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# The Relationship between the Big 5 Personality Traits and Eyewitness Recognition

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The aim of the current research was to identify which, if any, personality traits are related to recognition in an eyewitness task. A correlational design was used with the co-variables being personality traits and correct (false) recognition. Eighty participants viewed a video clip, which showed a female being robbed. Participants completed a personality inventory. They were then supplied with misinformation, and finally completed a memory recognition task relating to the video clip. Spearman's correlations were run identifying Openness as the only personality trait to be significantly associated with correct recognition scores. No predictor variables were found. The study may have highlighted that recognition is a favourable way to evaluate eyewitness testimony as it is not linked with, some, estimator variables.

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This article examines the relationship between personality traits and eyewitness memory in a forensic setting. Specifically, the current research aims to establish whether the personality trait of Neuroticism, and one of its sub-traits (anxiety), have a positive relationship with false recognition when participants have been exposed to misinformation (i.e., false information; Loftus, 1992). In addition, this study examines the relationship that personality traits have with recognition, rather than recall. The majority of research to date has focused upon recall rather than recognition (Porter, Birt, Yuille, & Lehman, 2002); and it is evident from previous literature that there is a difference between recall (the conscious remembering of information without the presence of stimuli) and recognition (identification of a stimuli from previous events; Horselenberg, Merckelbach, Breukelen, & Wessel, 2004).

Recognition is a more automatic process while recall is thought to be a more conscious process (Hasselmo & Wyble, 1997; Holliday, Reyna, & Hayes, 2002; Jacoby, 1991; MacLean, 2013). However, the main distinction between recognition and recall is that recognition is centred on the judgment of a present object, person or event and whether the stimulus has been shown before. Whereas, when recall is occurring volunteers depend solely on their memory (Yonelinas, Aly, Wang, & Koen, 2010). This suggests that there may be a gap in the current literature, as the relationship that recognition has with personality may be different from that found between recall and personality.

There are two main reasons as to why recognition will be studied in this research over recall. One reason to study recognition over the traditional recall is because of the different cognitive processes and brain areas associated with the two (Newell, & Dunn, 2008). For instance, when the symptoms of scopolamine – a memory impairment drug (Azizi-Malekabadi et al., 2012; Strachan, 2012) – are simulated in the hippocampus then recall and not recognition is affected (Hasselmo & Wyble, 1997). Interestingly, the posterior hippocampus is associated with the neuroticism also (DeYoung et al., 2010). This may insinuate that recognition has less of a relationship with personality traits, such as neuroticism, as the inhibition of the hippocampus would affect someone's recall and their level of neuroticism but would not affect their recognition. A second, and final, reason to study recognition is because much of an eyewitness' job relates to recognition. For example, line-ups and some facial composite software are based upon recognition. Therefore, research is needed to establish how personality traits have differing relationships with recognition, rather, than recall in a forensic setting. Furthermore, the current study hopes to establish the relationships that personality traits have with recognition in a forensic environment in an attempt to rectify the gaps in the literature.

The importance of investigating and understanding which factors may influence or be related to eyewitness recognition is also paramount. Unreliable eyewitness testimony may cause innocent individuals to be convicted for a crime they did not commit or, conversely, may lead to the release of a guilty party putting the general public in danger. Indeed, it has been proposed that poor eyewitness testimony is a major cause of wrongful convictions (Areh & Umek, 2004; Wells, 1978). Therefore, it seems logical for psychologists to try and identify which stable and which changeable variables may be able to predict how correct an eyewitness testimony is. One such set of (relatively) stable potential predictor variables is personality.

For instance, in one study (Hyman & Billings, 1998) participants were told correct and false stories from their childhood and were asked to recall the information they remembered surrounding these stories in subsequent interviews. The results highlighted

that talkative individuals (i.e., extraverts; Goldberg, 1990) may be more vulnerable to misleading information as they produced the most false memories. Therefore, it could be argued that talkative individuals produce more false information because they are more confident in their acceptance of a memory than quiet individuals (Heinström, 2003). While this research indicates that there may be a difference in talkative and quiet individuals, this is a simplistic way to measure stable personality traits in relation to false memories and misinformation. More recent research has moved on to measure clearly defined personality traits using standardised, reliable and valid personality measures (e.g., Areh & Umek, 2004).

