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The Intoxicated Co-witness: How alcohol affects eyewitness memory reports.

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**Abstract**

Intoxicated witnesses are routinely encountered by law enforcement officers (Evans, Schreiber Compo & Russano, 2009). Such witnesses may have discussed details of the crime with each other prior to having their statement taken (Skagerberg & Wright, 2008). In order to understand the consequences of co-witness discussion on intoxicated witnesses, three studies were conducted investigating the effect of intoxication on misinformation when (a) the source of misinformation is a written statement from a seemingly intoxicated source in an online study; (b) when two intoxicated dyad partners engage in a face to face discussion in a laboratory based, alcohol administration study; and (c) when an intoxicated person encounters post event information from a sober video witness in the field.

The results suggest that intoxication does not influence the tendency to report misinformation. This is consistent when the source of misinformation is perceived to be intoxicated and the recipient is sober, both co-witnesses are intoxicated, or the recipient of misinformation is intoxicated whilst the source is sober. Intoxication also does not influence source monitoring ability. That is, both sober and intoxicated participants are equally able to identify the source of their memory recall. The results also add to the current literature on the effect of intoxication on eyewitness memory at an individual level. They demonstrate that at moderate doses, whilst accuracy is not impaired, intoxication may reduce the completeness of recall and the confidence a witness has in their memory. At higher doses however, in addition to the detrimental effects of alcohol on confidence and completeness, accuracy is also impaired.

The findings have implications for the criminal justice system given that intoxicated witnesses usually complete their evidential interview at a later date when sober (Crossland, Kneller & Wilcock, 2018). Witnesses who were intoxicated at the time of the crime and who engaged in co-witness discussion are no more prone than their sober counterparts to report co-witness information and are equally able to identify the source of the information that they report. Additionally, an intoxicated witness may report fewer details, and the accuracy of their statement may be influenced by their degree of intoxication. As such, breathalysing witnesses at the scene of the crime should be encouraged in order to understand the likely effect intoxication will have on their testimony.

**Chapter one: Alcohol intoxication and eyewitness testimony**

The role of alcohol in crimes has long been documented with research showing that alcohol is implicated in 37% of sexual assaults and 40% of murders in the United States (Addiction Resource, 2017). According to the Crime Survey England and Wales, in the year 2014/5, 542,000 crimes occurred where the victim believed the perpetrator to be under the influence of alcohol (Office for National Statistics, 2016). In incidences of intimate partner violence two thirds of perpetrators were under the influence of alcohol at the time of the attack (Van Djik, 2007). Whilst in incidences of homicide, alcohol involvement of both the offender and the victim has often been reported (Van Djik, 2007). Allen, Nicholas, Salisbury and Wood (2003) demonstrate that 60% of crimes occur at the weekend around bars, pubs and clubs indicating the extent to which alcohol and crime are intertwined. Thus, it becomes apparent that intoxication and its links to crime is a common occurrence. This thesis examined how the presence of alcohol may influence the testimony of a witness. Specifically, given that crimes involving alcohol often occur in social spaces, it focused on how alcohol affects eyewitness memory when there are multiple witnesses present. This chapter will begin this investigation by outlining the prevalence of intoxicated witnesses and their presence within the criminal justice system. Moreover, the issues that may arise as a result of witnesses being intoxicated at the time of the offence will be discussed including their accuracy and susceptibility to misinformation.

As outlined above, alcohol is implicated in a large number of crimes. When one considers specifically the statistics around crime at the evenings and weekend, it is highly likely that victims, witnesses and perpetrators of crimes may be under the influence of alcohol during the criminal event. The Crime Survey England and Wales reports that in the years 2012/3-2013/4, 23% of violent incidents were alcohol related between 12pm and 6pm, compared to 83% of violent incidents between 10pm and midnight (CSEW, 2014). This notion is supported by research from Crossland et al. (2018) that revealed that intoxicated witnesses are common, with 57.3% of UK police respondents reporting that they frequently encountered intoxicated witnesses. Interestingly, 92% of respondents indicated that they determined intoxication through physical symptoms of alcohol intoxication, whilst only 10% reported breathalysing intoxicated witnesses. This is consistent with research by Evans, Schreiber Compo and Russano (2009) on U.S. police officers that indicated that intoxicated witnesses are commonplace. Despite their prevalence, there are no special measures or procedures to deal with witnesses who are intoxicated in either the U.S. or the United Kingdom. This has significant implications for the criminal justice system when one considers, for example, the case of Mathew McKay who was acquitted of attempted murder because the witnesses were intoxicated at the time the crime was committed (CBC News, 2019).

Although intoxicated witnesses are prevalent within the criminal justice system, the presence of an intoxicated witness may cause problems for a successful trial. As indicated by Crossland et al. (2018), there is no specific procedure in place for police officers with regards to interviewing intoxicated witnesses. Intoxication though is an important factor as it might impact the credibility and reliability of an eyewitness’ testimony, and the defence may use it to dispute the credibility of a witness’ statement. Evidence suggests that the experience of intoxicated witnesses in the criminal justice system is much the same as for their sober counterparts (Evans et al., 2009). Intoxicated witnesses are as likely to give a statement or make an identification as sober ones (Palmer, Flowe, Takarangi & Humphries, 2013). When a case ultimately goes to trial, there is also no ruling on witnesses who were intoxicated at the time of a crime being prevented from giving evidence at trial. The CPS guidelines state that a witness is competent to give evidence as long as they understand the questions put to them and can give answers that can be understood (Crown Prosecution Service, 2018). Therefore, a witness who was intoxicated at the time when the offence took place can be put forward to give evidence at a trial in front of a jury.

The prevalence of intoxicated witnesses and the lack of specific procedures in place within the criminal justice system to support them raise pertinent questions to the field of eyewitness research. First, are intoxicated witnesses perceived as credible? This question is of relevance when one considers not only the perceptions that police officers hold of intoxicated witnesses, but also the opinions of jurors. The criminal justice system in the United Kingdom utilises trial by a jury of one’s peers - it is for jury members to determine whether a witness is deemed credible. Research has demonstrated that eyewitness testimony is a powerful tool in a trial (Cutler, Penrod & Dexter, 1990) but it is important to establish how the presence of intoxication may or may not undermine this perception. Secondly, are intoxicated individuals reliable witnesses? Research has generally indicated that, although intoxicated witnesses may be less complete in their accounts, they are no less accurate than a sober witness (Hildebrand Karlen, 2018). However, the social and behavioural outcomes of drinking are inherently tied to the social and cultural beliefs surrounding the expectations of alcohol consumption. It is pointed out that in countries such as the United Kingdom, alcohol consumption is associated with increased violence (Social and Cultural Aspects of Drinking, 1998). Thus, one’s beliefs about alcohol are informed by the specific culture in which they are in. Associating the consumption of alcohol with violence has implications for the perception of intoxicated witnesses. This is because witnesses and victims who were intoxicated at the time of the offence may be judged based upon these beliefs. Research has demonstrated that, in cases of sexual assault, intoxicated victims are seen as more to blame for the crime than those who were sober (Rape Crisis Ireland, 2019). As such, the way an intoxicated witness is perceived is greatly informed by social and cultural context, which can have considerable implications for the likelihood of an offender being found guilty. Therefore, the association between alcohol and violence may impact the behaviour of witnesses and perpetrators of offences when intoxicated, in addition to the perceptions that jurors may hold of witnesses and suspects who were intoxicated at the time of the offence.

**1.1 Attitudes towards alcohol and intoxicated witnesses**

In this section, literature will be reviewed relating to the attitudes towards alcohol intoxication and intoxicated witnesses. For the purposes of completeness, this will also include attitudes towards intoxicated victims who, during a criminal investigation, would have to give evidence as a witness in a trial. This literature examines questions around perceptions towards intoxicated witnesses, including their perceived credibility.

Laboratory experiments into the effect of intoxication on witness accuracy can provide us with the evidence to suggest whether there is a significant effect of alcohol on accuracy. However, it is also important to consider how intoxicated witnesses are perceived. Ultimately these perceptions will inform a jury and thus will be influential when making a decision of guilt. Research into credibility typically focuses on juror decision-making due to its applications to the criminal justice system. This research has generally indicated that jurors rely on stereotypes and intuition to help them determine if someone is lying (Porter & Brinke, 2009). These stereotypes are preconceptions about particular groups that effect one’s evaluations of members of that group (Frings, 2018). The Stereotype Content Model (Fiske, Cuddy, Glick & Xu, 2002) argues that the two dimensions of warmth and competence encapsulate stereotypes. This model suggests that people are motivated to ascertain whether a stranger intends to help or harm them (warmth) and whether they are capable of acting on said intention (competence). A person perceives and behaves towards the group based on their position on these dimensions (Fiske, 2018). Hence a juror may judge the testimony of an intoxicated witness based upon such dimensions. Jurors also place great emphasis on other factors. For instance, Cutler et al. (1990) report eyewitness confidence as being the most significant factor in jurors’ decisions to convict a suspect. Juror decision-making studies provide invaluable insight into commonly held beliefs that people hold when deciding if a person is credible.

Research by Evans and Schreiber Compo (2010) examined mock jurors’ perceptions of witnesses under varying levels of intoxication. In the scenarios presented, a bystander witness was always sober but the victim who made the identification was reported as being sober, moderately intoxicated, or extremely intoxicated. The authors found, consistent with their hypothesis, that the participants rated the intoxicated witness as less credible than the sober witness. There was no significant difference in credibility ratings between mildly and extremely intoxicated witnesses. The rating of credibility did not differ according to witness type (e.g. bystander or victim) or by crime type (e.g. sexual assault or battery). The reported credibility ratings were also related to the credibility of their identification of the perpetrator in a line-up - those that were rated as credible witnesses also had their identifications rated as credible. In turn, these ratings influenced judgements of guilt, with participants more likely to choose a guilty verdict when they deemed the identification as credible and made by a credible witness. These results indicate that the perception of an intoxicated witness as not being credible may ultimately influence decisions of guilt, which can have serious consequences for suspects, victims and their families and friends.

In a further study of intoxicated victims, Lynch, Wasarhaley, Golding and Simcic (2013) found in a mock juror study, pertaining to a rape case, that in situations where the victim was intoxicated participants rated their credibility as much lower and were less likely to settle on guilty verdicts. A study of police attitudes towards intoxicated victims (Schuller & Stewart, 2000) also found that as victim intoxication increased their perceived credibility decreased. This is corroborated by studies that have demonstrated that victims of alcohol related rapes were much less likely to report them than those in cases that did not involve alcohol (Kilpatrick et al., 2007). Moreover, victims who were intoxicated at the time of the rape experienced greater levels of victim blame (Grubb & Turner, 2012). Such crimes involving alcohol consumption are seen as more ambiguous and as such a victim may be perceived as more responsible and a perpetrator less so (Cole, 2006).

A limitation of focusing on juror decision-making is that a credibility judgement alone provides an incomplete picture about the effect of alcohol intoxication on witness competence. It does not provide the person’s actual accuracy, that is the number of details a witness correctly recalled. This is important for a complete understanding of the utility of a witness’ statement. Maddison, Ormerod, Tonking and Wait (2016) purport that the role of the jury is to weigh up the evidence and decide what has been proven based upon their view of the facts. Jurors must weigh up the *reliability* of the witness’ evidence taking into account how far the evidence is honest and accurate. *R v Morrissey* (1995, as cited in Porter & Brinke, 2009) outlines the distinctions between credibility and reliability. Credibility refers to the truthfulness or veracity of the witness’ evidence. Whilst reliability refers to their accuracy. Thus, a witness who is not telling the truth is neither credible nor reliable, but a witness who is giving an honest account that lacks accuracy would be *credible* but not *reliable.*

While juror decision-making studies are informative it is necessary to assess the perceptions of intoxicated persons as credible in a forensically relevant context whereby credibility judgements can be compared to a witness’ actual accuracy. A witness could be judged a credible source whilst still being unreliable (Porter & Brinke, 2009) and understanding how well calibrated the credibility rating of a witness is with their accuracy is useful. In order to compare how the perceived credibility of an intoxicated witness relates to their accuracy, the first study of this thesis investigated the tendency of participants to report misinformation from either a sober or intoxicated witness who reported 0, 2 or 4 pieces of misinformation in their statement.

**1.2 The effect of alcohol intoxication on eyewitness testimony**

Despite the prevalence of intoxicated witnesses and victims in the criminal justice system, and the potential effect of this intoxication on a successful trial, there are relatively few laboratory studies examining this phenomenon. Such studies will be reviewed to establish the effect of alcohol intoxication on memory accuracy and completeness, in order to compare these findings to the perceptions of intoxicated witnesses outlined previously. Studies into the effects of alcohol on eyewitness memory have used a variety of different doses. Kneller and Harvey (2016) report 0.5g/kg, whilst Flowe et al. (2017) used a dose of 0.8g/kg. In studies comparing dose Hagsand et al. (2013) used doses of 0.4g/kg and 0.7g/kg as a low and high dose respectively whilst La Rooy, Nichol and Terry (2013) used 0.1g/kg and 0.7g/kg for their comparison. In order to be consistent when discussing previous studies that have administered alcohol, the thesis will use the following as reference points for alcohol dosage in laboratory research. Low dose (up to 0.4g/kg), moderate dose (between 0.4-0.6g/kg) and high dose (> 0.6g/kg) [[1]](#footnote-1).These classifications are informed by previous research that has considered doses of 0.4g/kg to be ‘low’ whilst doses of up to 0.6g/kg have been typically used as a moderate dose. Studies using a ‘high’ level of intoxication have used doses between 0.6g/kg- 0.8g/kg, thus a high dose has been classed as >0.6g/kg.

