B).

Crime video. All participants were shown a brief video (approximately 50 seconds in duration) of the confederate (i.e., target/perpetrator) committing a theft. The video depicted the female target reading a textbook while seated on a chair in a "waiting room". No other people appeared in the video. The target looked toward an unattended laptop on three occasions. The lens focused in on the target for approximately 10 seconds and panned in for a closer look for approximately seven seconds and then backed out. As the screen panned out, the target continued to look back towards the laptop. The confederate then stood up with her textbook, picked up the laptop and left the room.

Demographics form. After viewing the video participants were asked to complete a demographics form requesting their age, gender, and ethnicity (Appendix C). Participants were able refuse to answer any of the demographic questions.

Description form. After participants viewed the video they were asked to complete a description form, asking them to describe everything they remembered about the video and everything they remembered about the perpetrator in the video. This form was used as a filler task, and to mimic real life scenarios when witnesses are asked to describe a perpetrator and event (Appendix D).

Truth or myth activity. After participants completed the demographics and description form, they were asked to complete a 'truth or myth' activity. This activity served as a delay between completing the description and the identification task (Appendix E).

Photographic lineups. Six, 4 x 6-inch photographs were taken of volunteers resembling the target. Six of these photographs were used as the foil photographs in all the lineups, with one photograph used as the target replacement in the target-absent lineups. A 4 x 6-inch photograph of the target was taken for the target-present lineups. All photos were colour, head and upper body photographs taken against a white background. Those photographed adopted a neutral facial expression to maintain consistency across photographs.

Identification response form. After they viewed the video, participants were presented with a simultaneous lineup procedure, sequential lineup procedure, or elimination-plus lineup procedure.

Simultaneous lineup procedure. The lineup photographs were presented simultaneously to the participant in two rows. Each row contained three photographs. A "Not Here" option was placed at the bottom of the two rows, centered. The location of the target or the replacement photograph was randomly determined, with the foils displayed in the same order relative to each other. Participants were provided with the following instructions prior to viewing the lineup: "*Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The picture of the criminal may be here or may not be here. If you see the criminal's picture, please place a check mark in the box corresponding to the criminal's*

lineup number. If you do not see the criminal, please place a check mark in the box marked not here." Participants were provided with the form to make their selection. The form included the same instructions that were given orally to the participant. The form included seven boxes, numbered 1 to 6, and one labelled "Not Here". Following their identification decision, participants were asked to rate their confidence in the accuracy of their decision on a scale of 0 (*not at all confident*) – 100 (*very confident*) (Appendix F).

Sequential lineup procedure. The lineup photographs were presented serially (i.e., one at a time) to participants. The location of the target or replacement photograph was randomly determined. The other lineup members were displayed in the same order relative to each other. Participants were provided with the following instructions prior to viewing the lineup: "*Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at each picture. The criminal's picture may or may not be here. You will only be allowed to look at each photograph once. Please look at each photograph and decide if it is or is not a picture of the criminal. If the picture is of the criminal, please place a check mark in the box labelled 'yes'. If it is not a picture of the criminal, please place a check mark in the box labelled 'no'. Please note that you will NOT be able to re-examine any of the pictures. Also, you will NOT be allowed to move forward until you make a decision about the picture you are looking at. After each decision, please rate your confidence in your decision on a 0 (not at all confident) to 100 (very confident) scale"*. Following this, participants were given a sequential response form which required participants to indicate whether each photograph is or is not the criminal. They were also asked to rate their confidence in each decision on a scale of 0 (*not at all confident*) to 100 (*very confident*). Participants were also asked to

rate their confidence overall on the accuracy of their decision on a scale of 0 (*not at all confident*) to 100 (*very confident*) (Appendix G).

Elimination-plus lineup procedure. The lineup photographs were presented simultaneously in two rows, each row consisting of three photographs. The location of the target or replacement photograph was randomly determined. The other lineup members were displayed in the same order relative to each other. Participants were provided with the following instructions prior to viewing the lineup: "*Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The criminal's picture may or may not be here. To start off, please pick out the person who looks MOST like the criminal. Now let's look at the photos."* Participants were then given the first page of the elimination-plus lineup response form. Participants were asked to choose a photograph, and then to rate their confidence that the person they selected as looking most like the criminal, actually is the criminal on a scale of 0 (*not at all confident*) to 100 (*very confident*). Following this, all other pictures were removed with the exception of the photograph selected. Participants were given the second elimination response form and were asked to: *"Think back to the video. Think back to what the criminal looks like. This may or may not be a picture of the criminal. If this is a picture of the criminal, please place a check mark in the box labelled 'Yes this is a picture of the criminal'. If this is not a picture of the criminal, please place a checkmark in the box labeled 'No, this is not a picture of the criminal'."* Participants then rated their confidence in their decision on a scale of 0 (*not at all confident*) to 100 (*very confident*) (Appendix H).

Remember, know, guess response form. Participants who made a positive identification were asked to make a 'remember', 'know' or 'guess' judgment after the lineup task. After making a positive judgment, participants were informed that: "Sometimes when we recognize a face we have seen before, we can consciously REMEMBER specific details about the previous occurrence of the face. At other times, we simply KNOW that we have seen a face before, even though we cannot recall specific details about the event. For some faces, we simply GUESS, without any reason to believe that the face appeared before. I want you to tell me if you REMEMBER, KNOW, or GUESS the face that appeared before." (Appendix I).

Familiarity questionnaire. Participants were asked a series of open and closed ended questions regarding their notion of familiarity and in particular their perceptions of familiarity with the confederate (i.e., target) (Appendix J). As familiarity has yet to be clearly defined in the eyewitness literature, the familiarity questionnaire was used as a form of manipulation check.

Procedure

Participants who had been given consent by a parent or guardian were invited to participate (Appendix A). To begin the study, the lead researcher introduced herself and the research team as researchers from Carleton University. The research team consisted of the lead researcher, the confederate, and three additional researchers. The lead researcher then split the class into two groups. In the 'more familiar' condition, one group was required to work on a jury task directly with the confederate. In the 'less familiar' condition, one group was required to work on a jury task without the confederate, on the other side of the room. In the stranger condition, the confederate was not present in the

classroom and the groups worked on the jury task without the confederate. When dividing the classroom into two groups, the lead researcher appointed either the confederate or a participating student to be the 'head juror' in the case. The lead researcher provided a cover story that normally there are two research assistants who act as a 'head juror', however one is absent that day and therefore a student would need to take their place. As a 'head juror' the confederate or chosen participant were responsible for discussing a short trial summary based on a real-life case. The 'head juror' received three different pieces of evidence (e.g., inaccurate eyewitness evidence, alibi evidence, false confession) in the case which they presented to their group sequentially. After each piece of evidence was given, the group was instructed to consider the new piece of evidence and reach a verdict based on the information provided by the 'head juror'. While acting as the 'head juror', the confederate read from a detailed script/guideline to ensure adequate interaction between the confederate and the group. The remaining 'head jurors' received the same script to maintain consistency across groups (Appendix B). During the activity, the head juror recorded the groups answers (Appendix B). The interaction between the confederate and the participants is the manipulated variable, such that participants who interacted directly with the confederate was considered to be 'more familiar' with the confederate. The participants who worked in the same room but did not directly interact with the confederate were considered to be 'less familiar' with the confederate. Finally, those who were not exposed to the confederate were considered to be 'strangers' with the confederate. This interaction lasted for 10 minutes.

Following completion of the jury task, the confederate left the room for the remainder of the session. The jury activity was then explained and discussed as a class.

Following this, participants were shown a brief video depicting the confederate (i.e., target) stealing a laptop computer. Participants were not informed that their memory for the video would be tested prior to watching the video. Participants were then asked to fill out a basic demographics questionnaire (Appendix C). Participants were then asked to write down everything that they can remember about what the target looks like and what they remember about the video (Appendix D). Once participants completed the description and demographics questionnaires, the class completed a "truth or myth" activity about forensic psychology and the justice system (Appendix E).

While completing the truth or myth activity, participants were invited to participate in a one-on-one lineup identification task individually with one of three researchers. Participants were randomly assigned to a simultaneous (Appendix F), sequential (Appendix G), or elimination-plus (Appendix H) lineup procedure. Once the identification task was completed, they were asked to rate their confidence in their decision. Those who made a positive identification were asked to make a "remember", "know", or "guess" judgment (Appendix I). Following this, participants were asked to complete a familiarity questionnaire (Appendix J). Once all participants had completed all the tasks, the primary researcher addressed the class and provide a brief, informational lecture. The lecture covered the purpose of the research study including the design, hypotheses, and importance of the research. The lecture also discussed the accuracy of eyewitness memory and the role that familiarity plays on eyewitness accuracy. Finally, programs at Carleton University were discussed. Participants were given the opportunity to ask questions about the study or eyewitness memory in general, as well as questions

about University and Carleton University specifically. After questions, participants were thanked for their time and given a written debriefing form (Appendix K).

Results

Identification Data

Data were analyzed to determine whether overall identification accuracy (correct identifications and rejections were coded as 1, and the rest were coded as 0) differed across familiarity, lineup procedure, and target presence. A sequential logistic regression was used with familiarity, lineup procedure, and target presence in the first model. Familiarity, lineup procedure, target presence and the two-way interactions were included in the second model, and familiarity, lineup procedure, target-presence, the two-way and three-way interactions were included in the third model[2]. Model 1 including only the main effects was significant, χ^2 (5) = 51.68, $p < .001$, as was Model 2 including the main effects and two-way interactions, $\chi^2(13) = 61.84$, $p < .001$. Model 3, including the main effects, two-way interactions, and three-way interaction was also significant, $\chi^2(17) = 66.68$, $p < .001$. Given that the third model was significant, those results were retained and are discussed below.