As previous literature on memory and misinformation indicates the possibility of personality traits having some relationship with eyewitness memory (McDougall & Pfeifer, 2012), careful consideration of whether personality can be used to predict correct and false eyewitness memories is required. One of the most widely used trait approaches to personality in relation to eyewitness memory is the Big 5 approach (MacRae & Costa, 1997; Revelle & Loftus, 1992; Schaie, Willis, & Caskie, 2004). A trait approach proposes that every individual has traits that combine to create the personality/character of an individual (Goldberg, 1990). All the traits are on a continuum, from low to high, which is perfect for forensic/legal research as it may allow a relationship to be shown between the Big 5 traits and accuracy.

The five personality traits that exist in this approach are: Extraversion (sociability), Neuroticism (emotional stability), Conscientiousness (relates to preparation), Openness (associated with having an open mind) and Agreeableness (connects to empathy; Barrick & Mount, 1991). The Big 5 approach has been supported by confirmatory factor analysis and lexical analysis (Goldberg, 1990). Additionally, twin studies have shown that the Big 5 approach may also be supported by a genetic element (Jang, Livesley, & Vernon, 1996). Thus, the Big 5 approach, which was found from research that highlighted that five factors of personality existed in the human lexicon (Chaplin, John, & Goldberg, 1988, Goldberg, 1990), may be universal (Heine, & Buchtel, 2009) and externally valid.

Past research has indicated that some personality traits may have a significant relationship with memory (Wells & Olson, 2003). For example, personality traits such as Neuroticism (Wells & Olson, 2003), and Openness (Rasmussen & Berntsen, 2010), have a positive relationship with various aspects of memory. Additionally, Neuroticism, Extraversion and psychoticism (a trait relating to antisocial behaviour) may be related to eyewitness testimony (Areh & Umek, 2004; Eysenck & Eysenck, 1967/2006). Areh and Umek (2004) found that 26% of the variance in the accuracy of eyewitness testimony was related to these personality traits. It would therefore appear that there is a relationship between personality traits and memory.

In addition, reconstructed memories (Deffenbacher, Bornstein, McGorty, & Penrod, 2008) may be associated with an individual's personality (Porter et al., 2000). Specifically, personality traits may help an individual to reconstruct memories (Porter et al., 2000). Therefore, some personality traits may aid memories (Arana, Meilan, Perez, 2008; Areh & Umek, 2004), whereas others may hinder them (Porter et al., 2000). Each of the Big 5 personality traits (Extraversion, Openness, Conscientiousness, Agreeableness, and Neuroticism) will now be discussed in regards to their relationship with correct/false eyewitness memories.

Porter et al. (2000) suggested that Extraversion is related to individuals producing partial false memories, and it is thought that this may be due to extraverts having increased confidence in their abilities and hence may be more inclined to express memories that

they have imagined (Heinström, 2003). However, it has also been suggested that individuals who are high on Extraversion may give correct eyewitness testimony (Areh & Umek, 2004), and that Extraversion may not affect recall at all (McDougall & Pfeifer, 2012). It is clear, therefore, that the relationship between Extraversion and eyewitness memory is not well understood at present.

Openness may be positively related to certain aspects of autobiographical memory (i.e., personal history/memories; Conway & Pleydell-Pearce, 2000; Eysenck & Keane, 2010), suggesting a correlation between eyewitness memory and Openness (Rasmussen & Berntsen, 2010). Additionally, it has been found that a sub-trait of Openness, (i.e., values), has a positive relationship with false memories in the presence of misinformation (Liebman et al., 2002; Zhu et al., 2010). Likewise, open individuals in interviews have a high vulnerability to false memory production (Porter et al., 2000). This may be because open individuals are more willing to examine alternative information after a memory has formed (Goldberg, 1990), which may cause this alternative information to reconstruct their memory (Barrick & Mount, 1991; Hemmer & Steyvers, 2009; Lakshmanan & Krishnan, 2009).

Conscientiousness has been shown to be positively related to prospective memory (remembering to carry out an action; Arana et al., 2008). In addition, high conscientious scores have no relationship with false memories (Porter et al., 2000). In contrast, Agreeableness has been shown to have some relationship with memory. Two sub-traits of agreeableness, altruism and modesty, are significantly related to false memories in the presence of misinformation (Zhu et al., 2010). Moreover, previous research has demonstrated that Extraversion, Agreeableness, and Openness are related to recognition.