A laboratory study by La Rooy, Nicholl and Terry (2013) compared different doses of alcohol on memory recall. Alcohol was compared with a placebo over two sessions. Results showed no increase in recalled information 24 hours later, and no effect of alcohol dose. This suggests that, contrary to common attitudes and beliefs, alcohol intoxication may not be detrimental to eyewitness memory. Similarly, Hagsand et al. (2013) also compared high and low doses of alcohol with a placebo. Participants also returned to complete their recall phase in a sober state but in this instance, there was a retention interval of one week. The results showed, consistent with La Rooy et al. (2013), that there was no effect of alcohol dose on the accuracy of recall. However, alcohol dose reduced the completeness of the accounts. Those that received a high dose of alcohol reported significantly fewer details than the low dose alcohol group. Thus, intoxicated witnesses’ accounts may not be more errorful, but they may lack detail when compared to their sober counterparts.

In addition, research by Crossland, Kneller and Wilcock (2016) compared 0.6g/kg and 0.8g/kg doses of alcohol with a placebo measure and tested recall one week later whilst sober. Their findings suggested an effect of intoxication on confidence such that sober participants reported greater confidence levels than intoxicated participants. As with previous research an effect of alcohol on accuracy was not found. There seems to be a discrepancy in findings between the perceived effects of intoxication on eyewitness testimony according to juror decision-making studies and the actual effects as demonstrated by laboratory studies. There is a consistent finding that intoxicated witnesses are perceived as less credible (Evans & Schreiber Compo, 2010) but this lack of credibility is not supported by laboratory studies that have found that alcohol consumption is not detrimental to eyewitness accuracy.

**1.3 Interim Summary**

Official statistics on crime rates indicate the prevalence of alcohol intoxication in crimes. This includes both those who are perpetrating offences as well as victims and witnesses. With the estimated economic cost of alcohol in crimes at £8 billion per year (Alcohol Change UK, 2018), there is a clear need to understand how intoxication at the time of the offence may impede a witness’ ability to give evidence, make identifications and be perceived as a credible witness.

Witness credibility is an important factor to consider given the nature of the criminal justice system in the United Kingdom, as eyewitness testimony is one of the most influential sources of evidence during a trial (Loftus & Doyle, 1992). Research demonstrates that intoxicated witnesses are not perceived as credible (Evans & Schreiber, 2010) which can influence guilty verdicts (Lynch et al., 2013). Discounting testimony from a witness who is not a credible source may be helpful in reducing the number of wrongful convictions associated with eyewitness testimony (The Innocence Project, 2018). However, before discounting all intoxicated witnesses as not credible it is necessary to establish the actual effect of alcohol on memory accuracy and completeness.

Laboratory studies indicate that although intoxicated individuals may produce less information (Hagsand et al., 2013) and be less confident (Crossland et al., 2016) they are no more prone to errors than their sober counterparts. This highlights a discrepancy within the literature between how an intoxicated witness is perceived and how objectively accurate they are.

In an attempt to understand how accurate and credible an intoxicated witness may be, the field of eyewitness memory research is concerned with how able witnesses are to remember an event or correctly identify a suspect. Importantly, it also considers how susceptible a witness is to take on erroneous information from another source. The social nature of alcohol consumption means that witnesses often encounter a criminal event in the presence of others and as such may share details with one another. The next section of this review will outline the social nature of crime before outlining how alcohol may influence this process.

**1.4 The social context of crime: witness discussion**

Previous research has examined the effect of alcohol on individual participants or the perception of individual witnesses under the influence of alcohol. However, the social nature of crimes involving alcohol must not be ignored. Recall that 60% of crimes occur at the weekend around pubs and bars (Allen et al., 2003). This means that there is the potential for multiple witnesses to be present during the crime, who may interact with each other and discuss aspects of the incident prior to being interviewed by the police. Paterson and Kemp (2005) reported in their survey that police officers perceived that the majority of witnesses they encountered had discussed the event with one another. Multiple officers reported potential advantages of witness discussion, including aiding witnesses to recall details that they would not otherwise remember, and reinforcing a witness’ memory. In a study of real-life witnesses, Skagerberg and Wright (2008) reported that 88% of respondents stated having a co-witness. Of these, 58% reported discussing aspects of the crime with their fellow witnesses prior to making an identification. These findings suggest that not only are co-witnesses common but discussion about the crime prior to interview is also commonplace.

In light of this, one must consider not only the effect of alcohol intoxication on eyewitness memory in isolation but also in the context of the wider social environment in which the crime may occur. That is, how does alcohol intoxication impact upon the way in which witnesses interact with one another? Paterson, Kemp and McIntyre (2012) have reported that a witness can report hearsay unintentionally by reporting information gained from a co-witness that the initial witness did not see. However, one must consider how one’s impression of their co-witness would influence how likely they are to take on and report information from them. In light of this issue, the following section of this review will focus on the effect of discussion on memory.

**1.5 Group membership and eyewitness testimony: The Co-Witness**

Research indicates that witness discussion is prevalent within the criminal justice system, and police officers often believe that it might have potential benefits (Paterson & Kemp, 2005). Eyewitness discussion is a factor that cannot always be controlled by policy and procedure, but it may have an impact upon the accuracy of a witness’ testimony. This section of the review will highlight two strands of research, namely memory collaboration and memory conformity which examine the potential costs and benefits of witness discussion.

**1.5.1 Memory collaboration.**

The field of research on memory collaboration highlights both risks and benefits associated with collaborative recall. In their seminal research, Weldon and Bellinger (1997) explained how groups that remembered together did not perform at their optimum. That is, they were unable to remember as well as the pooled non-redundant responses of individuals whose results were pulled together to form a *nominal group*. This phenomenon is called collaborative inhibition (Weldon & Bellinger, 1997). Further research by Basden et al. (1997) and Wissman and Rawson (2015) have demonstrated that this may be caused by retrieval disruption, where the recall strategies of one group member disrupt the recall strategies by other members. These findings have implications for the treatment of eyewitnesses as it suggests that those who recall with another witness may have a less complete account than those who recall alone. Whilst this does not equate to a more errorful or erroneous account, it may be detrimental to a successful investigation. This is due to the potential for key details from the event to be missed out by either person and not included in the account.

In contrast to the reduction in performance associated with group recall, memory collaboration research has also identified potential benefits of collaborative remembering. Post-collaborative benefits refer to the finding that individuals who have previously had the opportunity to collaborate recall more than individuals who have only recalled alone. Pairs who adopted a content-focused recall strategy in which discussion partners showed acknowledgements, repetition or elaboration of the information that their partner has recalled recalled significantly more (Vredeveldt & van Koppen, 2018). Rajaram and Pereira- Pasarin (2007) elucidate on the benefits that discussion provides arguing that collaboration offers a *re-exposure* phase where group members hear suggestions from each other that they may otherwise have forgotten. This has implications for eyewitness memory as it suggests benefits from having the opportunity to collaborate with fellow witnesses to create a fuller witness account. Conversely, it also suggests significant costs to the extent that when a recall partner suggests misleading information the other person might remember it too leading to inaccurate accounts.

**1.5.2 Memory conformity.**

Although the opportunity to collaboratively recall may aid in creating a full account, research into memory conformity purports the potential for witnesses to report hearsay as a result of discussion (Paterson, et al., 2012). During a discussion erroneous information may be introduced and research has demonstrated that participants may incorporate this in their own accounts (Gabbert, Memon & Allan, 2003). French, Garry and Mori (2011) manipulated perceived visual acuity in one such laboratory study. Dyads wore glasses that they were told would change their visual acuity relative to their partner’s. They then watched two different movies whilst under the impression they were viewing the same one. Subsequently, discussing the events in the video led to participants reporting details gleaned from the discussion partner that they did not see in the video themselves. Participants’ tendency to do so was related to their perceived credibility relative to their partner’s. When participants perceived their visual acuity to be lower than their discussion partner, they were more likely to report misinformation from their partner. Thus, perceiving yourself at a detriment or an advantage relative to a discussion partner may alter the likelihood of reporting misinformation. Three mechanisms have been proposed through which this may occur; *normative influence*, *informational influence* and *source monitoring*. Each of these brings with it implications for eyewitness testimony.

Normative influence refers to the desire to be liked and behave consistently with group norms (Deutsch & Gerard, 1955). From this perspective, people report information that they did not see themselves due to a desire to be liked. Memory conformity work has demonstrated that this is increased when discussion partners are known to each other (French, Garry & Mori, 2008). If a group of friends witness a crime and discuss it, they are less likely to dispute inconsistent information than if they were a group of strangers due to a motivation to behave consistently with their perceived group norms.

Informational influence refers to the desire of people to have an accurate view of the world, and as such to take on information from other people if they believe it to be accurate. In the context of memory conformity, this results in people reporting information from another person because they perceive that person’s memory as better or more accurate than their own (Cialdini & Goldstein, 2004). Factors such as co-witness confidence (Goodwin, Kukuka & Hawks, 2013) and perceived encoding duration (Gabbert, Memon & Wright, 2007) have been shown to increase this influence. In terms of perceived encoding duration, participants have been shown to take on misinformation from their discussion partner more often when they believed their partner to have witnessed the event for longer than they had themselves (Gabbert, et al., 2007). This factor is forensically relevant - if a person believes their co-witness saw the crime for longer or at a more opportune angle, they may report erroneous information suggested to them due to a belief that their co-witness is more accurate than they are.

The final mechanism through which misinformation is thought to lead to memory conformity is through a source misattribution error. Lindsay (1994) defines source monitoring as a cognitive process by which people identify the sources of their memories and recollections. Source misattribution is an error that occurs when people incorrectly identify the source of their memories. In relation to memory conformity this manifests as one incorrectly attributing the source of the memory as themselves whereas the actual source is the co-witness. Johnson (1993, as cited in Lindsay, 1994) suggested that memory is a record of the cognitive processes that gives rise to our on-going experience. As such, there should be sufficient semantic detail in memories to act as cues to locate the true source of the memory. This process is typically automated but becomes more difficult and, by extension, cognitively effortful when there is a large number of stimuli and when the target and distractor stimuli are very similar. This is the case in memory conformity studies in which participants are exposed to misinformation related to specific details of an event they have just encountered.

In sum, there are important implications for the effects of discussion on eyewitness memory. One must consider the potential benefits of allowing witnesses to collaborate in order to create a more complete account against the potential risks of introducing misinformation, which may become part of a witness’ own final account.

***1.6 Alcohol, credibility and witness discussion.***

Research into the effects of alcohol on memory accuracy argues that although moderate alcohol consumption does not result in a less *accurate* account it may result in one that is less *complete* (Hagsand et al., 2013). Similarly, the literature on memory collaboration reports that group membership may lead to collaborative inhibition in which groups are unable to recall as much as a nominal group (Weldon & Bellinger, 1997). Thus, where group discussion and alcohol intoxication may be detrimental to the fullness of a person’s recall individually, a group of intoxicated witnesses may encounter both of these potentially detrimental phenomena due to the context of alcohol consumption often being a social event (Finlay, Ram, Maggs & Caldwell, 2012).

The presence of other group members may also ameliorate some of the effects of alcohol consumption on eyewitness recall. The *group-monitoring hypothesis* (Abrams, Hopthrow, Hulbert & Frings, 2006) suggests that group membership provides a protective mechanism for individuals. Groups are less susceptible to decrements in performance than individuals carrying out the same task. Thus, where intoxicated individuals are less complete and confident individually as a result of alcohol consumption, they may be less impaired in their recall when in groups. This has been identified in the domain of fatigue impairing performance, and on vigilance and engaging in risk. In situations where there may be impairment in performance, individual group members are motivated to overcome the impairment whilst also benefiting from the viewpoints of multiple sources within the group. This allows error pruning to occur before a decision is reached (Frings, Hopthrow, Abrams, Hulbert & Gutierrez, 2008). Furthermore, group members are able to recognise the level of impairment each member is exhibiting and use this when applying weight to each group member’s contribution. In a test of problem-solving ability under conditions of sleep deprivation and alertness, Frings (2011) found that sleep deprived teams showed the same level of problem-solving ability as both alert individuals and alert teams and greater ability than sleep deprived individuals. This latter finding lends support to the idea of group membership as a protective mechanism under conditions of impairment (e.g. fatigue).