See Table 1 for a breakdown of identification accuracy across familiarity, lineup procedure, and target-presence. There was no significant main effect of familiarity on overall identification accuracy, *Wald* = 2.13, *df* = 3, *p* = .35. There was, however, a significant main effect of lineup procedure, *Wald* = 6.20, *df* = 2, *p* = .05. Follow-up chi-square analyses indicated that participants were more likely to be correct (i.e., correct identification or correct rejection) when shown the simultaneous lineup procedure (0.76)

[2] The simultaneous lineup procedure was used as the reference group.

compared to the elimination-plus procedure (0.66), $\chi^2(1, N = 420) = 5.7$, $p = .02$, $\Phi = .12$. No significant differences were found between the simultaneous (.76) and sequential procedure (.70), $\chi^2(1, N = 415) = 1.90$, $p = .17$, $\Phi = .07$. No significant differences were found between the sequential (.70) and elimination-plus procedure (.66), $\chi^2(1, N = 411) = .99$, $p = .32$, $\Phi = .12$. There was a significant main effect of target presence on identification accuracy, B = 1.73, *SE* = .60, *p* = .004, Exp(B) = 5.65, 95% CI [1.76, 18.14]. Participants were more likely to make a correct decision when shown a target-present (0.78) compared to target-absent (0.64) lineup. There was, however a significant two-way interaction between lineup procedure and target-presence, *Wald* = 9.06, *df* = 2, *p* = .01. Specifically, the difference was observed for the sequential and simultaneous lineup procedure such that participants were more likely to be correct in target-present lineups when shown a simultaneous lineup procedure (.86) compared to the sequential lineup procedure (.71), B = 2.07, *SE* = .79, *p* = .008, Exp(B) = .13, 95% CI [.03, .59]. There was no significant interaction between target-presence and the elimination-plus procedure, B = .25, *SE* = .79, *p* = .75, Exp(B) = 1.28, 95% CI [.27, 6.05]. See Table 2 for all effects.

Table 1.

Identification accuracy as a function of target presence, lineup procedure, and familiarity

Target Presence	Lineup Procedure	Decision Type	Familiarity Condition		
			Stranger	Less Familiar	More Familiar
Target-Present	Simultaneous	Correct ID	0.86 (30)	0.80 (28)	0.92 (30)
		False Rejection	0.08 (3)	0.11 (4)	0.05 (2)
		Foil ID	0.07 (2)	0.09 (3)	0.03 (1)
	Sequential	Correct ID	0.58 (19)	0.68 (23)	0.88 (30)
		False Rejection	0.24 (8)	0.15 (5)	0.12 (4)
		Foil ID	0.18 (6)	0.18 (6)	0.00 (0)

Target Presence	Lineup Procedure	Decision Type	Familiarity Condition		
			Stranger	Less Familiar	More Familiar
	Elimination-Plus	Correct ID	0.71 (24)	0.71 (24)	0.89 (31)
		False Rejection	0.24 (8)	0.24 (8)	0.06 (2)
		Foil ID	0.06 (2)	0.06 (2)	0.06 (2)
Target-Absent	Simultaneous	Correct Rejection	0.52 (17)	0.61 (22)	0.86 (30)
		False ID	0.48 (16)	0.39 (14)	0.14 (5)
	Sequential	Correct Rejection	0.66 (21)	0.71 (25)	0.71 (25)
		False ID	0.34 (11)	0.29 (10)	0.29 (10)

Target Presence	Lineup Procedure	Decision Type	Familiarity Condition		
			Stranger	Less Familiar	More Familiar
	Elimination-Plus	Correct Rejection	0.35 (12)	0.54 (20)	0.76 (26)
		False ID	0.65 (22)	0.46 (17)	0.24 (8)

Note: Correct ID = Correct Identification, False ID = False Identification

Table 2

Statistic for sequential logistic regression Model 3

							95% CI for Exp(B)	
	B	*S.E.*	Wald	df	Sig.	Exp(B)	Lower	Upper
Familiarity[1]			2.13	2	.35			
Less Familiar	-.41	.64	.40	1	.53	.67	.19	2.35
More Familiar	.67	.77	.74	1	.39	1.94	.43	8.82
Lineup Procedure			6.20	2	.05			
Sequential	-1.49	.60	6.18	1	.01	.23	.07	.73
Elimination-Plus	-.92	.61	2.24	1	.14	.40	.12	1.33
Target-Presence	-1.73	.60	8.45	1	.004	.18	.06	.57
Familiarity[1]*Lineup[2]			1.53	4	.82			

							95% CI for Exp(B)	
	B	*S.E.*	Wald	df	Sig.	Exp(B)	Lower	Upper
LF*Sequential	.84	.82	1.05	1	.31	2.31	.46	11.50
LF*Elimination	.41	.83	.24	1	.63	1.5	.29	7.69
MF*Sequential	1.05	1.00	1.09	1	.30	2.84	.40	20.23
MF*Elimination	.51	1.01	.25	1	.62	1.66	.23	12.01
Familiarity[1]*Target Presence			1.50	2	.47			
LF*Target Presence	.80	.81	.98	1	.32	2.22	.46	10.77
MF*Target Presence	1.07	.98	1.20	1	.27	2.90	.43	19.62
Lineup[2]*Target Presence			9.06	2	.01			
Sequential*Target Presence	2.07	.79	6.96	1	.008	7.94	1.70	37.05

							95% CI for Exp(B)	
	B	*S.E.*	Wald	df	Sig.	Exp(B)	Lower	Upper
Elimination*Target	.25	.79	.10	1	.75	1.28	.27	6.05
Presence								
Familiarity[1]*Lineup[2]*Target			4.77	4	.312			
Presence								
LF*Sequential*Target	-.96	1.09	.78	1	.38	.38	.05	3.24
Presence								
LF*Elimination*Target	-.03	1.08	.001	1	.98	.97	.12	8.12
Presence								
MF*Sequential*Target	-2.51	1.28	3.84	1	.05	.08	.01	1.00
Presence								
MF*Elimination*Target	-.45	1.29	1.23	1	.73	.64	.05	7.98

Presence

Note: SE = standard error, LF = Less Familiar, MF = More Familiar, Lineup = Lineup Procedure, Elim = Elimination Plus

[1] denotes reference group (i.e., stranger)

[2] denotes reference group (i.e., simultaneous)

After analyzing overall accuracy, the data were split between target-present and target-absent lineups to examine the correct identification and correct rejection rates separately (Pozzulo & Lindsay, 1998). Pozzulo and Lindsay (1998) recommend analyzing target-present and target-absent lineups separately as the tasks for each are conceptually different, such that one requires making a selection from the lineup and the other requires a rejection of the lineup. Furthermore, past research suggests that there are different cognitive and social factors that underlie correct identifications in comparison to correct rejections (Pozzulo et al., 2012).

Target-present data. A chi-square analysis was conducted to examine whether identification accuracy differed by familiarity across lineup procedure. There was a significant effect of familiarity for the sequential procedure, $\chi^2(4, N = 101) = 10.08$, $p = .04$, $\Phi = .32$. Follow-up analyses show that there was a higher rate of correct identifications when the eyewitness was in the more familiar condition (.88) compared to both the stranger condition (.58), $\chi^2(2, N = 67) = 9.79$, $p = .007$, $\Phi = .38$, and the less familiar condition (.68), $\chi^2(2, N = 68) = 7.04$, $p = .03$, $\Phi = .32$ No significant effects were found for the simultaneous procedure, $\chi^2(4, N = 108) = 2.31$, $p = .68$, $\Phi = .15$, or the elimination-plus procedure $\chi^2(4, N = 103) = 5.17$, $p = .27$, $\Phi = .22$.

Target-absent data. A chi-square analysis was conducted to determine whether identification accuracy differed by familiarity across lineup procedure. In target-absent lineups, there was a significant effect of familiarity for the simultaneous procedure, $\chi^2(2, N = 104) = 9.57$, $p = .008$, $\Phi = .31$. Follow-up analyses show that eyewitnesses were more likely to make a correct rejection when they were in the more familiar condition

(.86) compared to the stranger condition (.52), $\chi^2(1, N = 68) = 9.31$, $p = .002$, $\Phi = -.37$, as well as the less familiar condition (.61), $\chi^2(1, N = 71) = 5.48$, $p = .02$, $\Phi = -.28$.

A significant effect also was found for the elimination-plus procedure, $\chi^2(2, N = 105) = 11.69$, $p = .003$, $\Phi = .33$. Follow-up analyses show that eyewitnesses were more likely to make a correct rejection when they were in the more familiar condition (.76) compared to the stranger condition (.35), $\chi^2(1, N = 68) = 11.69$, $p = .001$, $\Phi = -.42$, as well as the less familiar condition (.54), $\chi^2(1, N = 71) = 3.90$, $p = .05$, $\Phi = -.23$. No significant effects were found for the sequential procedure, $\chi^2(4, N = 102) = .35$, $p = .84$, $\Phi = .06$

Survival status. The survival status is the rate at which a lineup member 'survives' (i.e., is selected) during the first judgment of the elimination procedure (Pozzulo & Lindsay, 1999) and the elimination-plus procedure. The survival status information is only possible in the elimination procedures as the 'survival status' in other procedures (i.e., simultaneous, sequential) is equivalent to the identification rate. Binominal tests were conducted to determine if the guilty suspect survived judgment 1 at a higher rate than other lineup members across the three familiarity conditions. In the stranger familiarity condition, a binomial test indicated that the suspect survived judgment 1 at a significantly higher rate (.88) than any other lineup member combined, $p < .001$. In the less familiar condition, the suspect survived judgment 1 at a significantly higher rate (0.85) than any other lineup member, $p < .001$. In the more familiar condition, the suspect survived judgment 1 at a significantly higher rate (0.91) than any other lineup member, $p < .001$. See Table 3 for the survival rates and identification rates as a function of lineup member and familiarity.