Neuroticism's relationship with eyewitness memory is more complex. Research suggests that Neuroticism may not have an impact on the number of words recalled (McDougall & Pfeifer, 2012), yet individuals high in Neuroticism have more memory lapses than non-neurotic individuals (Flehmig, Steinborn, Langner, & Westhoff, 2007). Further, some psychologists have even proposed that individuals high in Neuroticism are the most accurate eyewitnesses when making identifications (Shapiro & Penrod, 1986; Wells & Olson, 2003). These differences in previous findings may be explained by a sub-trait of Neuroticism: anxiety (Studer-Luethi, Bauer, & Perrig, 2012). The increased anxiety and arousal of some neurotic individuals may create false memories, related to the attentional control theory (Studer-Luethi et al., 2012). This theory suggests that the central executive, which is the control system of working memory is vulnerable to anxiety and high physiological arousal, such as increases in adrenaline (Flehmig et al., 2007; Studer-Luethi et al., 2012). Consequently, this proposes that all individual's memories relating to witnessing a crime may be affected because of the state anxiety of watching a crime take place (Kennedy Schwab, Morris, & Beldia, 2001). Plus, it may mean that individuals with a trait anxiety may be at a disadvantage in relation to recalling and recognising forensic stimuli.

It is clear that the relationship between personality traits and eyewitness memory is not fully understood at present, and that the majority of the literature has focused on recall rather than recognition. The current research using a personality inventory, a recognition test and a misinformation sheet in conjunction with a video clip aims to investigate whether personality traits (and the sub-trait of anxiety) are related to, and can predict, eyewitness memory performance. Further, the current research is novel, and it would be interesting to see if the personality trait relationships with recognition, in the current study, differ from

previous research, which has focussed more on recall. It is hypothesised:

H<sub>1</sub>: Neuroticism will be negatively related to correct eyewitness memory.

H<sub>2</sub>: Anxiety and Neuroticism will be positively related to false memories.

H<sub>3</sub>: Conscientiousness will not be significantly related to correct or false recognition.

H<sub>4</sub>: Neuroticism will be a significant predictor of false eyewitness memory.

H<sub>5</sub>: Extraversion will have a significant relationship with both correct and false recognition.

H<sub>6</sub>: Openness will have a significant association with false and correct recognition.

H<sub>7</sub>: Agreeableness will have a significant link with both false and correct recognition.

## Method

### *Design*

A correlational design was used, with the co-variables being: the personality traits derived from the Big 5 model (MacRae & Costa, 1997) and selected from the International Personality Item Pool (2013), e.g. Extraversion, Openness, Agreeableness, Conscientiousness, Neuroticism, and the sub-trait of Neuroticism, Anxiety; and measures of accuracy in an eyewitness memory task, i.e., correct and false recognition scores. Additionally, two multiple regressions were conducted. In these multiple regressions the personality traits were run as predictor variables, and the recognition scores (both true and false) were conducted as criterion variables.

### *Participants*

Eighty participants (40 males, 40 females; aged 18-25 years), who were a mixture of students and non-students, were recruited using opportunity sampling. They were recruited using social media, and from psychology classes. All participants were aged between 18-25 years to reduce the impact of age related differences acting as a potential extraneous variable in the eyewitness memory task (Karpel et al., 2001).

### *Materials*

All participants received an information sheet and consent form prior to participation and a debrief sheet at the conclusion of the study.

**Video clip.** A video clip was filmed by the researchers, which showed a staged assault and theft of a female undergraduate student (age 20; who was small and had dark hair) by two males of the similar ages (one aged 21 and the other aged 20). The video lasted 14 seconds. The clip showed two males approaching the female and asking for, and then forcibly taking her mobile phone from her. The video clip was filmed using an iPod, which allowed the participants to both hear and see the staged crime. Further, the iPod was used in order to show the video clip to the participants as it increased the ecological validity of this research. This is because individuals may view crimes, such as “happy slapping”, on instruments such as an iPods and iPhones, and then have to provide eyewitness testimony. Additionally, it must be mentioned that the participants held the iPod in a landscape fashion,

whilst viewing the crime, and that the screen of the iPod was 4 inches.