A similar pattern has emerged with respect to the protective effects of group membership under conditions of alcohol impairment. Intoxicated groups have been shown to have greater accuracy than individuals on a quantity estimation task[[2]](#footnote-2) and have an increasing influence on accuracy for intoxicated participants (compared to those who were sober) (Frings, et al., 2008). Furthermore, group membership has protected its’ members against attraction to risk for groups whose members were intoxicated in laboratory (Abrams, Hopthrow, Hulbert & Frings, 2006) and field (Hopthrow, Randsley de Moura, Meleady, Abrams & Swift, 2014) studies. Thus, group membership improves accuracy and reduces attraction to risk for those who are intoxicated. As such, recalling in groups may overcome the decrements in confidence and completeness associated with individual recall when intoxicated. In addition, when considering the tendency to report PEI encountered from a co-witness, error pruning purported to occur in groups may lead to fewer participants reporting PEI due to informational influence. Participants in groups may exhibit greater vigilance when making the decision to report PEI encountered from their fellow group members. Intoxicated witnesses, according to the group monitoring hypothesis, may evaluate their group members’ level of impairment whilst discussing and thus, may protect themselves from reporting erroneous PEI. Similarly, research has demonstrated that informing participants of their discussion partner’s credibility prior to recalling an event together can serve to *inoculate* them from reporting of PEI (Andrews & Rapp, 2014). Therefore, under conditions of intoxication, group membership may be beneficial to overcoming the detrimental effects of alcohol consumption on eyewitness memory.

Whilst group membership may have protective effects, when one considers the potential for an eyewitness to report erroneous information they encountered during a discussion, intoxication may act as both a protective and detrimental factor. The mechanism of informational influence proposes that when encountering information from another witness, one must weigh up their own memory with that of their co-witness (Gabbert, Wright, Memon, Skagerberg & Jamieson, 2012). It is during this decision-making process that both accuracy and credibility are important. Deutsch and Gerard (1955) proposed that change through informational influence occurs due to a desire to have an accurate representation of the world - one takes on information from another person if they consider the other person’s memory to be more accurate than their own. This judgement as to whether a person’s memory is more trustworthy than one’s own is inherently tied to credibility. Research by Andrews and Rapp (2014) indicated that participants were less likely to rely on the input of a discussion partner deemed of low credibility compared to high credibility. Relatedly, Goodwin et al. (2013) showed that a participant would take on more information from a highly confident witness than a less confident witness. Interestingly, Numbers, Meade and Perga (2014) have shown that participants were just as likely to take on incorrect information from a witness who reported only incorrect information (100% incorrect) as they would from a witness who reported mostly correct information (33% incorrect). This effect, however, was reduced when participants saw their partners’ poor memory performance prior to the experimental task and when participants were asked to consider the source of their memories. In this instance, participants were less likely to attribute suggestions from the low credibility confederate as coming from the original source. When discussing with a low credibility partner, participants may exhibit greater vigilance regarding the information they put forward - they are better able to distinguish between information gained from the original source and that gained from a partner. It then becomes apparent that when assessing the memory of another source their perceived credibility is influential in making this decision. Therefore, previous research suggesting the perception of intoxicated witnesses as not credible (Lynch et al., 2013; Schuller & Stewert 2000) becomes informative for the tendency to report information from a co-witness. It suggests that beliefs about the effect of alcohol intoxication on credibility will mean that a person is less likely to trust the memory of an intoxicated person. Indeed, Thorley and Christiansen (2018) found that participants were less likely to take on erroneous information from a seemingly intoxicated confederate. Nonetheless, when discussion occurs between intoxicated co-witnesses each intoxicated person is also required to make an assessment of his or her own memory in order to decide whether to take on information from their intoxicated co-witness.

Laboratory studies on the effect of alcohol intoxication on eyewitness memory consistently show little to no impairing effect of alcohol on accuracy at moderate doses (La Rooy et al., 2013). However, there is a finding of lower confidence in those who have consumed alcohol (Crossland, et al., 2016). Research by Flowe et al. (2017) examined the confidence-accuracy relationship amongst intoxicated witnesses and found that sober witnesses reported higher confidence than those who had consumed alcohol. This finding suggests that participants who have consumed alcohol may have found the task harder or were showing an awareness of the perceived cognitive deficits associated with alcohol consumption. Thus, an intoxicated person, aware of the deficits to their own memory caused by alcohol intoxication, may regard their own memory as less accurate than their discussion partner’s. In this way during a discussion whilst intoxicated, the tendency for a witness to report information that they did not actually see will depend on the influence of how the co-witness is perceived in addition to how the witness judges the accuracy of their own memory. Therefore, when crimes occur in a social setting, the accuracy of a witness’ account will be influenced by the effects of intoxication on memory in addition to the potential risks of co-witness discussion. These risks are, in turn influenced by the perception of one’s co-witness as credible, which are based upon the beliefs about alcohol each person possesses.

**1.7 Thesis Questions**

The aim of the present thesis is to address the question of how intoxication and discussion affect eyewitness memory. More specifically, the research aims to address the following questions:

**Chapter Two:**

*How have memory conformity studies contributed to our understanding of normative influence, informational influence and source misattribution errors as mechanisms through which memory conformity occurs?*

Research into memory conformity has established three mechanisms through which it may occur. In order to understand how alcohol may influence memory conformity, it is necessary to elucidate on the relative roles of normative and informational influence and source monitoring. Chapter two presents a systematic review of the current memory conformity literature, with the aim of establishing how the aforementioned factors may lead to memory conformity, and the circumstances under which it is increased or decreased.

**Chapter Five:**

*Will a person be less likely to conform to the memory of an intoxicated person than a non-intoxicated person?*

This research question is concerned with understanding the nature of misinformation and whether perceiving the source as less credible will decrease a person’s susceptibility to taking on this misinformation. If this is the case, this points towards a social influence-based explanation of misinformation whereby the extent to which a person will take on misinformation depends on their perception of the limits of their own memory vs. their perception of what the other person remembers. The participant has to decide who the most trustworthy source of memory is - themselves or the other witness. Conversely, if participants take on misinformation despite perceiving its source as not credible it suggests that the misinformation is due to an error in source monitoring in which participants are unable to determine the source of their memory.

*Is the credibility of a witness related to their accuracy?*

Juror decision-making studies typically investigate perceptions of credibility of witnesses in particular circumstances. By examining perceptions of credibility when participants are exposed to written narratives by the witness with varying levels of errors after having seen the witness drink a soft drink or an alcoholic beverage, it will be possible to establish how the rating of a witness’ credibility is determined by (i) the number of mistakes they have made in their statement, and by (ii) their intoxication at the time of the event.

**Chapter six:**

*How does alcohol affect susceptibility to misinformation?*

Witnesses who discuss the crime together are at risk of reporting information gained from their co-witness in their own account (Paterson & Kemp, 2005; Skagerberg & Wright, 2008). Studies investigating misinformation have found a number of factors that may influence the tendency of witnesses to take on information from their co-witness including perceived encoding duration (Gabbert, et al., 2007) confidence (Thorley & Kumar, 2016) and visual acuity (French, et al., 2011). The research adds to the breadth of studies investigating memory conformity by examining how alcohol influences the extent to which a person will take on erroneous post event information in a discussion with a co-witness after viewing a mock crime. More specifically, whether intoxication will make participants more prone to report this information as a function of using normative and information influence processes as well as source monitoring.

**Chapter Seven:**

*Are there beneficial effects of collaboration for intoxicated witnesses?*

While studies have indicated the potential for witnesses to take on misinformation encountered from a discussion partner, collaboration may also have benefits. Therefore, the effect of exposure to correct information from a virtual co-witness on the recall of an intoxicated witness was examined.

*Does intoxication affect the susceptibility to misinformation in a naturalistic setting?*

Laboratory studies enable the researcher to control the approximate level of intoxication participants’ reach. However, such doses are often low and lack ecological validity in comparison to the drinking behaviour observed in real life settings. Study three took place in a field setting enabling the examination of the susceptibility to misinformation under a range of alcohol doses in situ.

**Thesis Structure**

This thesis is presented in eight chapters. Chapter two presents a systematic review of the memory conformity literature, addressing the relative contributions of normative influence, informational influence and source misattribution in witnesses’ reporting information gained from a discussion partner as part of their own account. This will establish the theoretical rationale for the assertion that discussion may reduce the accuracy of an eyewitness’ account.

Chapter three will move on to explore the potential for alcohol to act as a source of distortion in eyewitness memory. It will appraise theory relating to people’s motivations to consume alcohol (including the role of alcohol expectancies), as well potential mechanisms through which alcohol may influence behaviour as articulated through Alcohol Myopia Theory.

Chapter four will integrate alcohol and eyewitness memory research to provide a contemporary review of both laboratory and field research examining the effects of alcohol on eyewitness testimony.

Three empirical chapters will then be presented. The first addresses whether participants are more likely to take on misinformation from a sober witness as compared to an intoxicated witness. The second study combines the memory conformity paradigm (Gabbert, Memon & Allan, 2003) with an alcohol administration study to establish how alcohol intoxication affects the tendency to report misinformation in a dyadic discussion. Finally, the third study investigates the tendency of intoxicated participants to report misinformation in a field setting. Conclusions and implications of the findings are then presented in the final chapter in light of the thesis questions posed.

**Chapter Two: A systematic review of the memory conformity literature**

**2.1 Eyewitness testimony**

Eyewitness memory is one of the most compelling pieces of evidence in a criminal case, with most police respondents reporting that eyewitnesses typically provide the major leads to an investigation (Kebbell & Milne, 1998). U.S. courts still typically recognise a presumption of reliability regarding eyewitness testimony, which is consistent with jurors’ beliefs regarding confidently reported testimony (Thompson, 2008). However, during the process of a crime occurring, there are multiple instances where variables that cannot be controlled by policy and procedure could impact upon the testimony of an eyewitness. These are known as *estimator variables* (Wells, 1978). The task of being an eyewitness involves first seeing the crime. During this process it is possible to encounter issues that reduce the accuracy of an eyewitness’ testimony. This includes the presence of a weapon, time of day, and the amount of time the witness viewed the crime for. Thompson (2008) purports how human memory was perceived by many to function like a video recorder, thus encoding a veridical account of events and storing it in memory. However, this is not the case, the human brain is selective in what it perceives. Bartlett (1932, as cited in Loftus, 1975) stated how human memory is inaccurate, and remembering can be distorted by factors such as social and cultural norms and expectations. Thus, a witness may encode an incomplete account of the event (Loftus, 1979). Once said event has been encoded, the witness is then required to retain the information. During this time, memory starts to fade, however, a witness may also encounter new information relating to the memory during this period that may be an additional source of memory distortion (Wells, 2002).

Eyewitness testimony is prone to fallibility; research from the innocence project indicates that mistaken eyewitness memory is one of the leading causes of wrongful convictions (The Innocence Project, 2019).

**2.1.2 Understanding the co-witness.**

As previously outlined, the social nature of alcohol consumption means that crimes often occur when in the presence of others. Given that 58% of surveyed witnesses have reported discussing an event with a co-witness (Skagerberg & Wight, 2008) it becomes apparent that the presence of another person may be a cause of distortion to eyewitness memory. The previous chapter has alluded to the role of credibility and the perception of an intoxicated witness in contributing to the likelihood of discussion between co-witnesses resulting in misinformation being reported by both parties. In order to understand how alcohol may influence the accuracy of eyewitness testimony when multiple witnesses view an event, it is imperative to understand the theoretical mechanisms underpinning why discussion amongst witnesses may impact upon an eyewitness’ testimony. When witnesses discuss a crime, there is the potential for them to report information received from another source even though they did not see the event (Paterson et al., 2012).

The next section of the thesis will present a systematic review of the literature on memory conformity. This review aims to identify how research using various memory conformity paradigms has contributed to the understanding of normative influence, informational influence and source misattribution as mechanisms through which memory conformity may occur. It seeks to understand how and why memory conformity occurs, and the situations in which it may increase. In so doing, it will be possible to first establish the theoretical foundations of memory conformity. From this, it will be possible to understand how alcohol may contribute to the accuracy of eyewitness memory when multiple witnesses are present.

**2.2 The memory conformity effect and paradigm**

Memory conformity research has adapted the original misinformation paradigm to include misinformation that is passed on through face-to-face interactions with dyads and small groups. The aim of this development was to make the means of receiving misinformation more applicable to a social context (Gabbert et al., 2007). Schneider and Watkins (1996) introduced face-to-face interactions as a means of encountering misinformation by asking participants to recall previously encountered items one at a time in the presence of another participant. This methodology was then further modified to include exposing pairs of participants to two video versions of the same event after which they were required to discuss what they remembered such that each participant exposed the other to information that was erroneous (Gabbert et al., 2003). The type of stimuli used varies considerably and includes videos of mock crimes (Paterson, Kemp & Forgas, 2009), picture slideshows (Goodwin et al., 2013), and accounts by confederates (Meade & Roediger, 2001). After the ‘social’ encounter, participants usually engage in an individual recall session, which allows one to record and subsequently analyse the number of erroneous items participants recall (Gabbert, Memon, Allan & Wright, 2004). This is important as it identifies whether participants’ memory has been changed by the socially encountered information, or whether they were conforming to their partner during the discussion due to group pressure.

Memory conformity is said to occur as a result of three possible candidate mechanisms. The aim of this review is to evaluate the existing literature on its contribution to our understanding of these mechanisms.