The rate of survival status across all three familiarity conditions were found to be higher than the correct ID rate. Specifically, the survival status of the target was higher than the correct ID rate for the more familiar condition (.91 vs. 89, respectively), the less familiar condition (.85 vs. 71, respectively) and the stranger condition (.88 vs. .71, respectively).

Table 3

Survival rates (and identification rates) as a function of lineup member and familiarity

	Lineup Member					
	1	2	3	4	5	6
Target-Present						
Stranger	.06 (.00)	.00 (.00)	.00 (.00)	.03 (.03)	.03 (.00)	.88 (.71)*
Less Familiar	.06 (.06)	.06 (.00)	.00 (.00)	.00 (.00)	.06 (.00)	.85 (.71)*
More Familiar	.06 (.03)	.00 (.00)	.00 (.00)	.00 (.00)	.03 (.03)	.91 (.89)*
Target-Absent						
Stranger	.41(.29)	.30 (.24)	.00 (.00)	.00 (.00)	.23(.09)	.06 (.03)
Less Familiar	.30 (.19)	.22 (.32)	.05 (.00)	.08 (.03)	.30 (.11)	.05 (.00)
More Familiar	.24 (.06)	.29 (.06)	.03 (.00)	.15 (.03)	.24 (.06)	.06 (.03)

*denotes target

Diagnosticity

Diagnosticity ratios were calculated for each lineup procedure collapsed across familiarity condition. A higher diagnosticity ratio can be understood as the ratio of identifications of the guilty suspect in target-present lineups to the rate of identifications

of an innocent suspect in target-absent lineups (i.e., posterior odds of guilty; Steblay et al., 2011b). A higher diagnosticity ratio suggests that decisions from one lineup are more confirming of guilt. Diagnosticity ratios were calculated by dividing the number of correct identifications in target-present lineups by the number of false identifications in target-absent lineups (CorrectID/FalseID). Since there was no designated innocent suspect, the false identification rate was calculated by dividing the total number of false identifications in target-absent lineups by the total number of lineup members (i.e., 6 lineup members). The simultaneous lineup had a diagnosticity ratio of 15.95. The sequential lineup procedure elicited a diagnosticity ratio of 13.93, and the elimination-plus procedure elicited a diagnosticity ratio of 10.09. Diagnosticity rates also were calculated across the three familiarity conditions. Diagnosticity ratios were consistently higher for all lineup procedures when the target was familiar compared to a stranger. See table 4 for a breakdown of diagnosticity ratios across lineup procedure and familiarity condition.

Table 4

Diagnosticity ratios by lineup procedure and familiarity condition

	Stranger	Less Familiar	More Familiar
Simultaneous	10.75	12.30	39.43
Sequential	10.23	14.06	18.20
Elimination-Plus	6.55	9.26	22.25

Remember, Know, Guess

Binomial tests were conducted to determine if the rate of 'know' responses differed as a function of familiarity and lineup procedure. Participants had a higher rate of 'know' responses when the target was familiar, and the simultaneous lineup procedure was used (0.71) compared to when the target was a stranger and the sequential procedure was used (0.21), $p < .05$. Similarly, participants had a higher rate of 'know' responses when the target was familiar, and the simultaneous procedure was used (0.71) compared to when the target was a stranger and the elimination-plus procedure was used (0.31), $p < .05$. See Table 5 for rates of remember, know, guess responses by lineup procedure and familiarity condition.

Table 5

Rates of remember, know, guess responses by lineup procedure and familiarity

		Familiar (*n*)	Unfamiliar (*n*)
Remember			
	Simultaneous	.69 (56)	.31 (25)
	Sequential	.69 (52)	.31 (23)
	Elimination-Plus	.67 (62)	.33 (30)
Know			
	Simultaneous	.71 (20)	.29 (8)

		Familiar (*n*)	Unfamiliar (*n*)
	Sequential	.79 (23)	.21 (6)
	Elimination-Plus	.69 (18)	.31 (8)
Guess			
	Simultaneous	.42 (11)	.58 (15)
	Sequential	.64 (7)	.36 (11)
	Elimination-Plus	.40 (6)	.60 (9)

Confidence

Confidence-accuracy relationship. To examine whether there was a confidence-accuracy relationship, a point-biserial correlation was used, as the sample size was too small to compute calibration curves (Weber & Brewer, 2004). When examining the confidence-accuracy relationship, a significant relationship was found such that participants who reported higher confidence were more likely to be accurate in their identification decision for the simultaneous lineup procedure, $r(211) = .295$, $p < .001$. Similarly, participants who reported higher confidence were more likely to be accurate in their identification for the sequential procedure, $r(203) = .36$, $p < .001$, and the elimination-plus procedure, $r(208) = .20$, $p < .001$.

The confidence-accuracy relationship was also examined for each familiarity condition, collapsed across lineup procedure. A significant relationship was found across all familiarity manipulations, such that participants who reported higher confidence were

more likely to be accurate in their decision in the more familiar group, $r(210) = .31$, $p < .001$, the less familiar group, $r(211) = .32$, $p < .001$, and the stranger conditions, $r(201) = .15$, $p = .04$.

Choosers versus non-choosers. Data were split into those who made a choice from the lineup regardless of target presence ($N = 380$) and those who did not make a choice ($N = 242$). A significant confidence-accuracy relationship was observed for choosers, $r(380) = .41$, $p < .001$. No significant confidence-accuracy relationship was found for non-choosers, $r(242) = .12$, $p = .06$.

Confidence in the elimination-plus procedure. A logistic regression was used to determine if higher confidence ratings after judgment 1 in the elimination-plus procedure predicted accuracy at judgment 2. It was found that confidence in judgment 1 significantly predicted overall accuracy at judgment 2, $\chi^2(1) = 20.23$, $p < .001$, B = -.06, *SE* = .02, *Wald* = 13.56, Exp(B) = 1.06 95% CI [1.03, 1.09].

Discussion

The purpose of the current study was to examine the role of familiarity on eyewitness identification accuracy, in conjunction with target-presence and lineup procedure. It is vital that eyewitness researchers begin to examine how familiarity between an eyewitness and a perpetrator influences identification accuracy, as research suggests that in most cases the perpetrator is familiar to the eyewitness to some degree (e.g., Flowe et al., 2011; Perrault, 2015). Specifically, there are many cases where the eyewitness may have had *some* contact with the perpetrator before the commission of the crime; making the perpetrator a '*familiar stranger*' (Pozzulo, 2016). For example,

Statistics Canada reports that in the majority of cases of violent victimization, the victim knew their attacker (i.e., only 48% were stranger cases; Perrault, 2015); whereas Memon and colleagues (2008) found that 37% of eyewitness in real cases were familiar with the perpetrator.

Furthermore, perceived familiarity between an eyewitness and a perpetrator may influence not only the eyewitness' ability to correctly identify the perpetrator from a lineup but may also play a large role in the decision to prosecute and convict a suspect. For example, it is possible that police officers and prosecutors may be more likely to believe that a positive identification of a suspect is accurate and credible when the eyewitness claims to be familiar with the perpetrator. Despite the possible role that familiarity may play on accuracy and the decision to charge, prosecute, and convict 'familiar' suspects, the majority of eyewitness research, and policy recommendations, are based on the identification of strangers (i.e., someone previously unseen before the commission of the crime). As a result, it is unclear if current eyewitness research findings can be applied to the identification of a familiar-stranger.

This study examined identification accuracy with a sample that is generally ignored in the eyewitness literature—adolescent witnesses. Examining factors that impact adolescent eyewitness accuracy is essential, given that adolescents are frequently victims or witnesses to crime when compared to other age groups (Department of Justice, 2012; Perreault & Brennan, 2010); Statistics Canada, 2008). Age has also been a risk factor in violent victimization, with higher rates of reported victimization with youth and young adults aged 15-29 (Perreault, 2015). Furthermore, research suggests that youth are likely to be victimized by someone who is familiar to them. For example, with youth aged 14-

17 years old, 61% of those who experienced an assault were at the hands of a friend, acquaintance, or business relationship (AuCoin, 2005), suggesting that understanding the role that familiarity plays on adolescent identification accuracy is essential. Despite this, there is limited research on adolescents' eyewitness accuracy or the role of familiarity on accuracy. Therefore, this is one of the first studies that has attempted to experimentally manipulate and operationalize the concept of 'familiarity' to understand its' role on adolescents' eyewitness identification accuracy.