**Personality inventory.** The personality inventory was derived from the International Personality Item Pool (2013). Six scales were used in the personality inventory: five of the scales related to each of the Big 5 personality traits (i.e., Agreeableness, Openness, Neuroticism, Conscientiousness, and Extraversion; MacRae & Costa, 1997); one additional scale was selected to measure Trait Anxiety, a subscale of Neuroticism. The personality inventory included 42 questions (i.e., seven questions for each of the scales), such as “I am the life of the party.” Participant responses on the personality inventory were rated on a 5-point Likert scale. This allowed each of the scales to be measured *as a composite score ranging from 7 – 35*. In each of the traits, the greater the score you receive from the inventory the higher you are in that particular trait.

Likewise, a Cronbach’s alpha was conducted, which highlighted that the personality traits of Extraversion ( $\alpha = .72$ ), Neuroticism ( $\alpha = .78$ ), and Agreeableness ( $\alpha = .74$ ) all had acceptable alpha scores (George & Mallery, 2003). The other traits being measured had alpha levels below .70 (Conscientiousness  $\alpha = .66$ , Openness  $\alpha = .61$ ), but were above .60. These values are in accordance with George and Mallery’s (2003) and together demonstrate acceptable internal consistency. Furthermore, the personality inventory did not have poor internal consistency.

**Misinformation sheet.** A misinformation sheet was used to create confabulations following the video clip. This misinformation sheet provided statements to participants, such as “The victim’s purse was taken,” which was false as her mobile phone was taken. Participants were told that the information on the misinformation sheet was correct and was a summary of the main events in the video clip. Overall 20 pieces of misinformation were supplied to participants.

**Distractor task.** A maths puzzle (i.e., Zenos paradox; Prime, 2014) was used as a distractor task. In this task the participants were asked to predict when a faster greyhound (speed of 20 miles per hour, mph) will catch up with a slower rabbit (15mph) when the rabbit has had a head start of 10 miles.

**Recognition test.** A forced choice recognition test was used, containing 20 questions in a binary answer system, which would highlight whether the participant falsely or correctly recognised what happened in the video clip. For example, “Does the Mugger [a local colloquialism for ‘robber’] ask for the victim’s phone or her purse?”; if participants answered ‘phone,’ their recognition was correct, whereas if they answered ‘purse’ their recognition was false and based on the misinformation. The recognition task was designed to be an inventory. The participants were allowed to take as much time on the recognition test as they desired.

### *Procedure*

Participants were told that the research was conducted to establish if there was a link between personality traits and eyewitness characteristics. The participants were told the true procedure of the study in the debrief. However, the participants were told

that the misinformation sheet was a summary of what happened in the video and that the recognition test was an inventory relating to eyewitness testimony. Nevertheless, the participants were tested individually in a dedicated laboratory room. Following informed consent, participants were shown the video clip. They then completed the personality inventory. Following this, they read the misinformation sheet and were informed that the information on the sheet was correct. After this, participants performed the distractor task to create a gap between the experimental tasks and the recognition task, to align the study somewhat to be more akin to the delay experienced in a real life eyewitness situation. The delay was not standardised and related to the participants solving the Zeno’s paradox or giving up. Finally, participants completed the recognition test. Afterwards, each participant was fully debriefed about the true aims of the study.

### Results

#### *Descriptive Statistics*

As shown in Table 1, the mean, median, and standard deviation scores for the personality traits and sub-trait are relatively consistent, with only Agreeableness appearing higher than the other traits and sub-trait with a mean and median of 28.15 and 28, respectively. Higher correct recognition scores are present when compared to false recognition scores, with the range of scores being approximately equal across these two measures. Parametric testing (for the regression) was conducted as scale data was created by combing questions together. Similarly, there was not enough outliers in the data set to affect the distributions.

**Table 1.** *Descriptive statistics for the co-variables: Extraversion, Openness, Agreeableness, Conscientiousness, Neuroticism, Trait Anxiety, False Recognition and Correct Recognition*

Variables	Mean	Median	SD	Minimum	Maximum	Range
<b>Personality Traits</b>						
Extraversion	21.36	22.00	4.31	11.00	32.00	21.00
Openness	24.98	25.00	3.43	15.00	34.00	19.00
Agreeableness	28.15	28.00	3.67	18.00	35.00	17.00
Conscientiousness	23.49	23.00	4.37	16.00	32.00	16.00
Neuroticism	20.45	21.00	4.95	9.00	30.00	21.00
<b>Sub-Trait</b>						
Anxiety	20.59	21.00	5.00	5.00	35.00	30.00
<b>Recognition Scores</b>						
False recognition	5.19	5.00	2.51	1.00	16.00	15.00
Correct recognition	14.73	15.00	2.55	4.00	19.00	15.00

This is because the maximum number of outliers was for the personality trait of Openness ( $n = 3$ ). The only other personality trait to have outliers was agreeableness ( $n = 2$ ). This should not affect the data as 80 participants completed the questionnaires. Additionally, three extreme scores were present for correct and incorrect recognition. These extreme scores were participants 15, 60 and 63 for both variables. Therefore, because the data was non-parametric (had outliers and extreme scores) Spearman's correlations were conducted.