**2.2.1 Normative Influence.**

Normative influence, as a motivation for conformity, refers to the desire to gain social approval from others (Deutsch & Gerard, 1955). Observing the actions of others influences one’s own behaviour because they are driven to behave consistently with what they perceive to be social norms (Nolan, Schultz, Ciladini, Goldstein & Griscevicius, 2008). The normative route of social influence involves a person weighing up the cost of disagreeing with the cost of making an error. Such ‘costs’ of making an error represent the perceived social costs of disagreeing with a member of the group you are in (Deutsch & Gerard, 1955). Typically, this type of conformity is seen when the ‘cost’ of disagreeing is high (e.g. when responses are made in front of the other person or publicly). For example, manipulating the relationship between co-witnesses (i.e. friends vs. strangers) has been shown to increase memory conformity due to the increased cost of disagreeing with a person with whom you are well acquainted and invested (French, Garry & Mori, 2008). In general, the effects of normative influence are not typically long lasting and seem to represent an outward compliance as opposed to an enduring memory change (Gabbert et al., 2007). In contrast, informational influence is associated with a person taking on board new information as part of their own beliefs about the world (Cialdini & Goldstein, 2004) (See Figure 2.1).

A close up of a map

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*Figure 2.1*: Pathways to memory conformity in experimental studies (Wright, Memon, Skagerberg & Gabbert, 2009).

**2.2.2 Informational Influence.**

Informational influence is characterised by one’s motivation to form an accurate interpretation of reality and to behave accordingly (Cialdini & Goldstein, 2004). Individuals conform to another’s responses due to a belief that such responses are more indicative of the true state of the world. In other words, the other’s response is trusted as more accurate than one’s own. Festinger (1954) noted that social processes are motivated by a person’s desire to be correct as well as to evaluate one’s ability. In the context of the social world, this is best achieved by comparing one’s own abilities to others. In a memory conformity experiment, informational influence would present itself as the participant perceiving their co-witness’ memory as more accurate than their own. Research shows that participants are more likely to conform to a highly confident co-witness (Goodwin, Hannah, Nicholl & Ferri, 2017). Furthermore, by manipulating perceived encoding duration (Gabbert et al., 2007) participants who believed their discussion partner saw the stimulus for twice as long as they did would typically incorporate information from their discussion partner in their account. Conversely, participants who were told their partner had encoded the stimulus for half as long as they did, took on PEI less often. For both types of influence, people knowingly took on information received from the other person, either through perceived social pressure or a belief that the information was correct. In contrast, source-monitoring explanations suggest that during recall, people have great difficulty in locating the true source of their memories (Johnson, 1993).

**2.2.3 Source Misattribution.**

A final explanation for the mechanism underlying memory conformity is source misattribution (Gabbert, et al., 2012). Source misattribution errors occur when a person incorrectly attributes the source of a memory, for example an eyewitness may falsely identify an individual from a line-up because they believe that they have seen him at the crime scene, but they have actually only seen him in the mug shot book presented earlier at the police station. The witness wrongly misattributes the feeling of familiarity to having seen the person commit the crime. Source monitoring refers to the attempt to accurately locate the source of that memory. This is achieved by looking at the variety of different circumstances that collectively specify the conditions under which the memory was acquired and include spatial, temporal and auditory characteristics (Johnson, 1993). Research has studied the potential to increase accurate source monitoring through warnings as to the potential presence of erroneous information. For instance, Higham, Blank and Luna (2017) compared general and specific post-warnings. A post-warning informs participants after the exposure to misinformation, that some of the information they have received may have been inaccurate. A general post-warning was conceptualised as one that stated that there was misinformation present and a specific post-warning was one that identified the particular items for which participants received erroneous information. Findings indicated no benefit of a general warning on misattribution errors, but specific warnings reduced the misinformation effect. The finding that general warnings were not beneficial is consistent with Johnson (1993) who stated that the likelihood of making a source monitoring error increased when the distractor and target stimuli were more similar. Thus, a general warning is not sufficient to differentiate the source of two highly similar stimuli; whilst a specific warning enables greater differentiation (Higham et al., 2017).

**2.2.4 The Present Review.**

In their review Wright, Memon, Skagerberg and Gabbert (2009) outlined the three mechanisms involved in memory conformity and also proposed that advances in our theoretical understanding need to provide an account that differentiates between these mechanisms and employ manipulations that independently affect these mechanisms. As such, the present review will outline the extent to which memory conformity studies have contributed to the understanding of how either normative influence, informational influence or source monitoring errors lead to memory conformity.

A simple comparison of the results of eyewitness research is often unhelpful, as differences in outcome can often be attributed to differences in methodology (Chae, 2010). This notion is particularly applicable to memory conformity research, which includes diverse participant populations, such as children (Principe & Ceci, 2002), and the elderly (e.g. Gabbert et al., 2003), a variety of stimuli, including pictures (Meade & Roediger, 2001), videos (Zajac & Henderson, 2009), and accounts by confederates (Davis & Meade, 2013), covering neutral as well as emotional content (Soleti, Wright & Curci, 2017), and short as well as longer retention intervals. Paterson, Kemp and Forgas (2009) for example used a 20-minutes and a 2-week delay and Schwartz and Wright (2012) tested participants’ memory immediately or after a 2-day delay. Therefore, it is necessary to investigate the way that memory conformity is defined and measured in different studies, and in what ways the experimental methods used to test memory conformity are similar or different.

The present review has not included so called ‘post-warning’ studies. These studies examine the role of warning in reducing the amount of source monitoring error and thus reducing the effect of memory conformity. As such it would not be appropriate to include them in a review of how discussion may lead to memory conformity. Also, a comprehensive meta- analysis on the effect of post-warning studies has previously been conducted (Blank & Laurney, 2014).

**2.2.5 Scope and aims of the review.**

This chapter presents a systematic review of the memory conformity literature with respect to two research questions: (i) *How is memory conformity measured?* A criterion of expert evidence in court proceedings requires information to be reliable and valid, as well as being obtained through scientific methods (Kassin, Tub, Hosch & Memon, 2001). Thus, in order to establish the utility of memory conformity research for the field of eyewitness testimony, it is necessary to understand the diversity of methods used. (ii) *How have studies of memory conformity contributed to our understanding of normative influence, informational influence and source monitoring as mechanisms through which memory conformity occur?* As a review of mature literature, we also have an opportunity to look at the balance of evidence supporting different explanatory mechanisms. Here, the focus on these three processes which have received considerable investigation allows us to situate the effect within social (normative) and social cognitive (informational influence and source misattribution) contexts.

**2.3 Method**

**2.3.1 Inclusion criteria**

Inclusion criteria for studies in the present review were: (i) Misinformation was socially encountered such that erroneous PEI was introduced in a face-to-face interaction with a genuine participant or confederate. This definition included partner discussions as well as group recall but did not include written narratives from ‘previous participants’ or false interactions with ‘virtual’ participants.

Also included were dyadic discussions with participants who viewed slightly different versions of the same sequence of events, as well as confederate studies where participants were asked to respond to recognition questions after the confederate who would respond incorrectly (i.e. adaptation of the Asch (1951) experimental paradigm). Studies that induced misinformation through non-social means such as a written narrative were not included unless they were used as a control condition. (ii) Inclusion of a control condition such that the degree of misinformation taken on by participants could be compared to a no misinformation condition. Studies were included if they used a ‘no discussion’ control condition or if, in the case of confederate studies, they used the occasions where the confederate responded correctly as the ‘no misinformation’ condition; (iii) Participants over the age of 18. Research indicates that children are especially prone to suggestibility when being interviewed with suggestibility inducing techniques (Friedman & Ceci, 2000) and there is also an effect of age on proneness to immediate suggestibility in children, which disappears, with the addition of a delay (Vagni, Maiorano, Pajardi & Gudjonsson, 2015). As such a number of additional factors could contribute to the presence of memory conformity effects in children.

Papers were identified through an extensive search of Web of Knowledge, Science Direct and Scopus online databases. Searches were not limited by language. Searches were also not limited by a specific temporal period and therefore included all published work from the database up until the point of search (Web of Knowledge 1900-2017; Science Direct 1996- 2017; Scopus 1996-2017). Searching commenced in May 2017 and concluded in August 2017.The following search terms were used to general an initial pool of studies: “memory conformity” “misinformation” “eyewitness memory conformity” “false memories” “creating false memories” “social contagion” to identify an initial pool of potential studies (n=1,504). At this stage, studies were excluded on the basis of relevance by an examination of titles and abstracts, which led to a pool of 31 studies. The reference lists of relevant studies were then considered to identify further studies that met the inclusion criteria, which resulted in a sample of total studies that met the inclusion criteria (n = 40). In order to reduce publication bias, after an extensive search of both online databases and reference lists of specific papers, emails were sent to authors who had produced multiple papers that met the inclusion criteria to appeal for any unpublished work of relevance. This yielded a further two papers. Worldcat and Google scholar were also utilised in order to search for so called ‘grey literature’ including dissertations and theses of relevance to the review which led to a further six papers.

This procedure led to an initial pool of 48 papers that were then reviewed for adherence to the inclusion criteria. All full text papers were reviewed independently by two reviewers on the basis of pre-determined inclusion criteria as per the PRISMA recommendations for systematic reviews (Liberati et al., 2009). There was an initial disagreement rate of 17% between reviewers. After a discussion of the inclusion criteria, studies on which the reviewers were conflicted were discussed according to the inclusion criteria and a consensus was reached. Studies were excluded on the basis of using non-social means of misinformation, as well as those including post-warnings. This led to a final sample of 25 relevant papers (34 studies), which adhered to the inclusion criteria A screenshot of a cell phone

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*Figure 2.2*: Flow diagram of the review process.

**2.3.2 Data Collection**

A bespoke data extraction form was developed based on the Cochrane Review Group’s data extraction template (The Cochrane Collaboration, 2017). The data extraction forms were completed independently by one reviewer and then checked by a second independent reviewer. Any disagreements were then resolved by discussion between the reviewers for all included papers. The initial data extraction form included information on the sample, the use of a control condition, the intervention, the outcomes measures and the results. It was trialled on five papers and subsequently adapted to include whether the study included a ‘post-warning’, which told participants that they may have been exposed to incorrect details during their co-witness interaction.

**2.3.3 Study Characteristics**

The sample of studies included in the present review was generated from 25 papers published between 1996 to 2016. Two papers that met the inclusion criteria were published in the 1990s and 11 published post 2010. This demonstrates how the level of research interest in memory conformity has grown substantially over the last 20 years as the infallibility of eyewitness testimony in criminal proceedings has come into question.

The final 34 papers had a total sample of 2,532 participants all aged over 18 years of age and comprised primarily of university students. Fourteen of the studies included the allocation of an experimental confederate. The source of misinformation in these confederate studies was generated from (i) erroneous information from the confederate during a discussion with the participant using a pre-determined set of questions and (ii) where participants were asked to complete a recognition test with their (confederate) partner the confederate would respond either accurately or erroneously according to the schedule to expose the participant to either erroneous post-event information or no misinformation respectively.

In the review stage, each paper was assessed on its allocation process to examine how participants were assigned to groups. In non-confederate studies (n=20) seven studies specified that participants were randomly allocated to either the control or experimental condition. Due to the nature of the manipulation employed six studies used quasi or non-random participant allocation procedures, whilst seven studies did not specify the nature of the allocation procedure.

**2.4 Results**

The results of the present review will be discussed in accordance with two key research questions: Is there a consistent methodology to research memory conformity effects? How have studies contributed to our understanding of normative and informational influence and source monitoring as mechanisms through which memory conformity occurs?

**2.4.1 How is memory conformity measured?**

Although there were multiple experimental procedures used by the studies included in this review, a number employed the same or similar procedures. Seven studies used the MORI technique, (French et al., 2008) whereby two videos were superimposed on each other and presented on the same screen to two participants. Participants then wore polarising glasses so that they could only view one of the two videos, whilst they were under the impression that they were viewing the same video. Thus, during the discussion phase, participants unknowingly provided each other with misinformation. An experimental method developed by Roediger (2001) was employed by six studies. This method involved presenting household scenes to participant-confederate pairs who were later asked to recall the items present in the scene. The confederate recalled erroneous items from a pre-determined list. These items were classed as high and low ‘expectancy’ for the scene i.e. the items differed in the likelihood of one expecting to find the item in the particular scene. All of the studies using this procedure found a social contagion effect whereby participants subsequently recalled this false information. They also all reported an effect of expectancy such that high expectancy items (ones that were highly likely to be present in the scene) were more likely to be falsely recalled than low expectancy items (items which were less likely to be present in the scene). One study did not utilise the Roediger (2001) stimuli but used the same classification of high and low expectancy on a word list experiment and found the same effect (Andrews & Rapp, 2014).

As well as particular experimental techniques utilised, studies also differed in the stimuli they employed. Twelve studies used a video stimulus, presenting a video of a mock crime. Gabbert et al. (2003) devised a novel way of exposing participants to misinformation where one of two versions of the same crime event were presented to participants in which an opportunistic theft was seen from one angle but not the other. This results in participants exposing each other to misinformation during discussion. Three studies used wordlists as stimuli whereby participants and a confederate studied a list and made new/old recognition judgements in a later recall task. One study used forensically relevant words consisting of names relevant to the OJ Simpson trial (Shaw et al., 1997) and the others were not forensically relevant (Schneider & Watkins, 1996). This demonstrates the variability within studies in the field in that there is a difference in the extent to which the materials utilised aimed to be analogous to a real-life forensic context.