Familiarity

The main purpose of this study was to examine prior familiarity between an eyewitness and a target (i.e., perpetrator) and its' impact on identification accuracy. Degree of familiarity between an eyewitness and a perpetrator can occur on a continuum. The ability to accurately identify a previously seen face may be impacted by where the face falls on that familiarity continuum from complete stranger to family member. Furthermore, familiarity is subjective (Mandler, 2008), suggesting that there may be many different factors that are important in the definition, or the development of, familiarity (e.g., knowledge of personal information; Aron et al., 1997). This study found that, under certain conditions of exposure and interaction, being more familiar with a target increased identification accuracy, both in terms of correct identifications and correct rejections. This finding was predicted, given that past research suggests familiarity increases one's ability to recognize a face (e.g., Pezdek & Stolenberg, 2014). Unexpectedly, no differences in identification accuracy were found when comparing the 'less familiar' to the 'stranger' conditions. This is surprising, as the witnesses in the 'less familiar' group were exposed to the confederate for ten minutes before the commission of

the crime. Specifically, the target was present in the classroom for ten minutes before the commission of the crime. Simply being "exposed" to a person does not appear sufficient to produce an increase in identification accuracy. Although exposure is an important component to familiarity (Mandler, 2008), it seems that exposure by itself does not fully encompass what it means to be 'familiar'. Here, we are beginning to understand that for familiarity to influence identification accuracy some type of direct, prior interaction may be needed.

There is some support for the idea that familiarity is more than just exposure to a person or a face, and that more information is required before one moves from being 'unfamiliar' to 'familiar'. It has been argued that recognition of familiar and unfamiliar faces is impacted directly by the experience we have with the to-be-recognized face (Johnston & Edmonds, 2009), and that face recognition of personally familiar individuals is conceptually different than recognizing unfamiliar individuals, due to the enriched semantic and episodic memories that are tied to familiar individuals (Sugiura, Mano, Sasaki, & Sadato, 2011). For example, researchers examining the identification of celebrity (i.e., "familiar") faces has found that participants are better able to identify celebrities from low quality video images compared to still-image photographs. The authors suggest that this may be due to the additional use of recognizable patterns of facial movement in video images, which increases identification accuracy (Bruce et al., 1999; Lander & Bruce, 2000).

In a similar vein, Johnston and Edmonds (2009) argue that the processes involved in the recognition of familiar and unfamiliar faces are qualitatively different, and can be impacted in different ways (e.g., viewpoint, expression, lighting) beyond length or

frequency of exposure. In their article, the authors argue that viewpoint (i.e., viewing a face from the front, side), expression, and semantic information (i.e., context) associated with a face are important in the development of familiarity (i.e., moving from an "unfamiliar" to a "familiar" face). In this study, participants in the 'more familiar' condition had the opportunity to experience other information important in the development of familiarity – primarily, changes in expression and viewpoint, as well as exposure to important episodic information by interacting with the confederate directly on a juror decision making task. Whereas participants in the 'less familiar' (and stranger) conditions were not given the same opportunity. Indeed, the participants in the 'less familiar' condition were not directed to pay any undue attention to the confederate beyond the brief introduction to the task. In fact, there may have been some cases where students in the 'less familiar' conditions did not notice or realize the confederate was in the room because they were too focused on the task at hand. As a result, it is possible that the 'less familiar' and 'stranger' conditions in the current study were *too similar* to see any differences in identification accuracy.

Familiarity as more than "just exposure" also has been supported in the forensic area. For example, Bruce, Henderson, Newman, and Burton (2001) examined participants' ability to match (Experiment 1 and 2) and identify (Experiment 3) familiar and unfamiliar faces from CCTV video clips across three studies. In Experiment 1, the authors found that participants were better able to match (i.e., CCTV image to correct face) *personally* familiar faces when compared to unfamiliar faces. In Experiment 2, Bruce et al. (2001) examined whether 'casual' familiarity would also increase accuracy in a matching task, by exposing participants to videos of to-be-remembered individuals (i.e.,

creating 'familiarity') before the matching task. Despite prior exposure (1 minute) to the faces, no differences were found in matching accuracy between familiar and unfamiliar faces. Finally, in Experiment 3, the authors attempted to create familiarity in a more realistic fashion by including a 'social component' in which participants were asked in pairs to discuss the people they saw during the exposure phase. They found that participants were better able to identify faces from a photo array when they (a) had prior exposure, and (b) discussed the faces with a partner during the exposure phase. The findings by Bruce and colleagues suggest that in order to be 'familiar' there has to be an additional component (e.g., discussion) beyond exposure. The findings of the current study support this idea.

The impact of familiarity on identification accuracy has important, real-world implications. This study suggests that eyewitnesses who are familiar with a perpetrator may be more accurate and reliable witnesses when police apprehend a guilty suspect, but also when they erroneously apprehend an innocent suspect. Understanding how familiar witnesses may perform when shown a lineup is important, given that mock jurors may be more likely to believe an eyewitness when they claim to be familiar with the perpetrator (e.g., Sheahan et al., 2017). In fact, there is some research suggesting that *perceived* familiarity between an eyewitness and a suspect influences perceptions of eyewitness accuracy and the guilt of the suspect. For example, Sheahan and colleagues (2017) found that mock jurors were more likely to reach a 'guilty' verdict and assign higher guilt ratings to a defendant when the eyewitness and defendant were described as being familiar with each other. Similarly, Pica, Sheahan, Mesasan, and Pozzulo (2017) examined the role that familiarity between an eyewitness and a defendant played on

mock juror decision-making across three studies. The authors found that mock jurors assigned higher guilt ratings (i.e., continuous guilt on a scale of 0 to 100) when the eyewitness was described as being familiar with the defendant as opposed to being strangers (Studies 1 and 2). The findings from the current study suggest that familiarity between an eyewitness and a perpetrator may be an important factor to consider when evaluating eyewitness accuracy.

Lineup Procedure

In the current study, three lineup procedures were examined to determine any interaction with "familiarity" for an adolescent age group. The simultaneous, sequential, and elimination-plus lineup procedures were investigated. When examining overall accuracy, witnesses were more likely to make a correct decision when a simultaneous lineup procedure was used in comparison to the elimination-plus procedure. No differences were found between the simultaneous procedure and the sequential, or the sequential and the elimination-plus procedures. This finding adds to the literature examining adolescent eyewitness accuracy, specifically that the simultaneous and sequential procedure are likely comparable when used with this aged sample. This is an important finding, as there is only one other study to date that has examined the use of the sequential procedure with adolescent witnesses (see Pozzulo et al., 2013). This finding is consistent with Pozzulo and colleagues (2013), who found that there were no differences in the rate of correct identifications or correct rejections for the simultaneous and sequential procedures in a sample of 15- to 17-year-old participants.

The utility of the simultaneous procedure over the elimination-plus procedure is surprising, given that the elimination procedure was developed to be used with child

eyewitnesses (Pozzulo & Lindsay, 1999). It is possible that by the time children reach mid-adolescence, they already may have an expectation of what a lineup procedure entails; specifically, that they are to make one judgment, one decision. As such, the two-judgment process of the elimination-plus procedure may have confused the witnesses or may have made them second-guess their decision. For example, Pozzulo and Lindsay (1998) hypothesized that adults may perform poorly with the elimination procedures as they may assume that they were incorrect after being asked to make two judgments, as it violates their expectations of making *only one* identification decision when shown a lineup. It is possible that this was also the case for adolescent eyewitnesses. The findings of the current study suggest that when examining overall accuracy, regardless of familiarity and target presence, the simultaneous or sequential procedure may be more beneficial with adolescent witnesses than the elimination style procedure.

Familiarity and lineup procedure. The notion of familiarity has been largely ignored thus far in eyewitness research, therefore, the role that familiarity plays on accuracy across lineup procedure is important to consider. Given that many policy recommendations have emerged from research examining stranger identifications, for example, the use of the sequential procedure (National Academy of Sciences (NAS), 2014; Technical Working Group for Eyewitness Evidence, 1999; 2003), it is vital to determine whether similar recommendations would be made when identifying a familiar individual. Moreover, there may be an interaction between familiarity and lineup procedure.

Interesting findings emerged when examining the influence of familiarity and lineup procedure. Unlike past research examining stranger identifications, the sequential

procedure elicited more correct identifications when the witness was ‘more familiar’ with the perpetrator in comparison to ‘less familiar’ or ‘strangers’. This finding is likely driven by the lower correct identification rate in the stranger condition for the sequential procedure compared to the simultaneous and the elimination-plus. As previously found, the sequential procedure tends to produce a lower correct identification rate than the simultaneous procedure (for stranger- perpetrators; Wells et al., 2015b), the increase in familiarity produces a correct identification rate in line with the simultaneous (and elimination) procedure for stranger-perpetrators.

Correct rejection rates were aided by having a familiar-perpetrator. Perhaps we should not be surprised to see an increase in correct rejection rates (regardless of type of lineup procedure) given that a correct rejection is a harder *type* of decision to make. A witness needs to overcome the demand characteristics of a lineup task where the expectation is to “pick a face” (Wells & Luus, 1990). Being more familiar with the perpetrator may help overcome social pressure to make an identification, hence, increasing the correct rejection rate. Intriguingly though, familiarity was less helpful with correct rejections for the sequential lineup procedure.