### *Inferential Statistics*

#### *Correlations*

A Spearman's correlation was run with the eight co-variables to test the seven hypotheses as ordinal data was collected for the personality inventory. The findings, which show two tailed p-values, are presented in Table 2.

**Table 2.** Spearman's Correlation Coefficients for Personality Traits/Sub-Traits and Recognition Scores

	Correct Recognition	False Recognition
<b>Personality Traits</b>		
Extraversion	-.016	.009
Openness	.289*	-.304*
Agreeableness	.178	-.172
Conscientiousness	.042	-.030
Neuroticism	.027	-.054
<b>Sub-Trait</b>		
Anxiety	.065	-.055

\* significant at  $p < 0.05$ .

Only Openness was significantly related to correct recognition (positive relationship;  $r_s(80) = 0.289$ ,  $p = 0.009$ ,  $r^2 = 0.0835$  weak effect size) and false recognition (negative relationship;  $r_s(80) = -0.304$ ,  $p = 0.006$ ,  $r^2 = 0.092$  weak effect size). No other significant relationships were found between eyewitness testimony and personality traits. Trait Anxiety was significantly and positively related to Neuroticism ( $r_s(80) = 0.550$ ,  $p < 0.01$ ,  $r^2 = 0.303$  moderate effect size), but was not related to the eyewitness testimony measures.

#### *Multiple Regression*

A multiple regression was used to identify whether or not certain personality traits/sub-traits could predict whether participants would correctly recognise or falsely recognise



information from the video clip. This was ran despite extreme scores being presented as it was unlikely that three extreme scores out of a sample of 80 would affect the results in relation to the forecasting ability of personality traits. A simultaneous regression method was used to see if the personality traits could predict false recognition. See Tables 3 and 4 for more details. A non-significant regression equation was found ( $F(5, 79) = .715, p = .614$ ) with the following results  $R^2 = .046$  and  $R = .215$  for the predictability of false recognition from the personality traits. This shows that there is not a strong correlation between predicted and actual scores, and that only 4.6% of false recognition can be predicted by personality traits/sub-traits.

To double check that the outliers and extreme scores were not having an impact, the regression was re-conducted without the outliers. A non-significant regression equation was found ( $F(5, 71) = 1.367, p = .248$ ), which presented the following results  $R = .306$  and  $R^2 = .094$  for the predictability of false recognition from the personality traits. This shows that the outliers and extreme scores did not have an impact on the significance of the regression. However, it did inflate the variance from 4.6% to 9.4%.

**Table 3.** Multiple Regression Findings Across False Recognition

	<b>b</b>	<b>Beta</b>	<b>p</b>
Extraversion	.038	.066	.622
Openness	-.146	-.199	.110
Agreeableness	-.041	-.061	.620
Conscientiousness	.015	.026	.843
Neuroticism	.019	.038	.747

**Table 4.** Multiple Regression Findings Across False Recognition when Outliers were Removed

	<b>b</b>	<b>Beta</b>	<b>p</b>
Extraversion	.031	.080	.555
Openness	-.145	-.246	.048
Agreeableness	-.047	-.090	.466
Conscientiousness	.026	.066	.622
Neuroticism	-.034	-.099	.422

Similarly, a multiple regression testing the extent to which personality traits could predict correct recognition presented the following results:  $R = .225$  and  $R^2 = .051$  (5.1% of variance). Similarly to the previous regression, the regression equation was found to be non-significant ( $F(5, 79) = .789, p = .561$ ).

Once again the multiple regression was repeated without the outliers and extreme scores. A non-significant regression equation was found ( $F(5, 71) = 1.180, p = .329$ ) with the following results  $R = .286$  and  $R^2 = .082$  for the predictability of correct recognition from the personality traits. This shows that the outliers and extreme scores did not have an impact on the significance of the regression. Nevertheless, it did increase the variance of the model from 5.1% to 8.2%. See tables 5 and 6.