Three studies used other picture presentation stimuli. In these studies participants would recall items from the scenes in the presence of either another participant, or a confederate. Thus, memory conformity could be measured through how the order of responding influenced the response given. Of these there were a mixture of household scenes in an adaptation of the Roediger paradigm (Meade & Roediger, 2001) a power point presentation of a crime, and images of cars (Goodwin et al., 2013; Kieckhafer & Wright, 2015; Wright et al., 2000).

**2.4.2****How have studies of memory conformity contributed to our understanding of normative influence as a mechanism through which memory conformity occurs?**

**2.4.2.1 Forced consensus.**

Normative influence represents the desire to be liked, and to behave consistently with social norms (Deutsch & Gerard, 1955). The presence of normative influence can be identified by the experimental procedure utilised. Studies (n = 11) used a forced consensus decision during the discussion phase, meaning that participants had to settle on an agreement, regardless of any dispute. French et al. (2008) found dispute occurred for 51% of items suggested in romantic couple pairs and 46% for stranger dyad discussions, demonstrating the presence of normative influence when settling on a consensus decision. Furthermore, in Garry, French, Kinzett and Mori (2008) 85% of participants who agreed to report misinformation as their answer during the dyadic discussion also incorporated it in their own recall. However, 15% did not, indicating that they agreed to ‘go along with’ the suggestion posed by their dyad partner initially, but reverted back to their own answer when no longer under any pressure to conform. Therefore, memory conformity through normative influence may occur when recall is carried out jointly, as normative influence is increased when people experience greater desire to affiliate with the group (Griskevivius et al., 2006).

**2.4.2.2 Order of Responding.**

Three studies investigated how order of responding would influence memory conformity (Goodwin et al., 2013; Schneider & Watkins 1996; Shaw et al., 1997). Participants were significantly influenced by their discussion partner’s response. When the confederate responded with a false item, the participant was significantly more likely to report said false item than if they responded first. The focal concern of normative influence is liking, as such, when a person’s responses were made in the presence of other group members, conformity would increase (Schultz, Tabanico & Rendón, 2008). Goodwin et al. (2013) found that during turn taking recall, if the confederate responded with misinformation, participants reported 2 times more misleading information.

**2.4.2.3 Perceived Credibility.**

Whilst Goodwin et al. (2013), found that order of responding may influence the tendency to report misinformation, they have also identified the importance of the credibility of the source in leading to memory conformity. When misinformation was introduced; participants were more likely to report the false suggestions from a highly confident confederate. Normative influence is brought about as a result of one’s *perceptions* of others (Schultz et al., 2008) as such, a highly confident confederate is more likely to induce conformity. However, at individual recall, co-witness confidence, and co-witness influence had no significant effect on the tendency to report misinformation. Thus, it demonstrates that the costs of disagreeing with a highly confident confederate were high, however when no longer under normative pressure, participants reverted to their original responses. Similarly, Schneider and Watkins (1996) found an effect of confederate response on participants’ immediate responses when the confederate was required to respond with their confidence in their recognition judgement. Participants’ own confidence may also provide the potential to resist conforming to the memory of another. Hirokawa, Matsuno, Mori and Ukita (2006) found that participants who scored more highly on a masculinity scale were significantly less likely to concede to others’ misinformation during discussion than those who scored lower. Additionally, those who scored highly on masculinity reported higher confidence in their own responses. These findings suggest that, when participants are highly confident in their own memories, and therefore perceived their own memory as credible, they are willing to resist the social pressure to conform to misinformation during a group discussion. Therefore, credibility is important in leading to memory conformity in two ways. That is, the perception of one’s discussion partner(s) as credible or not, and the perception of one’s self as credible.

**2.4.2.4 Summary.**

Normative influence purports that people conform to the suggestion of others due to the perceived social pressures to do so. Thus, participants are choosing to report information despite believing that it is not accurate. Wright et al. (2009) suggest that a person has to weigh up the costs of disagreeing with the costs of making an error. These ‘costs’ refer to perceived social costs. Studies requiring forced consensus from participants (French et al., 2008) have created a norm of agreement and as such, to disagree with the misinformation presented by one’s partner would be to break this social norm. Thus, forced consensus studies demonstrate the importance of adherence to social norms in leading to memory conformity. Moreover, in experiments in which participants make their responses after a confederate, the incidence of memory conformity is also demonstrative of the role of social norms. That is, if a participant chose not to report misinformation, they would be choosing to disagree with the suggestion of their partner. Thus, when participants discuss an event together and must reach a joint decision on the most accurate response, memory conformity may be increased due to the perceived pressure to conform to another’s response. Equally, when recalling an event in the presence of another person, the order of responding may increase memory conformity. That is, if a person makes a false suggestion, the person who recalls subsequently is more likely to incorporate this suggestion in his or her own recall. Such studies demonstrate that when in the presence of others, memory conformity may occur due to the perceived normative pressure to agree with one’s partners. However, it is not able to provide a complete theoretical account of memory conformity as this effect is not enduring. Once able to, those who have felt normative pressure to conform would revert back to their own recall of the event. Therefore, the concept of normative influence may only provide an explanation of why memory conformity occurs when in the presence of others. It is unable to explain why participants report misinformation from a discussion partner in the absence of normative pressure to do so.

**2.4.3 How have studies of memory conformity contributed to our understanding of informational influence as a mechanism through which memory conformity occurs?**

**2.4.3.1 Credibility.**

Informational influence refers to the desire to be correct and form an accurate interpretation of the world (Deutsch & Gerard, 1955). People take on the responses of others when they perceive them to be more accurate than their own memory of an event. Therefore, in addition to perceived credibility influencing normative influence, manipulating the perceived credibility of one’s discussion partner also brings about conformity due to informational influence processes.

Andrews and Rapp (2014) manipulated credibility using a confederate study in which participants were told that their partner had high credibility, low credibility or were uninformed as to their credibility. The findings demonstrated that participants who recalled with a high credibility partner showed significantly greater false recall than those who recalled with a low credibility partner. Interestingly, those who recalled with a low credibility partner showed lower false recall than those who were uninformed as to their partner’s credibility. Thus, discussing with a partner whose memory ability is believed to be poorer than your own can actually *protect* a person from memory conformity due to the mechanism through which informational influence occurs. That is people take on information from another source if they believe it to be correct (Gabbert et al., 2012).

In studies manipulating age, participants were more likely to include PEI given by a young adult confederate and were likely to discount PEI provided by an older adult (Davis & Meade 2013; Gabbert et al., 2003). Participants assumed younger adults to be more correct than themselves whilst discounting older adults as less correct (an informational influence effect). Cialdini and Goldstein (2004) proposed that informational influence results in a longer lasting memory change to information presented by another person than that found as a result of normative influence

One study used a comparatively unique experimental manipulation by instructing participants to complete an ego depletion task prior to post event discussion with a confederate (Harkness, Paterson, Denson, Kemp, Mullan & Sainsbury, 2015). In this context, ego depletion referred to a temporary reduction in self-regulatory capacity. This self-regulation is involved in executive function and processes including working memory and attentional control (Harkness et al., 2015). Participants were required to complete a ‘crossing the ‘e’s task’ whereby after one page of completing the task, participants in the ego depleting condition were then given much more complex instructions. This required them to break the previously learned instructions and exert self-regulation to carry out the more complex version of the task. The findings demonstrated that ego depletion had no significant effect on the tendency to report misleading post event information. However, ‘ego depleted’ participants reported significantly fewer accurate details gained from their discussion partner than did participants with no ego depletion. As such, ego depleted participants were susceptible to the negative effects of discussion, but did not benefit from the positive, accurate informational influence.

**2.4.3.2 Individual recall.**

Asking participants to complete the recall phase individually (i.e. not in the presence of the co-witness or confederate) allowed experimenters to measure a more enduring recall of the memory consistent with informational influence. Multiple studies (Bodner, Musch & Azad, 2009; Zajac & Henderson, 2009; Soleti, Wright & Curci, 2017) included an individual testing phase, finding that participants typically incorporated PEI in their individual accounts despite no longer being under any pressure to conform. Twenty-six studies used individual recall conditions. This means that participants were recalling whilst under no pressure to publicly conform to their partner and as such any conformity seen must have been due to a perception that the misinformation was correct (Deutsch & Gerard, 1955). French et al. (2008) used the MORI technique as a method of exposing pairs of participants to slightly different versions of the same sequence of events. In the initial discussion phase, participants were asked to respond to questions with their discussion partner, and then subsequently completed a 40-item recognition questionnaire individually. The findings indicated that 85% of participants who agreed to use misinformation in response to a discussion question also used misinformation in their own individual recall. If participants disputed the misinformation at discussion, they were less likely to include it at test. Whilst participants that agreed the misinformation item was correct at discussion, were significantly more likely to include it at test. Thus, the inclusion of an individual recall condition allowed an examination of the extent to which participants would incorporate misinformation in their accounts when no longer under normative pressure to do so. Furthermore, by comparison of discussion and individual recall responses, it was possible to establish that when participants agreed to the misinformation initially, and when they outwardly reported it as correct, memory conformity was increased (Cialdini & Goldstein, 2004).

In an examination of the propensity of post event information to impact upon domains other than the initial context in which the information was introduced, Zajac and Henderson (2004) used both a line-up ID task and an individual recall test. After being exposed to misinformation via a confederate discussion about the target’s eye colour, participants were significantly more likely to erroneously report PEI when asked about the target’s eye colour. Furthermore, they were significantly more likely to incorrectly choose a blue-eyed suspect out of a line-up. Importantly, the majority of participants prior to exposure to misinformation could not recall the real eye colour of the target. Thus, participants took on the suggestion from the confederate in the absence of knowledge of their own. Informational social influence is especially likely in circumstances in which the situation is somewhat ambiguous (Girskevicius et al., 2006). Importantly this study demonstrated that the informational influence of one person’s suggestion may impact upon verbal testimony and line-up identifications.

**2.4.3.3 Relationship to dyad partner.**

Studies (n = 3) either manipulated relationship to dyad partner (French et al., 2008; Hope, Ost, Gabbert, Healey & Lenton 2008) or used groups of participants who were all known to one another (Mori & Mori, 2008). Hope et al. (2008) found that friends and couples were more susceptible to reporting misinformation than stranger dyads. Furthermore, they were more likely to make unfounded attributions of guilt after discussion than those in the stranger dyad condition. Importantly for the understanding of informational influence in memory conformity, participants who had a previous relationship with their dyad partner provided significantly more positive evaluations of them. When in stranger pairs, 79% of participants believed themselves to be more accurate than their partner, compared to 46% of pairs who were previously acquainted. Therefore, consistent with the idea of informational influence as a desire to be accurate and correct, those who were in stranger dyads in general believed themselves to be more accurate than their partner, and thus, were less susceptible to reporting misinformation than those who were acquainted with their dyad partner. Similarly, French et al. (2008) found couples were 27 times more likely to be misled than stranger dyads and were four times more likely to be misled if they did not dispute their partner’s suggestion in the discussion phase.

**2.4.3.4 Summary.**

Informational influence purports that people conform to the opinion of others due to a belief that the information is correct. As such, as a theoretical explanation of memory conformity it asserts that participants are knowingly reporting information gained from their discussion partner in their own accounts. Consistent with this notion, memory conformity studies have found that perception to misinformation was greater when perceived credibility increased (Andrews & Rapp, 2014). Additionally, when discussion partners were known to each other, the reliability of one’s self, compared to one’s discussion partner decreases (Hope et al., 2008) leading to greater susceptibility to misinformation as a result, when compared to dyads comprised of strangers. These findings lend support to the idea that memory conformity occurs as a result of a person weighing up their belief in their own memory with their belief in their partner’s memory. When one considers both social influence mechanisms proposed in this review, informational influence may provide a more compelling account of the ‘candidate mechanism’ through which memory conformity occurs. The majority of studies included in the systematic review included individual recall conditions (n = 26), therefore it can be asserted that, in most cases, memory conformity occurred when no longer under social pressure to do so. Therefore, it is unlikely to be as a result of normative influence. However, it is not possible to assert that informational influence presents the only convincing explanation of memory conformity. This is due to the fact that the evidence for this theoretical explanation comes from studies that have utilised specific methodology. That is, when an individual recall condition is used, and when one’s perception of their memory versus their partner’s is manipulated. Additionally, whilst studies using an individual condition can demonstrate that participants report memory conformity when under no normative pressure to do so, they can not necessarily assert that participants are doing so knowingly. That is, participants could be unknowingly engaging in memory conformity as a result of a source misattribution error.