The sequential superiority effect is the notion that the sequential procedure produces a lower rate of correct identification and a higher rate of correct rejection compared to the simultaneous procedure, which produces a higher rate of correct identification and a lower rate of correct rejection. However, when the witness is familiar with the perpetrator, this debate as to which procedure is better (or worse) appears to be nullified. When the eyewitness was familiar with the perpetrator, this helped increase that rate of correct identification in the sequential procedure compared to the simultaneous

rate, while maintaining a comparable rate of correct rejection between the sequential and the simultaneous procedure. Given that a false identification is more likely to occur in a simultaneous lineup procedure when the witness is identifying a stranger, the sequential lineup is the better option. However, if the eyewitness reports being familiar with the perpetrator, whether the sequential or simultaneous procedure is used no longer seems relevant; either procedure can be used with an adolescent person. This is especially beneficial for police jurisdictions that employ only the sequential or only the simultaneous lineup procedure. Furthermore, this is an important area to explore with adult witnesses, as the development and recommendation to use the sequential procedure stemmed from research involving adult witnesses.

Familiarity also increased the rate of correct identifications and correct rejections when the elimination-plus procedure was used. The elimination style lineup procedures allow for survival status (i.e., the rate at which the suspect survives the first, relative, judgement) to be examined. Often the survival rate of a guilty suspect is higher than the correct identification rate (e.g., Pozzulo et al., 2013; Pozzulo & Lindsay, 1998; Sheahan et al., 2017), suggesting that the decision criterion for making a relative, 'most similar' judgment is generally lower than the threshold for making an absolute, positive identification. As has been found in past research, the identification rate in the current study was lower than the survival status across all levels of familiarity. However, an interesting pattern of responding emerged when examining the *degree* of difference between the survival status rate (judgment 1) and the identification rate (judgment 2) across familiarity. In the 'more familiar' condition, the rate of survival status (.91) was larger than the rate of correct identifications (.89), however this difference was quite

minimal at only a 2% difference. This suggests that familiarity with the target reduced the threshold between making a *most similar* judgment and making an identification. This is further supported when examining the differences between judgment 1 and judgment 2 in the stranger and familiar groups. Specifically, the survival status rate was much higher for the stranger (.88) and less familiar group (.85) when compared to the rate of correct identifications (.71 and .71, respectively). This shows a 17% reduction for the 'stranger' condition and a 14% reduction for the 'less familiar' condition. Taken together, this pattern suggests that witnesses who are more familiar with a perpetrator may be more likely to make an identification. Furthermore, this provides further support that the elimination-plus procedure can be used as an investigative tool, especially if the witness claims to be familiar with the perpetrator. Given the survival rate is comparable to the identification rate, investigators would be able to use survival status as a tool to determine if they are pursuing the guilty suspect.

Familiarity appears to increase identification accuracy overall. Specifically, the current study found high diagnosticity ratios across the simultaneous, sequential, and elimination-plus lineup procedures when the witnesses was 'more familiar' with the target compared to lower diagnosticity ratios when the witness was 'less familiar' or 'strangers' with the target. This finding suggests that lineup procedures may be more diagnostic of guilt when the witness is familiar with the perpetrator.

Remember Know Guess

Eyewitnesses who made a positive identification decision were asked to make a "remember, know, guess" judgment. Participants were instructed to choose "remember" if they could consciously remember specific details about the face; to choose "know" if

they simply know they have seen the face; and to choose "guess" if they had no reason to believe the face was seen before. This judgment was included to measure the dual-process theory of recognition, a theory which posits that there are two, independent processes involved in recognition memory – specifically, recollection and familiarity (Jacoby, 1991; Mandler, 1980; Yonelinas, 2002). According to this theory, recollection is best understood as intentional remembering of specific episodic information (i.e., remembering specific details about a face); whereas familiarity is an automatic form of processing associated with semantic memory (e.g., a vague feeling of 'knowing'; Jacoby, 1991; Tulving, 1985). The remember, know, guess paradigm has been found to successfully measure responses based on recollection (i.e., "remember") compared to familiarity (i.e., "know"; Gardiner et al., 1998; 2002). Based on this, the hypothesis that there would be a higher rate of 'know' responses when the target was familiar, and the simultaneous procedure was utilized (.71), compared to when the target was a stranger and the elimination (.31) or sequential (.21) procedure was used was supported.

This finding aligns with past research examining the remember, know, guess paradigm in stranger identifications has found that 'know' responses are reduced when lineup procedures promoting absolute judgments are utilized (e.g., Meissner et al., 2005, Experiment 4). Increased 'know' responses in simultaneous lineups are expected, as it promotes a familiarity-based decision making. In identifications for simultaneous lineups, we may see eyewitnesses relying on a general feeling of 'knowing' their selection is the perpetrator, in relation to the remaining lineup members, especially when the perpetrator is familiar to them. Specifically, in relation to eyewitness memory, 'familiarity' or the idea of the 'familiar stranger' may refer to when the eyewitness has a feeling of

'knowing' they have seen the perpetrator before, but lacking any episodic, detailed information regarding that person. Furthermore, when examining the rates of remember and know responses across familiarity, participants consistently provided more 'know' or 'remember' responses when compared to 'guess' responses, when the perpetrator was familiar (more or less familiar) compared to a stranger. This suggests that eyewitnesses who are familiar with the perpetrator (i.e., have had some type of direct or indirect interaction) are likely to rely on episodic or semantic memory cues when making an identification (i.e., they can either identify a feeling of 'knowing' or they can identify specific details regarding the encoding event).

Confidence-Accuracy Relationship

An eyewitness' confidence in his/her identification decision is one of the most common ways to assess eyewitness accuracy (Sporer et al., 1995) and can be conceptualized as the degree of match between the eyewitness' memory of the perpetrator and the person selected from the lineup. In the current study, participants were asked to rate their confidence in the accuracy of their identification using a numerical value from 0 (*Not at all confident*) to 100 (*Very confident*). As hypothesized, a relationship was found between confidence and accuracy such that witnesses who reported higher confidence with their identification decision were more likely to be accurate in that decision. This was found for all three lineup procedures. This finding gives insight into the abilities of adolescent witnesses specifically, suggesting that adolescents have the meta-cognitive ability to make accurate confidence judgments, similar to adult witnesses. This contrasts with research suggesting there is a weak or no confidence—accuracy relationship with child witnesses (e.g., Humphries & Flowe, 2015;

Keast et al., 2007, Experiment 1). It appears that by mid-adolescence (i.e., 15 years old), witness confidence judgments are comparable to adults. This finding adds to the literature suggesting that confidence is a useful indicator of accuracy with adolescent witnesses (e.g., Brewer & Day, 2005). Additionally, we wanted to examine whether the confidence-accuracy relationship varied across familiarity conditions. A confidence-accuracy relationship was also found, such that a stronger confidence-accuracy relationship was found when the eyewitness was familiar (more or less familiar) compared to when the eyewitness was a stranger. This finding suggests that increased familiarity with a perpetrator may improve an eyewitness' ability to make judgments regarding their accuracy in their decision making.

Data were then further split into choosers (i.e., a witness who selected someone from the lineup) and non-choosers (i.e., a witness who rejected the lineup). Similar to past research, a stronger confidence-accuracy relationship was found for witnesses who made a selection from the lineup compared to those who did not make a selection (e.g., Brewer & Wells, 2006; Sauer et al., 2010; Sporer et al., 1995). This finding adds to the literature which indicates that confidence may be a good postdictor of identification accuracy. Furthermore, this suggests that when an eyewitness makes a selection from the lineup with high confidence, they are more likely to be accurate than when they report low confidence. Very little research has examined how choosing is related to identification accuracy with an adolescent population; therefore, the results of the current study suggest that adolescents may have abilities similar to young adults, but different from older children.

Confidence and the elimination-plus procedure. The elimination-plus procedure is a unique lineup procedure as it includes two judgments and two ratings of confidence. First, the eyewitness is asked to rate their confidence at judgment 1 ("How confident are you that the person you selected as looking most like the criminal actually is the criminal") and at judgment 2 ("How confident are you in your decision"). The inclusion of an additional confidence judgment at Judgment 1 of the elimination procedure was meant to provide an additional piece of evidence that can be used to determine the suspects' guilt – pre-identification confidence (Pica & Pozzulo, 2017b).

As predicted, the current study found that confidence at judgment 1 of the elimination-plus procedure predicted overall accuracy in judgment 2. This is consistent with the past two studies that have included the elimination-plus procedure. For example, Pica and Pozzulo (2017b) found that confidence in Judgment 1 was predictive of overall accuracy in Judgment 2 in target-present lineups, with a sample of adults. Similarly, Sheahan and colleagues (2017) found that confidence in judgment 1 predicted overall accuracy in both adult and adolescent witnesses. This study adds to this literature suggesting that the addition of an extra confidence judgment may provide an additional useful piece of information for an investigation.

Specifically, pre-identification confidence in the elimination-plus procedure may be a useful tool for investigators, as it has been found to predict identification accuracy. The elimination-plus procedure permits eyewitnesses to provide two useful pieces of evidence (i.e., a similarity judgment and a pre-identification confidence judgment) before they must make an identification. This additional piece of evidence may be indicative of the eyewitness' memory of the perpetrator, and whether the police have apprehended the

correct suspect (Pica & Pozzulo, 2017b). For example, if the police use the elimination-plus procedure and an eyewitness has low confidence in Judgment 1, this may suggest to police that the person they suspect may not be the perpetrator, and they may need to broaden their investigation before they ask the eyewitness to make an identification. Alternatively, if the eyewitness is very confident in their selection at judgment 1, it may suggest to police that their suspect is guilty and should move ahead to the identification decision. Overall, this study suggests that pre-identification confidence is a useful tool with adolescent witnesses across different levels of familiarity.