**Table 5.** *Multiple Regression Findings Across Correct Recognition*

	<b>b</b>	<b>Beta</b>	<b>p</b>
Extraversion	-.043	.074	.579
Openness	.157	.213	.087
Agreeableness	.034	.049	.686
Conscientiousness	-.012	-.021	.869
Neuroticism	-.027	-.053	.656

**Table 6.** *Multiple Regression Findings Across Correct Recognition when Outliers were Removed*

	<b>b</b>	<b>Beta</b>	<b>p</b>
Extraversion	-.033	-.086	.532
Openness	.138	.236	.059
Agreeableness	.047	.092	.463
Conscientiousness	-.022	-.057	.675
Neuroticism	.024	.070	.569

## Discussion

Seven hypotheses were tested, investigating the relationship between personality traits and eyewitness recognition:

- H<sub>1</sub>: Neuroticism will be negatively related to correct eyewitness memory.
- H<sub>2</sub>: Anxiety and Neuroticism will be positively related to false memories.
- H<sub>3</sub>: Conscientiousness will not be significantly related to correct or false recognition.
- H<sub>4</sub>: Neuroticism will be a significant predictor of false eyewitness memory.
- H<sub>5</sub>: Extraversion will have a significant relationship with both correct and false recognition.
- H<sub>6</sub>: Openness will have a significant association with false and correct recognition.
- H<sub>7</sub>: Agreeableness will have a significant link with both false and correct recognition.

In sum, only two of the hypotheses were upheld:  $H_3$  – Conscientiousness would not be related to either correct or false recognition, as would be expected from previous literature; and  $H_6$  – Openness would be associated with correct and false recognition. This latter finding indicated that Openness had a positive relationship with correct recognition, and a negative relationship with false recognition. These relationships had a weak effect size, however, suggesting that these relationships can only be seen when investigated within the specific experimental context (Walker, 2008), and must thus be interpreted with some caution. Nevertheless, this finding was in contrast to that found in previous research (e.g., Porter et al., 2000). Previous research proposed that Open individuals were vulnerable to false memory implantation (Porter et al., 2000), whereas the current findings would suggest that the more Open an individual is, the more likely they will recognise correct information about a crime, and the less likely they will be to falsely recognise information in relation to a crime.

The reason for this contrast may be attributable to the relatively low sample size used in Porter et al.'s (2000) research. Porter et al.'s (2000) research used only 50 participants, with three of the participants not adequately completing the personality measure, potentially indicating an issue with reliability related to the study's measurement of personality. The current research's findings indicate, in contrast to those of Porter et al. (2000), that individuals high in Openness may have more correct recognition than those who are low on Openness, and this may be because open individuals are more critical of misinformation as they process information in a more analytical way (Duff, Boyle, Dunleavy, & Ferguson, 2004). However, as the effect size in the current research was weak and the regression model was not found to be a significant predictor of false or correct recognition, further research is required, with adequate measurement and appropriate statistical analyses for the sample size and data type collected.

The remaining five hypotheses were not supported. In regard to  $H_1$ , Neuroticism did not relate to eyewitness recognition. While there has been some supporting research for the relationship between correct recall and Neuroticism, as discussed previously, other research indicates that no relationship exists between Neuroticism and false memories/recognition (Christiaansen, Ochalek, & Sweeney, 1984; Horselenberg et al., 2004; McDougall & Pfeifer, 2012). Thus, the current finding is not wholly unexpected and the function of the relationship between eyewitness accuracy and Neuroticism may lie in the different tasks associated with recall and recognition. Similarly, the lack of support for the remaining hypotheses may be, at least partially, a result of the current research pursuing recognition rather than recall as the outcome measure of interest.

The current study investigated recognition, whereas the majority of previous studies focussed on recall (Butler & Pallone, 2002; Holliday et al., 2002; Horselenberg et al., 2004; Hyman & Billings, 1998; MacLean, 2013; Porter et al., 2000; Tulving et al., 1994). Therefore, the differences surrounding recognition and recall may be based on different cognitive processes (Newell, & Dunn, 2008). For example, it has been suggested that recognition is unconscious, whereas recall is conscious and demands more cognitive effort (Holliday et al., 2002; Jacoby, 1991). Consequently, it is evident that what may have been being measured in the current research was the unconscious recognition of information in the video clip and the misinformation sheet, compared to previous research where the conscious recollection of previously shown materials was the target variable (Holliday et al., 2002). Furthermore, the lack of significance in the current study is interesting, and it

may hint that the relationship that personality traits have with recall is different from the relationship that they have recognition.