**2.4.4 How have studies of memory conformity contributed to our understanding of source misattribution as a mechanism through which memory conformity occurs?**

**2.4.4.1 Expectancy.**

Of the present studies, seven manipulated the expectancy of the misinformation items. All of the studies that manipulated expectancy used the Roediger household scene paradigm, in which participants would recall items from household scenes with a confederate (Roediger, Meade & Bergman, 2001). *Expectancy* in this instancereferred to the salience of the item, that is, how likely the misinformation item would fit in to the household scene being recalled. In all of the studies that manipulated expectancy (Andrews & Rapp 2014; Davies & Meade 2013; Numbers, Meade & Perga 2014; Roediger et al., 2001; Szpitalek, Polak, Polczyk & Dukala, 2015) participants were significantly more likely to recall high expectancy rather than low expectancy contagion items. The increased likelihood of falsely recalling items that were more consistent with one’s schema of the given context is indicative of a source monitoring error. The ability to monitor the source of the information one is recollecting requires an assessment of the different characteristics of a memory to identify the distinctions between one or more memories and thus correctly identify its source. However, the ability to source monitor is more difficult when the target and false memory are highly similar (Johnson, 1993). Additionally, participants may adopt a ‘familiarity’ criterion regarding their source monitoring decisions and thus, because the misinformation has previously appeared, it satisfies the criteria to be incorporated into their recall (Lindsay, 1994). The present studies demonstrated that when a misinformation item was of high salience to the given context, memory conformity was more likely than when the item was of lower salience. While expectancy has been shown to influence memory conformity in isolation, studies have also examined additional factors that may interact with expectancy to influence memory conformity.

One such study (Roediger et al., 2001) manipulated encoding duration in addition to expectancy. Their findings demonstrated that high expectancy items were significantly more likely to be recalled, and this effect was greater for participants who viewed the scene for a shorter period. The shorter period of encoding may mean that participants were more vulnerable to the retroactive interference provided by the collaborative recall phase (Dewar, Cowan & Della Sala, 2007) resulting in greater reporting of high expectancy misinformation items.

**2.4.4.2 Delay.**

Four studies in the present review utilised a delay procedure in their experiment. Paterson et al. (2009) used an experimental paradigm in which participants either had a 20-minute delay between encoding the initial event and being exposed to misinformation prior to recall, or a two-week delay. The findings indicated that the delay period had no effect on accuracy on items for which participants had not been misled. However, participants were significantly less accurate, and less confident on items for which they had been misled after a two-week delay. The delay period may have caused the original memory trace to decay (Ricker, Vergauwe & Cowan, 2014) thus leading to participants being more vulnerable to misleading post event information. Furthermore, because of the decay to the original memory, it would be harder for participants to distinguish the source of the information thereby leading to greater reporting of misinformation.

Research by Shaw et al. (1997) similarly used a delay period, however of 48 hours. Participants received either correct or incorrect information from a confederate. They were asked either neutral, suggestive correct or suggestive incorrect questions immediately after receiving this information. The results showed a significant effect of information type, such that participants were significantly more accurate for questions that referred to correct information gained from the co-witness. After 48 hours, participants returned and were only asked neutral questions. However, the previous pattern of results remained. Participants were significantly more accurate for items pertaining to correct co-witness information, and significantly less accurate for items pertaining to incorrect co-witness information, despite no question manipulation being used. The consistency of these findings may reflect the fact that after the initial encoding of information, participants had been exposed to misinformation, and then reported this misinformation in response to leading questions about the initial material. Thus, in the delayed recall, participants may have had difficulty locating the source of the information between the initial event, the co-witness information, and the first recall condition due to their similarity (Johnson, 1993). This led to an effect of co-witness information after a delay under conditions of neutral questioning. However, this study did not include a remember/ know question or ask participants to make a source monitoring decision. Therefore, such an explanation is tentative given the information available.

Mori and Mori (2008) asked participants to indicate the source of the information they reported one week after taking part in a triad group discussion in which they were asked to reach a group consensus on each discussion item. Conversely to the finding described above, Mori and Mori (2008) demonstrated that participants reported the group decision one week later in their individual recall. Twenty-five participants did so ‘consciously’ i.e they were aware that the information they were reporting came from their group’s suggestions. However, 13 did so unconsciously, i.e. after reporting the information came from their own memory. Thus, a minority of participants were erroneously attributing the source of their memory to themselves as opposed to their group members. Consistent with Paterson et al. (2009) this may have been as a result of memory decay due to the delay period, which made accurate source monitoring more difficult.

**2.4.4.3 Remember/Know.**

Multiple studies (n = 7) asked participants source-monitoring questions at the end of the experiment. Of these, six were remember/ know judgement tasks and one used a source attribution questionnaire (Jack et al., 2014). A remember/ know question asks participants to state whether they can clearly recollect seeing the item, i.e. ‘remember’ it, or whether they cannot recollect seeing the item but ‘know’ that it was there. Andrews and Rapp (2014) found high levels of ‘remember’ judgements in the ‘high partner credibility’ condition, in which participants were told their partner had a high level of cognitive ability and in the ‘uninformed’ conditions where participants were not told about their own or their partner’s cognitive ability. They also found a lower number of ‘remember’ judgements in the low credibility condition, where participants believed their partner had a lower than average cognitive ability. In other words, participants in the ‘high partner credibility’ condition reported greater source misattributions. Numbers et al. (2014), however, found equal numbers of remember and know judgements on contagion items, which were items erroneously reported by the confederate across different conditions of partner accuracy. Therefore, participants were equally likely to make remember and know judgements in conditions where the experimental confederate proposed a small number of false items, compared to conditions where the confederate reported a high percentage of false items. Both studies demonstrated the presence of a source misattribution effect whereby participants were unable to locate the true source of their memory. A ‘remember’ response to a contagion item indicates a clear error in source attribution in which participants have created a false memory for the contagion item proposed by the confederate. With a remember response indicating an episodic memory for the item. Whilst a ‘know’ judgement for a contagion item reflects a global familiarity with that item: or a semantic memory for the item itself (Tulving, 1987). Roediger et al. (2001) found greater numbers of know than remember responses, suggesting that participants were unable to locate the source of these contagion items. In contrast, Jack et al., (2014) found participants in the co-witness condition compared to the individual condition were more likely to accurately attribute the source of their memories to the discussion than to erroneously attribute them to the video, suggesting some conflicting evidence in the role of source monitoring errors in memory conformity.

**2.4.4.4 Summary.**

In manipulating item expectancy, studies of memory conformity have demonstrated that the reporting of misinformation was more likely when the item was consistent with our schema for the specific context of recall. Expectancy was further influenced by exposure time, which provides evidence for the role of a source misattribution error leading to memory conformity as it demonstrates firstly that when the target memory and the false memory were of greater similarity, source misattribution errors were more likely to occur. This effect was exacerbated when the original memory was weaker. As such, a source misattribution error provides a convincing explanation of memory conformity by demonstrating that, in circumstances where PEI information is highly similar to the original event, the tendency to report it is increased. However, this theoretical explanation is difficult to disentangle from informational influence in which a person knowingly reports PEI due to a belief that it is correct. The finding that participants were more likely to report high expectancy items than low expectancy items may also be demonstrative of informational influence. That is, participants knowingly reported high expectancy PEI due to a belief that the detail was correct, whereas low expectancy items were reported less often, as fewer participants believed the detail to be correct. Similarly, exposure time may also increase the likelihood of knowingly reporting PEI from one’s partner, as a shorter duration of encoding may lead a participant to question their own credibility and thus rely on their partner.

Whilst both informational influence and a source misattribution error purport that a person is reporting PEI due to a belief that the detail is correct, they differ in whether a participant is doing so knowingly. As such, asking a source monitoring question is necessary in order to assert whether participants are making a source monitoring error, or are knowingly reporting PEI due to a belief that it is correct. The greater instance of ‘remember’ and ‘know’ judgements for high expectancy items demonstrates either that participants were unable to identify the true source of the information, or that they were employing a familiarity based decision criteria in which items suggested by a confederate ‘passed the test’ simply because they have appeared during the testing session. Thus, for some participants, memory conformity occurs due to an inability to locate the source of the information they have reported. However, of 26 studies that used an individual condition, only 7 used a source monitoring question. Thus, for the remaining 19, it is not possible to assert whether participants were reporting PEI knowingly or unknowingly.

**2.4.4.5 Overall Summary**

The present systematic review has examined published research on memory conformity, that has used a variety of research methods and different circumstances to examine when memory conformity occurs, and situations in which it is more or less likely. A comparison of research methods indicates that memory conformity occurs in a range of experimental circumstances, and it is likely that the mechanism through which memory conformity is occurring is different depending on the experimental scenario employed. As such, no one theoretical explanation can provide a complete account of why memory conformity occurs. Normative influence, as the desire to be liked is a convincing explanation of memory conformity in situations where partners make their response in the presence of another or must reach a consensus (French et al., 2008). Wright et al. (2009) highlight how, when memory conformity occurs as a result of normative influence, the person has weighed up the costs of disagreeing with their partner with the costs of making an error and decided to knowingly make an error. This explanation is compelling in scenarios in which one may feel social pressure to conform to others, including if their partner is highly confident (Goodwin et al., 2013). However, it cannot provide an explanation for why participants conform to an erroneous response when no longer under normative pressure to do so. In these instances, it is likely that a combination of informational influence and source misattribution are occurring. That is, participants are reporting PEI due to a belief that it is correct.

For informational influence, this occurs when one’s belief in their partner’s memory is greater than their belief in their own (Wright et al., 2009). As such, it is seen when one’s partner has high credibility (Andrews & Rapp, 2014) or when a participant is manipulated to believe that they are of low credibility (Harkness et al., 2015). Informational influence purports that participants are reporting PEI knowingly due to a belief that it is correct. Although, the increased tendency to report PEI after a delay (Paterson et al., 2009), and when one encoded the original event for a short period (Roediger et al., 2001) provides evidence to support the idea that participants are reporting PEI unknowingly due to a belief that the detail came from the original source. Thus, it is likely that a combination of informational influence and a source misattribution error lead to participants reporting PEI when under no normative pressure to do so. In both instances, participants report the detail due to a belief that it is correct, but they differ in their knowledge of where the information came from. Therefore, it is imperative to ask participants source monitoring questions, in order to determine whether they are engaging in memory conformity knowingly.

**2.5 Discussion**

The aim of this review was to synthesise the key research into the memory conformity effect in order to elucidate the key theories associated with the research paradigm. It sought to identify the potential consequences of co-witness discussion, and the situations when this may be increased or decreased. The findings of the present review will be discussed in terms of the research questions, and its implications for the possible effects of alcohol on eyewitness memory.

The present review aimed to build upon that of Wright et al. (2009) who discussed the three theoretical mechanisms through which memory conformity may occur, whilst examining a range of experimental findings in order to demonstrate how they evidenced each of these processes. The review presented in this chapter took this examination one step further by systematically comparing published research based upon how each study has contributed to our understanding of normative influence, informational influence and source misattribution. From this it identified different experimental manipulations used in research, and how they have furthered our theoretical understanding. For normative influence, experimental manipulations including forced consensus (French et al., 2008), order of responding (Schneider & Watkins, 1996) and perceived credibility (Goodwin et al., 2013) increased the social cost of disagreeing with the other person which led to memory conformity. For informational influence, the manipulation of relationship to one’s dyad partner (Hope et al., 2008) and the perceived credibility of one’s self and one’s discussion partner (Andrews & Rapp, 2014) changed participants’ beliefs in their own versus their partner’s memory and thus led to greater memory conformity. In addition, the use of an individual recall condition allowed researchers to examine the number of participants reporting PEI when no longer under normative pressure to do so. Finally, studies manipulated item expectancy (Roediger et al., 2001) the period of exposure to the original event and the delay between encoding and recall (Paterson et al., 2009) which could all lead to memory conformity due to a source misattribution error. Crucially to understanding this, a small portion of studies included source monitoring questions.

Whilst this review has examined how different experimental manipulations can provide evidence of each theoretical mechanism, it was not possible to assert that any one mechanism was the ‘candidate mechanism’ through which memory conformity is *most* likely to occur. This is because, whilst research can demonstrate the presence of normative influence in leading to memory conformity whilst in the presence of others, it is more difficult to disentangle whether PEI is reported in one’s individual account knowingly, due to informational influence, or unknowingly, due to a source misattribution error. In order to assert this with greater certainty, source monitoring questions would be required in every study that used an individual recall phase (n = 26) rather than just a small minority (n = 7).

This review was interested in how memory conformity was measured and conceptualised amongst various studies. It was found that studies could be grouped together according to the methodology they employed, and within these groups, the experimental procedure followed was consistent. This is a helpful way to classify memory conformity studies in order to make comparisons within the literature. Taking studies that used the Roediger method as an example (n = 6). Of these, all studies measured false recall, expectancy of contagion items and almost all (n = 5) took remember/ know judgements. In addition to this, studies included manipulations such as participant age, partner credibility, and encoding duration. Therefore, it is possible to make meaningful comparisons between these studies, as they have operationalised their terms and measured their outcomes in consistent ways. As such it is possible to compare how (within this specific method) the manipulations employed affected the level of memory conformity seen.