Limitations

There are some limitations to the current study that could need to be considered when interpreting results and planning future research. First, only one target was used in the familiarity manipulation and therefore the results can only be applied to the identification of one confederate/target. Future studies should include more than one target to ensure that the findings are specifically due to the familiarity manipulations rather than be specific to the target. Another limitation of the study is that participants were exposed to the confederate in groups as opposed to individually. Given the limited amount of class time devoted to this study, it was not possible to have students interact individually with the confederate. Due to the group activity, it is possible that some students may have paid more or less attention to the confederate, suggesting that there would be variability in the quality of interaction across participants. In the future, it would be interesting to expose eyewitnesses to the confederate individually to determine if that impacts identification accuracy. In a related vein, the groups utilized during the exposure phase in the current study ranged in size depending on class size and participant

consent, which could also have impacted the amount of interaction each participant had with the confederate. Ideally, group size would have been controlled for to ensure that interaction between each individual participant and the confederate were comparable.

Furthermore, there was only a brief delay between the exposure phase, the crime video, and the identification. In reality, eyewitnesses are often asked to make an identification days, weeks, or months after the crime. A delay between witnessing the crime and making an identification has been found to impact identification accuracy both in laboratory and field studies (e.g., Berhman & Davey, 2001; Deffenbacher, Bornstein, McGorty, & Penrod, 2008; Horry, Memon, Wright, & Milne, 2012). It is important that future researchers examine the role that delay between witnessing a crime and making an identification of a familiar perpetrator may play on identification accuracy.

Additionally, the current study used only a sample of adolescent witnesses. Given that adolescents are a unique population, with ongoing psychosocial and cognitive development (Pozzulo et al., 2013), it is important to examine familiarity with adult witnesses to determine if these results would be replicated. Specifically, it is important to determine if familiarity increases identification accuracy with adult witnesses, and whether familiarity impacts the sequential-superiority effect that is generally found when making stranger identifications. If similar patterns are observed for adult witnesses, (i.e., that familiarity may reduce differences in identification decisions between the simultaneous and sequential procedure), this would suggest that either lineup procedure can be used when the witness is familiar with the perpetrator. Understanding the impact of familiarity across lineup procedure with adult witnesses is an important next step in the simultaneous-sequential debate.

Other limitations of the study are commonly found in many eyewitness research studies, specifically low external validity. In the current study, participants were exposed to a confederate in a very calm, non-threatening situation (i.e., completing an activity in their classroom). This made their exposure to the confederate and their view of the crime optimal. In the real world, witnessing a crime may induce higher stress and there would likely be greater distractions present these may in turn impact identification accuracy. Similarly, participants knew they their decisions in the lineup task were for research purposes only and would have no real-world consequences.

Conclusions, Implications, and Future Research

Over the past few decades there has been an immense amount of research examining the influence of system (i.e., a variable that influences eyewitness accuracy that is controlled by the justice system; Wells 1978) and estimator variables (i.e., a variable that influences eyewitness accuracy that is not controlled by the justice system; Wells 1978) on eyewitness identification accuracy, with the hope to inform practice and policy. Despite real world cases suggesting that witnesses are often asked to identify a perpetrator they are familiar with (e.g., Flowe et al., 2011), the role that familiarity plays on identification accuracy has not been adequately addressed in research. This is one of the first studies to demonstrate that familiarity positively impacts identification accuracy. This finding has important real-world implications, as investigators may be more confident in the reliability of identifications made by familiar-witnesses. Given that this is the first study to experimentally manipulate familiarity, much more research is needed to truly understand how familiarity impacts identification accuracy. Familiarity is a highly subjective concept and many different factors may impact whether we perceive or

process a face as familiar compared to unfamiliar. Future research should examine other conceptualizations of familiarity and its' impact on identification accuracy.

This study also provides important insight into the simultaneous-sequential debate (see Amendola & Wixted, 2015a; Amendola & Wixted, 2015b; Gronlund, Carlson, Dailey, & Goodsell, 2009; Steblay, Dysart, & Wells, 2015; Wells, Dysart, & Steblay, 2015b). Results of the current study suggest that the utility of the simultaneous procedure in target-present lineups and the sequential procedure in target-absent lineups that is seen with stranger identifications, is essentially nullified when the witness is familiar with the perpetrator. In the real world, this suggests that police jurisdictions may be able to employ either lineup procedure when the witness and perpetrator are familiar. In fact, the elimination style procedure also is a viable option when the perpetrator is familiar. Clearly, the role of familiarity needs to be considered before any firm conclusions are made regarding which lineup procedure is superior.

Overall, this study provides a number of new insights into the identification accuracy of familiar strangers by adolescent eyewitnesses. Primarily, the results of this study show that eyewitnesses who are familiar with the perpetrator are more likely to make correct identifications and correct rejections when shown a lineup; and that familiarity seems to increase accuracy in a way that surpasses some of the issues with common lineup procedures (i.e., the trade-off between correct identifications and correct rejections in the simultaneous and sequential procedures, respectively). Furthermore, this study suggests that the quality of the interaction between a witness and a perpetrator may be a starting point in the conceptualization of what it means to be 'familiar'. While there

is no concrete definition of familiarity in the eyewitness literature, the current study serves as a starting point in developing that definition.

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Appendix A

Parent Letter/Consent

Dear Parent(s)/Guardian(s),

As researchers from Carleton University, we are conducting an experiment to better understand youth's memory and their ability to report what they see. Carleton University's Research Ethics Board-B, the Ottawa-Carleton Research and Evaluation Advisory Committee, and the principal of your child's school have granted us permission to request your child's participation in this study.

This study is directed at understanding adolescents' memory for people they have or have not seen before. We are examining whether adolescents show differences identification accuracy when presented with someone who is familiar or unfamiliar to them. Your child will interact with a researcher (i.e., a confederate) completing a jury decision making task for approximately fifteen minutes. This task will require them to read information about a crime, and as a group, be asked to render a verdict for the case based on the information given. Following this, they will be shown a short video approximately one minute in length. The video will depict the confederate in a waiting room filling out a form. The video will then depict the confederate stealing an unattended laptop from the waiting room. After viewing the video, your child will be asked to write down everything he/she can remember about the confederate. They will then be shown six photos and asked to pick out the confederate. Participants will also listen to a brief lecture discussing Carleton University and the programs offered at the University.

This research is important because it will inform us about adolescents' abilities when acting as eyewitnesses. As there is almost no research examining adolescent's abilities when they are casually familiar with a perpetrator, this information will help us determine how adolescent's accuracy may change when compared to identifying a stranger.

We would very much like to include your child in this project. Results from previous research have shown that students have enjoyed the experience of participating in this type of study. The study will take place at your child's school, during class time and at the teacher's convenience as he or she will be present. Four or five researchers will work with your children. Students will be asked questions individually however. Upon completion of the project, a presentation on memory will be provided to all students. The duration of the study will be approximately 75 minutes (i.e., one class period).

Participation in the study is completely voluntary and your child may withdraw from the study at any time. As well, your child may choose not to participate even though you have granted permission for him/her to do so. If you give your child permission to participate and he or she does not want to during the time of the study, he or she will continue the group activity. If you do not give permission for your child to participate in the current study, his or her teacher will provide additional work for your child, or he or she can participate in the activities, but their data will not be collected. The consent form for a student who does not wish to participate will be kept separate and disposed. Participants' responses will remain completely anonymous and strictly confidential. The information that is gathered will not appear on any school records and will have no bearing on their evaluation of classroom

performance. The information gathered is solely for research purposes and will only be seen by the researchers involved. You do not have to answer any question you choose not to. Also, note that the gathered information will not contain your child's name or any other form of identifying information. Informed Consent Forms will be kept in the Child Forensic Psychology Lab for seven years. They will be placed in a box in a data room that has restricted access and is kept locked and closed at all times. At the seven year mark, the consent forms will be shredded and disposed of.

Please indicate on the form below whether or not you give your child permission to participate and return the bottom portion to your child's teacher as soon as possible.
We ask that if you do decide to give your child permission to participate in the study that you please save a copy of the letter with the contact information in the event that you or your child have any questions after participating.

We sincerely appreciate your co-operation. If you should have any questions or comments about this research please feel free to contact, Dr. Joanna Pozzulo (Faculty Advisor & Chair of the Department of Psychology, 613-520-2600, ext.1412) or research team member Chelsea Sheahan, (PhD Student, Chelsea.Sheahan@carleton.ca, 613-520-2600 ext. 3695). All members of the research team have undergone police records checks. If you should have any ethical concerns about this study please contact the Carleton University Research Office at ethics.carleton.ca. Should you have any other ethical concerns, please contact Dr. Shelley Brown (Chair, Carleton University Research Ethics Board-B, 613-520-2600 x 1505). This project has been approved by the Carleton University Research Ethics Board-B **(#105287**).

Sincerely,
Joanna Pozzulo, Ph.D., C.Psych.
Department of Psychology
Carleton University

(Please cut off and return to teacher)

The information collected for this project is confidential and is protected under the Municipal Freedom of Information and Protection of Privacy Act. (1989, Bill 49)

I have read and understood the request for my son/daughter to participate in the study on adolescent's memory. I have discussed this with my son/daughter and:

____I **give permission** for my son/daughter to participate in this study and to see researchers on the day of testing in my child's school. I understand that my child will be asked about people and events. I understand that all of my child's responses will remain anonymous and that he/she is participating voluntarily and is able to withdraw at any time. Any questions or comments I may have will be answered by the principal investigator.This form is to be completed and returned to the school **ONLY** if I consent to my child participating in this research.