Additionally, it could be argued that personality may affect recall more. Recall is more effortful so it may need to use other areas of the brain that are associated with personality, such as the posterior hippocampus which is an area of the brain related to Neuroticism (DeYoung et al., 2010) and the encoding of memory (Azizi-Malekabadi et al., 2012), in order to recall a reconstructed memory. This is evident by the fact that when the effects of scopolamine (Azizi-Malekabadi et al., 2012; Strachan, 2012) are replicated in the hippocampus, encoding is affected, which has a detrimental effect on recall but not recognition (Hasselmo & Wyble, 1997). Therefore, it could be argued that recognition may not be as influenced as much as recall by estimator variables such as personality traits. In summary, the differences found in this study compared with previous research are likely to be based on the use of a recognition test in the current research, compared with previous research using recall tasks.

This has implications for both research and for practice. Researchers ought to carefully consider what their key outcome or target variable of interest is, and/or which cognitive process(es) they are interested in, prior to collecting data. Clearly both recall and recognition are involved in eyewitness testimony, and having a clear understanding of both is important. That is, when witnesses give evidence to the police or when they are asked to give a witness statement within the courtroom, recall will be used; but when presented with an item of evidence, the accused or even a written or spoken version of the events, recognition will be used. Additionally, this difference in whether the police focus on recognition or recall may affect how the eyewitness is questioned. For instance, a question that is focussed on recall may be “tell us everything you remember about an incident?” Whereas, recognition questions may be “Do you recognise the suspect from the line-up?” Plus, this research would seem to suggest that (apart from openness) personality traits are less likely to link with correct and false recognition (in comparison to recall), which may hint that personality has less of a biasing effect on recognition (in contrast to recall), and the police may want to utilise this. This may also mean that recognition is affected less by estimator variables (in comparison to recall), which the police should consider. In short, future research is needed which focuses on how useful recognition may be in police investigations.

One limitation of this study, however, is that the ecological validity of this research may be poor because the research was conducted at a university, rather than in a police station with eyewitnesses who have witnessed a criminal act. Future research may wish to employ a procedure similar to police investigation to counter this. For instance, staging a criminal act live to eyewitnesses (i.e., participants) and then getting participants to be interviewed by an actor playing a detective. This may increase the ecological validity of the experiment and cause the stimuli and processes that occur in the experiment to be more in align with a real life eyewitness experience.

Additionally, future research may focus on finding out how personality traits have a different effect on recall and recognition. This could be employed by using a matched samples design. Consequently, participants could be given a personality test and matched into four groups (which will be stated after premise for research is stated) based on similarities in the personality trait of Openness. The personality trait of Openness should be focused on specifically as Openness in this study had a positive relationship with correct recognition, whereas previous research has suggested that open individuals are vulnerable to false memories (Porter et al., 2000). Then the participants could be shown the same

crime. However, one half of the participants could be given a recognition test and the second half of the participants could be given a recall test. The design of this study thus creates four groups: one group high in Openness that is shown a recognition test, a second group that is high in Openness that is given a recall test, a third group low in Openness that is given a recall test and a fourth group that is low in Openness that is given a recognition test. This would then show how the personality trait of Openness may effect recognition and recall differently.

In summary, only Openness was found to correlate with false and correct eyewitness recognition, with the findings indicating that people high in Openness were more likely to be correct and produced smaller false recognition scores than those low in Openness. No other personality trait measured was related to false or correct eyewitness recognition, in contrast to past research findings which focused on recall. Thus, the estimator variables (personality traits) cannot be used to significantly predict how correct an eyewitness will be. In addition, the findings may be used, when considered in light of past research, to highlight the importance of investigating not only recall, but also recognition, in the context of personality traits in relation to eyewitness accuracy. This research has been relatively novel, and will hopefully provoke future similar studies to increase the knowledge that psychologists have about estimator variables in relation to recall versus recognition in eyewitness memory. Plus, the study may have highlighted that recognition is a favourable way to evaluate eyewitness testimony as it is not linked with, some, estimator variables, which may mean that recognition would allow institutional systems (both legal and forensic) to have more control over” eyewitness testimony in comparison to when recall is used

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