A potentially unforeseen methodological difference between studies in the present review was the degree of variability between the control conditions each study employed. Fourteen studies were confederate studies; therefore, the control condition was the instance in which the confederate did not provide misinformation to the participant. Three studies used a participant’s pre-discussion report as the control condition and seven used designated ‘non-discussed’ items as the control. Seven studies used a ‘no discussion’ individual condition as their control condition. This finding is potentially problematic as it may alter what the meaning of the memory conformity effect is between studies. For instance, in a confederate study (Davis & Meade, 2013), it means that participants were likely to erroneously recall misinformation when suggested by one’s partner, compared to when their partner did not suggest erroneous information. Whereas in studies with an individual control (Gabbert et al., 2003) it means that a participant who discussed the event was likely to include information in a later recall test that they did not see themselves, compared to a participant who recalled an event alone. This means that, conceptually the two studies are measuring different things. Whilst one is comparing recall after discussion with individual recall, the other is comparing two situations, which may occur in a group recall scenario, i.e. the exposure to erroneous information vs. no exposure to erroneous information. Although both of these findings are informative and taken together create a more detailed account of the potential costs involved when witnesses talk, one must be aware that they are conceptually different, even though the outcome measure is the same.

Studies of memory conformity have identified the contributions of normative influence, informational influence and source misattribution as mechanisms through which memory conformity may occur. What’s more, such studies have identified conditions under which these mechanisms are more or less likely. Studies of memory conformity have contributed to the understanding of normative influence by establishing certain conditions under which conformity is likely to occur. Eleven studies used forced consensus experimental designs and, under these conditions’ conformity had to occur. When participants discussed an event together and must reach a joint decision on the most accurate response, memory conformity may be increased due to the perceived pressure to conform to another’s response. Garry et al. (2008) found that dispute in the initial discussion process reduced later conformity. This demonstrates the presence of normative influence in the discussion phase, whereby participants had to weigh up the cost of disagreeing with the cost of being right, but later were able to return to their own judgements. Equally, when recalling an event in the presence of another person, the order of responding may increase memory conformity (Goodwin et al., 2013; Schneider & Watkins 1996; Shaw et al., 1997). That is, if a person made a false suggestion, the person who recalled subsequently was more likely to incorporate this suggestion in his or her own recall. This effect, however, was not enduring. Once able to, those who had felt normative pressure to conform would revert back to their own recall of the event.

Informational influence can be seen in 27 studies in which participants were asked to recall their final accounts individually. Studies of memory conformity have illustrated the importance of credibility in inducing informational influence. Participants were less prone to memory conformity when recalling with an older partner (Davies & Meade, 2013). Additionally, susceptibility to misinformation was greater when perceived credibility was increased (Andrews & Rapp, 2014). Importantly, memory conformity did not occur in the low credibility condition. This suggests that, when recalling with a partner perceived as low in credibility, one’s belief in their own memory is greater than their belief in the other persons (Gabbert et al., 2012). As such, memory conformity did not occur. What’s more, when discussion partners were known to each other, the reliability of one’s self, compared to one’s discussion partner decreased (Hope et al., 2008) leading to greater susceptibility to misinformation as a result, when compared to dyads comprised of strangers.

In manipulating item expectancy, studies of memory conformity have demonstrated that the reporting of misinformation was more likely when the item was consistent with our schema for the specific context of recall (Kleider, Pezdek, Goldinger & Kirk, 2008). Expectancy was further influenced by exposure time, which provides evidence for the role of a source misattribution error leading to memory conformity as it demonstrates the importance of similarity between stimuli in reporting of misinformation, which was further increased with a delay.

**2.5.1 Implications of the memory conformity literature to the intoxicated co-witness**

The review presented in this chapter has examined the methodology used in memory conformity studies, in addition to looking at the roles of normative and informational influence and source monitoring as mechanisms through which memory conformity may occur. The next section of this discussion will address what the findings of this review might suggest as to the effect of alcohol on eyewitness discussion.

**2.5.1.1 Normative and Informational Influence.**

Studies that utilised a forced consensus paradigm in which participants had to agree on a suggestion, found that this increased memory conformity as participants may have felt normative pressure to agree with their partner. In real world settings, it is likely that co-witness discussion may occur in places such as bars and pubs prior to having their evidential statement taken by police. Such a social setting may lead to an intoxicated witness outwardly agreeing with erroneous statements made by their co-witnesses due to the perceived social pressures to do so. What’s more, Garry et al. (2008) outlined that memory conformity was reduced when a participant initially disagreed with the erroneous suggestions made by their dyad partner. Therefore, memory conformity can be reduced when witnesses recognise that the information being suggested is discrepant with their own account. Intoxicated witnesses were shown to have equal accuracy to sober witnesses at moderate doses (La Rooy et al., 2013; Schreiber Compo et al., 2011) but they recalled fewer details (Crossland et al., 2016; Van Oorsouw & Merckelbach, 2012) and were less confident in their memories (Harvey, Kneller & Campbell, 2013). As such, they may be less likely to recognise that a detail is discrepant with the actual event and thus, they may not dispute it. This means that they would then be more likely to report such a detail in their individual accounts.

Memory conformity studies have demonstrated the importance of credibility in leading to informational influence. Hope et al. (2008) showed how recalling with a dyad partner known to you decreased one’s perception of their own reliability relative to their dyad partner’s. This has considerable implications for real world drinking contexts, as it is likely that discussion could occur with friends after witnessing a crime. This could lead intoxicated witnesses to be more vulnerable to misinformation by virtue of the effect that knowing one’s co-witness has on one’s own sense of self reliability. The effect of co-witness discussion on eyewitness memory under intoxication may also be dependent on the perception of intoxicated witnesses as credible or not. Studies found that participants were significantly less likely to report misinformation from an older than a younger dyad partner (Davies & Meade, 2013). Thus, as seen in Thorley and Christiansen (2018) participants may be less likely to report misinformation from an intoxicated than a sober participant. However, when both discussion partners are intoxicated, each must weigh up their belief in their own memory, with their belief in their discussion partner’s memory. In this instance, the idea of an intoxicated witness as credible or not must be weighed up against the lack of confidence shown in their own memory (Harvey et al., 2013) in order to decide whether or not to report erroneous information from one’s discussion partner.

The addition of a delay may also be particularly detrimental for those who have consumed alcohol. The immediate recall of an intoxicated witness is impaired in its completeness as compared to those who are sober. Thus, the increased tendency to report misinformation after a delay may be greater for those who are intoxicated, as their memory of the event was less complete initially.

Therefore, the social context in which drinking occurs means that it is likely a person will have co-witnesses to a crime. Such social settings may lead to normative pressure to agree with erroneous suggestions gained from co-witnesses during the discussion. Moreover, the impairing effects of alcohol on eyewitness memory may result in an intoxicated witness being less likely to dispute erroneous information during the initial discussion. This could increase the chances of intoxicated witnesses reporting this false information in their own recall. Furthermore, if co-witnesses are known to each other, the tendency to report misinformation is increased, which is a likely scenario for intoxicated co-witness discussion in real world settings such as pubs. Furthermore, the ideas and expectancies people possess about the effects of alcohol may impact upon the extent of memory conformity amongst intoxicated witnesses. Studies showed that memory conformity was reduced when one’s discussion partner had low credibility (Andrews & Rapp, 2014) as such; people may be less likely to conform to the suggestions of an intoxicated witness. However, when both witnesses are intoxicated, they must weigh up the impairments of their own memory with their perception of their co-witness’ memory in order to decide whether they will report false information suggested by their partner.

**2.5.2 Limitations**

The variability in outcomes and procedures in the studies in the present review is both a strength and a limitation. The variability indicates that the memory conformity effect is not stimulus specific, and as such can be considered a robust finding of the outcomes associated with remembering in pairs and groups. However, it also makes the studies difficult to compare. One must bear in mind when comparing memory conformity studies that the nature of the outcomes means that what is being called ‘memory conformity’ may differ between studies.

The inclusion criteria for the present review required studies to have a control condition. This criterion relates to a measure of methodological rigour however it resulted in the exclusion of a number of studies (n = 14). Many of the earlier papers (pre 2010) on memory conformity did not contain a control condition and as such were excluded from the review. These papers do offer valuable insight into the research area; however, a decision to include studies without a control condition would have decreased the rigour in which the current reviews’ questions could be addressed.

Furthermore, the inclusion criteria required studies not to use a post-warning in order to reduce the memory conformity effect. This is due to the aim of the review being to identify the presence of the effect and how it is measured in research. Thus, it would have been counterintuitive to include studies that actively try to reduce memory conformity. However, such studies are able to identify the presence of a source misattribution error despite the presence of a warning, as identified in Higham et al. (2014) and therefore provide valuable insight into the processes involved in memory conformity. It is unfortunate that greater numbers of studies do not measure the source misattribution error through inclusion of a source judgement question task.

**2.5.3 Conclusions**

This review aimed to synthesise the memory conformity literature and establish the nature of the memory conformity effect and how it is measured in research. The findings showed that, despite variability within the experimental procedure, there is a robust memory conformity effect and studies can be meaningfully grouped together according to methodology. How memory conformity was conceptualised differed amongst the studies, which means that researchers must be cautious when making direct comparisons. However, the heterogeneity in the studies demonstrates a generaliseable effect of memory conformity and as such, has contributions, which can be made to the field of eyewitness testimony. Lastly the review aimed to examine whether normative and informational influence and source monitoring can be identified in the literature. This goal was more difficult to reach, and it seems that the experimental methodology employed does not allow for a meaningful distinction between these three processes and the relative roles they play. Building upon the suggestion by Wright et al. (2009) future research should aim to address this issue in order to advance the theoretical underpinnings of the memory conformity effect. By including individual recall procedures as well as source judgement tasks, it will be possible to make meaningful assertions as to the roles these processes might play.

**Chapter Three: Literature review of alcohol theory**

The previous chapter has identified witness discussion as a possible source of error in eyewitness testimony. Memory conformity research has demonstrated, using a variety of experimental methods that normative and informational influences, as well as source misattribution may lead to a witness incorporating erroneous post event information in their accounts. A second possible source of error in an eyewitness’ testimony is the presence of alcohol intoxication.

The consumption of alcohol is associated with multiple social consequences. These can be positive, such as a feeling of increased confidence (Smith, Abbey & Scott, 2009) or reduced stress, (Barnett et al., 2013), but they can also be negative; including increased sexual risk taking (Zanna, MacDonald & Fong, 1996) and increased violence and aggression (Giancola, Duke & Ritz, 2011). These consequences are widely known, and research has been interested in explaining both people’s decisions to drink, as well as the social-behavioural consequences associated with alcohol consumption. Prior to exploring the risk of an intoxicated witness being less reliable, it is important to identify the mechanisms underlying the effect of alcohol on cognition and behaviour. This review will examine literature relating to both a person’s decision to engage in the consumption of alcohol as well as the behavioural and cognitive outcomes.

**3.1 Why do people consume alcohol?**

Models of problematic alcohol consumption suggest that the effect people expect to gain from alcohol consumption is integral to the motive for consumption. This effect is further mediated by coping motives, whereby people consume alcohol as a method to cope with stress (Hasking, Lyvers & Carlopio, 2011). Cooper, Frone, Russell and Mudar (1995) found that the desire to control negative affective states is a significant motive for alcohol use. Hull and Slone (2004) purport that alcohol consumption is used as a means of regulating social and affective experience. Specifically, individuals drink alcohol to avoid negative affect and enhance positive affect. Drinking motives are thus informed by the predicted effects of alcohol consumption (Hasking et al., 2011). Cooper (1994) identified four motivations associated with alcohol consumption; enhancement, coping, social and conformity motives. Enhancement motives involve drinking to enhance positive affect, while coping refers to drinking to cope with negative emotions. Social motives suggest that people consume alcohol to enhance the social benefits one can gain. Conformity motives suggest that a person consumes alcohol due to perceived normative pressures to do so (Cooper, 1994). Cooper (1994) found that social, enhancement and coping motives were positively related to the quantity and frequency of alcohol consumption. Specifically, enhancement motives were found to be the strongest predictors of both. Conformity was negatively related to both the quantity and frequency of drinking, whilst enhancement was the strongest predictor of heavy drinking.

White, Anderson, Ray and Munn (2016) followed a group of college students for 6 months to examine the ability of drinking motives to distinguish binge drinkers from extreme and potentially problematic drinkers. Findings showed that at baseline, extreme binge drinkers showed greater social, coping and enhancement motives in addition to greater quantity and frequency of alcohol consumption. Participants who were not extreme binge drinkers at baseline, but who became such at follow up, reported significant increases in social and enhancement motives. This was corroborated by research from Merrill, Wardell, and Read (2014) who found that coping motives in students predicted a variety of negative outcomes, including poor self-care, academic problems and physiological dependence on alcohol. Furthermore, a review by Knutsche, Knible, Gmel and Engel (2005) found that most adolescents reported drinking for social and enhancement motives. Social motives were associated with moderate drinking in most studies, whilst heavy drinkers reported enhancement motives. Coping motives were also found to be associated with heavy drinking; in particular drinking to cope with negative emotional states was associated with alcohol problems. In addition, Lyvers, Hasking, Hani, Rhodes and Trew (2010) purport that coping, social and enhancement motives were all related to alcohol consumption and alcohol related problems. Moreover, cognitive and emotional preoccupation with drinking (a factor within the temptation and restraint inventory) that predicts problematic alcohol use was related to all the measured criterion variables. In addition, the relationship between coping motives and drinking behaviours was mediated by preoccupation with drinking. Thus, drinking motives, or the reasons people endorse for consuming alcohol (White et al., 2016), are clear predictors of drinking behaviour.