Name of Child (please print): _____

Name of Parent/Guardian (please print): _____

Signature of Parent/Guardian: _____Date:_____

Appendix B

Familiarity Script

(**Note:** the information read out loud by the head juror italicized)

Instructions to the Head Juror – You have been selected as the 'head juror' in this case. It is your job to present the evidence provided to you to the other members of the jury. You will receive 3 different pieces of evidence in this case. After you present each piece of evidence, you will instruct the members of the jury to discuss the piece of evidence and reach a verdict as a group. You will be instructed to record your decisions as you proceed through the case. As a head juror, it is your job to maintain a discussion about the facts of the case and present each piece of evidence. You will be given 10 minutes to complete this task.

Please read the following case summary below aloud to the members of the jury.

Please Read the following information aloud to your group: "*First I will read the basic facts about a case. Following this information, I will read out different pieces of evidence that we need to consider. After each piece of evidence is presented we will discuss it, and reach a verdict together. Here are the basic facts about the case*"

"*The crime occurred on September 29, 1987 at 5:00 a.m. The location was Scarborough, Ontario, Canada. The victim was the homeowner's daughter who was 15 years old. The homeowner is an eyewitness to the crime. The defendant in the case is Anthony Hanemaayer.*
Around 5:00 AM, a homeowner heard noise coming from her 15-year-old daughter's room. She had thought maybe she fell out of bed, so she went to her daughter's room to check on her. When she turned on the light she saw a man in her daughter's room, sitting on her attempting to keep her quiet. The homeowner then yelled at the assailant to get his attention and to see his face. The man then jumped off the bed and confronted the homeowner. He stood inches from her face and 'roared' at her. He then fled the house."

PART ONE

Instructions to the Head juror: Please read the evidence listed below. Once you have presented the first piece of evidence to your group, you will be given the opportunity to discuss the evidence and reach a verdict.

Please Read Aloud: "*Please listen to the first piece of evidence*"

"EVIDENCE #1 – "*The homeowner provided a description of the assailant to the police. The homeowner provided a description of the assailant to the police. She described the assailant as a "6'0", 170 lbs., slim build, 19 years of age with sandy brown, wavy hair, wearing a black leather jacket and blue jeans.". The police began surveying the area. The homeowner also surveyed the area. At a local construction site she had found the man she believed broke into her home. She phoned the construction company she saw this man was working for and provided her description. She was given a name on who fit that description, and she passed this information along to the police. Two months after the break-in, the police showed the homeowner a photo lineup and she picked out Anthony Hanemaayer's photograph. The investigating officer told her she had picked out the defendant's picture. At the time of identification, Hanemaayer was wearing a black t-shirt and blue jeans. Hanemaayer was at least 5 years older and 5 inches shorter than the homeowner originally reported.*

Hanemaayer was then taken to the police station for further questioning. Hanemaayer was charged with the breaking and entering, assault, and assault while threatening to use a weapon. The case went to trial."

Head Juror: Now that you have read the first piece evidence, it is time for your group to reach a unanimous verdict. Please discuss the facts of the case and Evidence #1 with your group. Below, there are some talking points you can follow and read aloud to your group to facilitate discussion.

Talking Point #1 (please read aloud): "*In this case, the homeowner provided a description of the perpetrator and when she was presented with a photo-lineup two months later, she identified Hanemaayer as the perpetrator. However, when Hanemaayer was identified he was wearing different clothing, was 5 years older and 5 inches shorter than the eyewitness first described him to police. That means the eyewitness was inaccurate in some of her descriptions. Based on this new information, we need to determine a verdict. What does everything think about the evidence?*"

Talking Point # 2 (please read aloud): "*How important is it for eyewitnesses to be accurate in their descriptions of a perpetrator? Are these mistakes by the homeowner something that should be considered in our decision?*"

Verdict: Based on the case summary above and the first piece of evidence (i.e., Evidence #1), do you, the jury, think the defendant is guilty or not guilty? (Please record your group's decision on the paper provided).

PART TWO

Instructions to Head Juror: You have now reached a verdict based on Evidence #1. However, you have now found out additional pieces of information that needs to be considered. It seems that there is new alibi evidence. Please read the new piece of evidence aloud to the jury.

Please Read Aloud: "*Please listen to the second piece of evidence*"

"EVIDENCE #2": *The homeowner has provided a description and has identified Hanemaayer from a photo-lineup. Hanemaayer was then taken to the police station for further questioning. During questioning, Hanemaayer maintained that he had been home at the time of the crime. Hanemaayer's family, including his mother and father, all corroborate Hanemaayer's alibi of being at home at the time in question. Hanemaayer maintains that he was apprehended by police because he fit a description of one of the construction workers at his former place of employment. Hanemaayer was charged with the breaking and entering, assault, and assault while threatening to use a weapon. The case went to trial*."

Instructions to Head Juror: Now that you have read the additional evidence, it is time for your group to reach a unanimous verdict. Please discuss the facts of the case and Evidence #2 with your group. Below, there are some talking points you can follow and read aloud to your group to facilitate discussion.

Talking Point #1 (please read aloud): "*In this case, the defendant, Hanemaayer, has an alibi. He said that he couldn't have committed the crime because he was at home sleeping during the time of the crime (5 am). His mother and father both stated that Hanemaayer was indeed home at that time. Based on this new information, we need to determine a verdict. What does everything think about the evidence*?"

Talking Point #2 (please read aloud): "*Juries are less likely to believe family members than non-family members when they provide an alibi. This is problematic because we spend most of our time with our family members, meaning that they are more likely to be the ones to provide us with an alibi. Do you think a family member would lie about an alibi*?"

Verdict: Based on the case summary above and the second piece of evidence (i.e., Evidence #2), do you, the jury, think the defendant is guilty or not guilty? (Please record your group's decision on the paper provided).

PART THREE

Instructions to Head Juror: You have now reached a verdict based on Evidence #2. However, you have now found out additional pieces of information that needs to be considered. It seems that there is new alibi evidence. Please read the new piece of evidence aloud to the jury.

Please Read Aloud: "*Please listen to the third piece of evidence*"

EVIDENCE # 3 – "*After Hanemaayer was identified by the eyewitness, he was then taken to the police station for further questioning. During questioning, Hanemaayer maintained his innocence. Police detectives continued to insist to Hanemaayer that he was guilty and provided a variety of scenarios to explain how and why the crime occurred. The detectives insisted that Hanemaayer needed money and had broken into the house to obtain valuables. The questioning continued on and off for 12 hours. During the interrogation, the detectives used 'strong-armed' tactics including physical and verbal intimidation. Hanemaayer's family was not informed of their son's arrest until late in the evening, approximately 12 hours after his arrest. Hanemaayer indicated that he would like a lawyer, but no lawyer was provided to him. After repeated questioning, Hanemaayer admitted to breaking and entering into the homeowner's house. Hanemaayer was charged with the breaking and entering, assault, and assault while threatening to use a weapon. Hanemaayer provided a full and signed confession.*

However, later on that evening Hanemaayer recanted his confession, stating that he had felt pressured by the police to make the statement. Hanemaayer said the police wouldn't stop interrogating him unless he confessed. The case went to trial. After the trial had finished, he was sentenced to imprisonment. The case went to trial."

Instructions to Head Juror: Now that you have read the additional evidence, it is time for your group to reach a unanimous verdict. Please discuss the facts of the case and Evidence #3 with your group. Below, there are some talking points you can follow and read aloud to your group to facilitate discussion.

Talking Point #1 (please read aloud): "*In this case, the defendant, Hanemaayer, was interrogated by the police and he eventually confessed. However, he later retracted that confession, meaning that he took it back saying that he did not actually commit the crime. Based on this new information, we need to determine a verdict. What does everything think about the evidence?*"

Talking Point #2 (please read aloud): "*Often, people confess to crimes they did not commit. Young people in general are often susceptible to falsely confessing. Here, we need to decide if he correctly confessed or falsely confessed. If you were in Hanemaayer's situation, would you confess to this crime?*"

Verdict: Based on the case summary above and the third piece of evidence (i.e., Evidence # 3), do you, the jury, think the defendant is guilty or not guilty? (Please record your group's decision on the paper provided).

Appendix B

Jury Task Recording Sheet

Please record your groups' answers on this sheet. Feel free to make notes on this sheet of paper.

Verdict # 1.

Based on the first piece of evidence, we the jury find the defendant (please circle):

GUILTY NOT GUILTY

Notes:

Verdict # 2.

Based on the second piece of evidence, we the jury find the defendant (please circle):

GUILTY NOT GUILTY

Notes:

Verdict # 3.

Based on the third piece of evidence, we the jury find the defendant (please circle):

GUILTY NOT GUILTY

Notes:

Appendix C

Participant Demographics Form:

Your age:_____

Your sex:_____

Ethnicity: Please indicate which ethnic group you would consider yourself to belong to by checking the appropriate box (optional):

- ☐ White (e.g., European)
- ☐ Black (e.g., African, African American, African Canadian, Caribbean)
- ☐ East Asian (e.g., Chinese, Japanese, Korean, Polynesian)
- ☐ South Asian (e.g., Indian, Pakistani, Sri Lankan, Bangladeshi)
- ☐ Southeast Asian (e.g., Burmese, Cambodian, Filipino, Laotian, Malaysian, Thai, Vietnamese)
- ☐ West Asian (e.g., Arabian, Armenian, Iranian, Israeli, Lebanese, Palestinian, Syrian, Turkish)
- ☐ Latin American (e.g., Mexican, Indigenous Central, South American)
- ☐ Aboriginal Canadian/Native Canadian/First Nations
- ☐ Mixed origin, please specify:_____
- ☐ Other:_____

Appendix D

Free Recall Form[3]

Person Description
Please write down everything that you can remember about the criminal.

Event Description

Please write down everything that you can remember about the video.

[3] Note the order of questions will be counterbalanced across participants

Appendix E

Truth or Myth Activity

Instructions: Read through the following statements. Each statement relates to forensic psychology, the law, and/or the criminal justice system. Please read through each statement and determine whether the statement is a TRUE statement or a MYTH. Please provide a reason why you chose "truth" or "myth" for each statement.

STATEMENT	TRUTH OR MYTH (please circle)	REASONING
Jurors can disregard evidence or information when instructed by the judge.	**Truth** **Myth**	
Jurors are often influenced by their own personal biases when making a decision regarding a case.	**Truth** **Myth**	
A trial participants' (e.g. witness, victim) personal appearance can influence juror decision making.	**Truth** **Myth**	
Jurors can tell the difference between accurate and inaccurate witnesses.	**Truth** **Myth**	

Jurors often have trouble fully understanding judicial instructions.	**Truth** **Myth**	
Most testimony provided by expert witnesses is common sense.	**Truth** **Myth**	
Forensic testing is always 100% accurate.	**Truth** **Myth**	
Physical (forensic) evidence is always present at a crime scene.	**Truth** **Myth**	
Polygraph (i.e., lie detector) evidence is primarily used as an investigative tool.	**Truth** **Myth**	
The majority of crime is committed by youth.	**Truth** **Myth**	
Youth violence is on the rise.	**Truth** **Myth**	

People sometimes confess to crimes that they did not commit.	**Truth** **Myth**	
Forensic psychologists are criminal profilers.	**Truth** **Myth**	
Forensic psychologists work with criminals.	**Truth** **Myth**	
Forensic psychologists conduct research studies.	**Truth** **Myth**	

Appendix F

Simultaneous Lineup Response Form

Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The picture of the criminal may be here, or may not be here. If you see the criminal's picture, please place a check mark in the box corresponding to the presenter's lineup number. If you do not see the criminal, please place a check mark in the box marked not here.

☐ Photo 1

☐ Photo 2

☐ Photo 3

☐ Photo 4

☐ Photo 5

☐ Photo 6

☐ Not Here

Please rate your confidence in the accuracy of your decision using a numerical value between 0 (*not at all confident)* and 100 (*very confident):* _____

Appendix G

Sequential Lineup Response Form

Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at each picture. The criminal's picture may or may not be here. You will only be allowed to look at each photo once. Please look at each photo and decide if it is or is not a picture of the criminal. If the picture is of the criminal, please place a check mark in the box labelled 'yes.' If it is not a picture of the criminal, please place a check mark in the box labelled 'no.' Please note that you will NOT be able to re-examine any pictures. Also, you will NOT be allowed to move forward until you make a decision about the picture you are looking at. After each decision, please rate your confidence in your decision on a 0 (*not at all confident*) to 100 (*very confident*) scale.

1. Is #1 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

2. Is #2 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

3. Is #3 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

4. Is #4 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

5. Is #5 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

6. Is #6 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

7. Is #7 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

8. Is #8 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

9. Is #9 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

10. Is #10 the criminal?

☐ Yes ☐ No

Confidence on a 0 (*not at all confident*) to 100 (*very confident*) scale: _____

Overall Confidence:

Please rate your overall confidence in the accuracy of your decision on a numerical scale of 0 (not at all confident) to 100 (very confident): _____

Appendix H

Elimination-Plus Lineup Response Form

Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The criminal's picture may or may not be here. To start off, please pick out the person who looks MOST like the criminal. Now let's look at the photos.

Photo 1 Photo 2 Photo 3

Photo 4 Photo 5 Photo 6

Please rate your confidence that the person most similar looking to the criminal is the criminal using a numerical value between 0 (*not at all confident)* and 100 *(very confident)*: _____

This might be a picture of the criminal or it might be a picture of somebody else. Think back to what the criminal looks like. I want you to compare your memory of the criminal to this picture. I would like you to tell me if this is a picture of the criminal or somebody else. If you think this is a picture of the criminal, place a checkmark in the box labelled '*Yes, this is a picture of the criminal'*. If you think this not a picture of the criminal, place a check mark in the box labeled '*No, this is not a picture of the criminal'*.

☐ ***Yes, this is a picture of the criminal.***

☐ ***No, this is not a picture of the criminal.***

Please rate your confidence in the accuracy of your decision using a numerical value between 0 (*not at all confident)* and 100 *(very confident)*: _____

Appendix I

Remember, Know, Guess Response Form

Sometimes when we recognize a face we have seen before, we can consciously REMEMER specific details about the previous occurrence of the face. At other times, we simply KNOW that we have seen a face before, even though we cannot recall specific details about the event. For some faces, we simply GUESS, without any reason to believe that the face appeared before.

I want you to tell me whether you REMEMBER, KNOW, or GUESS that the face appeared before: (Please check one)

☐ REMEMBER

☐ KNOW

☐ GUESS

Appendix J

Familiarity Ratings

1. How familiar are you with the criminal? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   Not at all familiar Very familiar

2. How well do you think you know the criminal? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   Not well Very well

3. How much exposure do you feel you had with the criminal? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   None A lot

4. How accurately do you think you could describe the criminal? Please circle your answer
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   Not accurately Very accurately

5. How likely would you be able to recognize the criminal in public? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   Not likely Very likely

6. How confident would you be in your accuracy of your recognition of the criminal? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   Not confident Very confident

7. How much information could you provide someone about the criminal? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   None A lot

8. How much interaction have you had with the criminal? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   None A lot

9. How likely are you to forget that you have met the criminal? Please circle your answer.
   0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
   Not likely Very likely

10. To what degree do you think that the criminal is a stranger? Please circle your answer
    0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
    Not at all a stranger Very much so a stranger

11. How friendly are you with the criminal? Please circle your answer.
    0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
    Not friendly Very friendly

12. How well will you remember your interaction with the criminal? Please circle your answer.
    0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
    Not well Very well

13. How well acquainted are you with the criminal? Please circle your answer.
    0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
    Not well Very well

14. How comfortable do you feel with the criminal? Please circle your answer.
    0….10…….20…….30…….40…….50…….60…….70…….80…….90…….100
    Not comfortable Very comfortable

15. How many minutes do you think you spent with the criminal? _____

16. How many minutes do you think you spent *interacting* with the criminal?
    _____

Appendix K

Parental and Student Debriefing Form

What are we trying to learn in this research?

Very few studies have examined adolescent eyewitness identification accuracy. The few studies that have examined adolescent identification accuracy have found that adolescent eyewitnesses produce comparable rates of accuracy to adults. Furthermore, even fewer studies have examined the role that familiarity plays on identification accuracy. Familiarity in this context can be understood as an individual who is not well known to the eyewitness, but is someone with whom the eyewitness has come in contact with before (i.e., a familiar-stranger). Examining the role of familiarity in the context of eyewitness identification is important, as individuals are often eyewitnesses to a crime where the perpetrator is known, or familiar to them (Flowe et al., 2011). The purpose of this study was to examine the role of familiarity, specifically through amount of interaction with a confederate, on adolescent's eyewitness identification accuracy. We are also examining whether the type of lineup procedure used will influence identification accuracy.

Why is this important to scientists or to the general public?

This research is important because in many cases people become eyewitness or victims to a crime in which the perpetrator is casually familiar to them. Adolescents' are a group that are at high-risk to become witness to a crime. Understanding how familiarity influences identification accuracy will help provide information to the justice system when dealing with a familiar-stranger case.

What are our hypotheses and predictions?

We predict that adolescents will be more accurate when they are more familiar (i.e., worked on a task with the confederate for 15 minutes) compared to less familiar (i.e., worked in the same room as a confederate) with the researcher and compared to a stranger (i.e., did not meet the confederate)

Where can I learn more?

To learn more about identification accuracy with adolescents, the article below can be made available:

Pozzulo, J.D., Dempsey, J., & Pettalia, J. (2013). The Z generation: Examning perpetrator descriptions and lineup identification procedures. *Journal of Police and Criminal Psychology, 28*(1), 63-74. doi: 10.1007/s11896-012-9107-5

What if I have questions later?

If you should have any questions please feel free to contact any of the following people: Dr. Joanna Pozzulo (Faculty Advisor, Joanna.Pozzulo@carleton.ca, 613-520-2600,

ext.1412) or Chelsea Sheahan, (PhD Student, Chelsea.Sheahan@carleton.ca, 613-520-2600 ext. 3695). All members of the research team have undergone police records checks. This research has been approved by the Carleton University Research Ethics Board-B (###). If you should have any ethical concerns about this study please contact the Carleton University Research Office at ethics.carleton.ca. Should you have any other ethical concerns, please contact Dr. Shelley Brown (Chair, Carleton University Research Ethics Board-B, 613-520-2600 x 1505). This study has also received approval from OCREAC and your school principal. Should you have any questions concerning research in schools, please contact Tsala Mosimakoko (OCREAC Chair, Tsala.Mosimakoko@ocdsb.ca, 613-596-8211 ext. 8571).

Please note that your participating has no impact on your school results or the process in which your data will be handled.

At this time we would like to thank you for participating in this study! We greatly appreciate it!!