The relevance of personality traits on alcohol consumption has also been considered. A prospective study on university students during their first week on campus examined personality traits and motives in predicting drinking behaviours (Loxton, Bunker, Dingle & Wong, 2015). The study found that trait impulsivity and sensation seeking were significant predictors of drinking. Impulsivity was the best predictor of drinking behaviours, with high impulsivity scoring students maintaining a higher level of drinking over 6 months. In addition, enhancement motives moderated this effect. The authors also found a significant gender effect, in which gender moderated the indirect effect between impulsivity and enhancement. Women showed a significant association between impulsivity and enhancement, which was not present in men. Therefore *enhancement,* in which people consume alcohol in order to receive the positive affective experience associated with consumption (Cooper, 1994), is a widely reported motive for drinking alcohol in association with personality traits such as impulsivity and also gender.

As well as the aforementioned motives for alcohol consumption, social norms are also influential in the decision to engage in drinking. Social norms refer to social rules characterising a group that outline desirable behaviour (Kandori, 1992). In a study on descriptive norms, which refer to the perceived prevalence of peer drinking, Halim, Hasking and Allen (2012) found a significant association between descriptive norms and drinking in a sample of college students. Students who were higher risk drinkers were more likely to perceive the typical student as drinking at high levels. Specifically, high-risk students, as measured with the AUDIT questionnaire, were less likely to think that a student would consume fewer than four drinks at a bar. Both distal and proximal injunctive norms significantly predicted alcohol consumption. In other words, when considering groups with a close relationship such as friends, and a reference group such as a ‘typical student’, the norms around drinking significantly predicted drinking behaviour. Additionally, social drinking motives mediated the relationship between descriptive and proximal norms and alcohol consumption. Thus, one of the motivations underlying drinking behaviours was the perceived norm surrounding alcohol consumption. When the social group encouraged alcohol consumption individuals were more likely to engage in alcohol consumption.

In a further study of the relationship between social norms and drinking behaviours, Rinker and Neighbours (2013) also examined the role of temptation and restraint. This refers to the cycle of control of alcohol consumption with periods of lapses in this control leading to heavy drinking (Bensley, 1989). The results demonstrated that gender, perceived descriptive norms and cognitive and emotional pre-occupation, all predicted drinks per week. However, cognitive behavioural control, a measure of restraint, was not significantly related to drinks per week. The relationship between temptation and restraint and drinks per week was stronger for those with higher perceived descriptive norms relating to alcohol consumption. Those who scored highly on measures of temptation to drink were more inclined to do so when they perceived that the ‘typical student’ drinks a lot (Rinker & Neighbours, 2013).

**3.1.1 Interim Summary.**

Alcohol consumption is employed as a tool for affect regulation. That is, people consume alcohol to increase positive affect and reduce negative affect. Cooper (1994) demonstrated how enhancement, coping and social motives were positively related to alcohol consumption, whilst personality factors, such as impulsivity, have been identified as motivations for engaging in alcohol consumption (Rinker & Neighbours, 2013). What the literature on drinking motives demonstrates, is that people consume alcohol due to their desire to experience its’ effects on behaviour and cognition. Therefore, it demonstrates that people possess beliefs as to the consequences of consuming alcohol. The systematic review presented in the previous chapter demonstrated the importance of how one is perceived by others in leading to memory conformity via normative and informational influence (Wright et al., 2009). Therefore, a witness who has consumed alcohol may be evaluated by others based upon their own motives for alcohol consumption. In addition to drinking motives and personality factors, social norms also contribute to the decision to drink alcohol. The perception that others were drinking alcohol was a significant predictor of the likelihood of engaging in drinking. This effect was greater when ‘others’ were close friends or acquaintances rather than a distant comparison group (Halim, Hasking & Allen, 2012). This notion demonstrates that drinking is often a social event, and therefore, when considering intoxicated witnesses to a crime, it is important to consider the potential for these witnesses to have multiple ‘co-witnesses’ who, given the role of social norms in alcohol consumption, are likely to have also consumed alcohol.

While the role of drinking motives in the decision to engage in the consumption of alcohol is clear it is also necessary to elucidate the beliefs people possess as to the effect alcohol intoxication is perceived to have. The next section of this review will examine alcohol expectancies, that is, the schemas and beliefs relating to experience with alcohol that guide the decision to consume alcohol.

**3.2 What do people believe about the effects of alcohol? The role of alcohol expectancies**

Alcohol expectancy theory refers to the perceived consequences of alcohol consumption that are anticipated by an individual (Montes, Wilkewitz, Andersson, Fossos-Wong, Pace, Berglund & Larimer, 2017). Expectancies can be considered as schemas that are stored in memory which guide future actions (Smith & Goldman, 1994). Alcohol expectancies refer to both the positive consequences of consuming alcohol as well as the negative. The Comprehensive Effects of Alcohol Questionnaire (CEAQ) is the most widely used measure of alcohol expectancy and contains items pertaining to both positive and negative outcomes (Sociability, tension reduction, enhanced sexuality, liquid courage, cognitive and behavioural impairment, risk and aggression and negative self-perception). Research by Ham, Stewart, Norton and Hope (2005) indicated that after controlling for all seven subscales of the CEAQ higher risk and aggression expectations as well as higher sexual expectations and lower self-perception expectation contributed to participants reported drinks per week. Furthermore, Montes et al. (2017) in a prospective study demonstrated a positive correlation between alcohol expectancies and the consumption of alcohol. Thus, the expectancies people possessed for consuming alcohol drove one’s decision to engage in alcohol consumption (Valdiva & Stewart, 2005). To add greater specificity to this idea, research has indicated that positive and negative expectancies lead to different outcomes, with positive expectancies leading to increased alcohol consumption, whilst negative expectancies lead to less alcohol consumption (Anthenien, Lembo & Neighbours, 2017).

Findings from Lewis and O’Neill (2000) support this notion. They showed that undergraduates classed as problem drinkers were more likely to report positive alcohol expectancies. Specifically, problem drinkers reported higher expectancies of arousal than non-problem drinkers in addition to sexual enhancement expectancies. Furthermore, such students were also more likely to report social anxiety and shyness as compared to non-problem drinkers. Thus, the findings suggest that those who engaged in problem drinking had positive expectancies about the immediate effects of alcohol consumption, such as its association with social behaviour, rather than considering the negative long-term effects of alcohol consumption. This is consistent with Norberg, Norton, Olivier and Zvolensky (2010) who showed that females with social anxiety were more likely to consume alcohol to avoid negative social situations compared to males who were more likely to experience negative consequences of alcohol consumption as a result of drinking too much in positive situations. Therefore, research demonstrates that individual differences and personality characteristics may also impact upon a person’s alcohol expectancies, which in turn, will influence a persons’ drinking behaviour.

Alcohol expectancies are based upon both *direct* and *indirect* experience with alcohol. Merrill, Lopez-Vergara, Barnett and Jackson (2016) demonstrate this by showing that adolescents’ experience of consuming a drink of alcohol was related to how consequences associated with the consumption of alcohol were rated. Participants who had never consumed a full drink of alcohol rated negative consequences as significantly higher, and positive consequences as significantly lower, than those who had previously consumed a full drink of alcohol. Those with prior drinking experience rated the negative consequences of drinking as less negative and the positive consequences as more positive.

Interestingly, alcohol expectancies may also differ according to environmental context. Wall, Hinson and Mckee (2000) manipulated environmental context by conducting their study either in a laboratory or an on-campus bar and manipulated the phase of intoxication as either ‘just enough to begin to feel intoxicated’ vs. ‘too much to drink’. Participants who took part in the study in the bar expected to experience greater alcohol related stimulation and pleasurable disinhibition than those participants who took part in the laboratory. Furthermore, the study found a gender difference such that males and females expected similar levels of behavioural impairment at the early stages of intoxication, but females expected more behavioural impairment during the later stages of intoxication as compared to males.

Alcohol expectancy theory purports that a person’s decision to drink is based upon the perceived consequences of alcohol consumption, which in turn are based upon both direct and indirect experience with alcohol. In addition to influencing the decision to consume alcohol, these expectancies can also be influential in the behavioural outcomes of alcohol consumption. Lac and Brack (2018) investigated the link between alcohol expectancies and myopic behavioural consequences. This refers to Alcohol Myopia Theory (AMT) (Josephs & Steele, 1990), which will be outlined in greater detail later in this review. In brief, AMT refers to the attentional narrowing caused by alcohol intoxication, which reduces a person’s ability to weigh up competing internal and external cues to guide behaviour. The authors found that alcohol use mediated the relationship between alcohol expectancies to three myopic effects, relief, self-inflation and excess. Greater general alcohol expectancies contributed to greater alcohol use and increased relief, self-inflation and excess. This is consistent with research by Moss, Albery and Rahman (2016) who found that the effect of an alcohol related prime on self-enhancement behaviours was moderated by type of drinker. That is, those who were heavy drinkers demonstrated a myopic response in the absence of alcohol consumption compared to those who were not heavy drinkers. Thus, alcohol expectancies not only guide the intention to drink, but also the post consumption behaviours that may occur. What alcohol expectancy research in general shows is that the general population possess a set of beliefs about the effects of alcohol consumption on behaviour. These beliefs may be positive, which may encourage drinking behaviour, or they may be negative, which may discourage behaviour (Anthenien et al., 2017). Regardless of the specific expectancy however, it indicates awareness that the consumption of alcohol is associated with a change in behaviour, which may have social consequences.

**3.2.1 Interim Summary.**

Alcohol expectancies are the consequences of consuming alcohol perceived by an individual (Montes et al., 2017). Based upon both direct and indirect experience with alcohol (Merrill et al., 2016) positive expectancies are purported to increase the likelihood of consuming alcohol whilst negative expectancies reduce the likelihood of alcohol consumption (Anthenien et al., 2017). While alcohol expectancies are schemas stored in memory (Smith & Goldman, 1994) they can also be mediated by environmental context (Wall et al., 2000) and can influence post consumption behaviours (Lac & Brack 2018).

Research into alcohol expectancies has considerable implications for one’s understanding of the intoxicated co-witness. First, when considering the perception of intoxicated witnesses, research indicates that intoxicated witnesses are perceived as less credible (Evans & Schreiber Compo, 2010) and their identifications as less reliable (Lynch, Wasarhaley, Golding & Simcic, 2013). These perceptions may be informed by alcohol expectancy schema and thus, intoxicated witnesses are judged based upon the beliefs people possess as to alcohol’s effects. These may be based upon direct experience but also indirectly (Merrill et al., 2016). For instance, the perception of intoxicated witnesses is likely informed by social context. As outlined (Social and Cultural Aspects of Drinking, 1998) in the United Kingdom, alcohol consumption is associated with violence and aggression. In addition, when considering the risk of co-witnesses reporting information gained from a discussion, alcohol expectancies may be important to consider. As stated previously, memory conformity reported due to social influence depends on one’s perception of the other person in addition to ones’ self (Wright et al., 2009). As such, the beliefs one possesses about alcohol will likely inform this decision as to their own and their co-witness’ level of impairment, which may in turn affect the tendency to report PEI encountered from them.

**3.3 What happens to behaviour when we consume alcohol?**

The preceding sections of this review have outlined that people possess motivations for consuming alcohol and expectancies surrounding the effects of alcohol consumption. These factors contribute to the decision of a person to engage in the consumption of alcohol. Additionally, these beliefs may also impact upon a person’s post consumption behaviour. The next section of this review will outline two theoretical explanations surrounding the effect of alcohol on behaviour and cognition. The first, hypervigilance, refers to the compensatory effect on behaviour exhibited by people who believe they have consumed alcohol. The belief that alcohol intoxication can result in an impairment of perception and performance decrement leads people who perceive themselves to be intoxicated to engage in more effortful performance to overcome this decrement. Secondly, Alcohol Myopia Theory (AMT) outlines the source of the performance decrement associated with alcohol consumption.

**3.3.1 Alcohol, metacognition and hypervigilance.**

Metacognition refers to the way one thinks about thinking (Livingston, 2003). Flavell (1979) presented a model of cognitive monitoring comprising metacognitive knowledge, metacognitive experiences, goals and actions. Metacognitive knowledge is the stored knowledge a person possesses pertaining to the world around them. It consists of the factors and variables that interact to affect the outcome of a cognitive endeavour. Metacognitive knowledge refers to information that people possess relating to their own internal states, which may include beliefs about one’s emotions and competence (Wells, 2000). Metacognitive experiences are described as a cognitive or affective experience relating to an intellectual enterprise, such as the realization that you do not understand something that another has said. Whilst goals refer to the objectives of an endeavour, actions refer to the strategies employed to achieve the goal (Flavell, 1979). Metacognition is concerned with the way a person thinks about and appraises their own beliefs and knowledge, and research has been interested in the effect of alcohol intoxication on this ability.

Honan, Skromanis, Johnson and Palmer (2018) purport that metacognitive functioning involves monitoring and regulating one’s own thinking, memory and decisions. It is integral for accurate social, cognitive function as it is necessary not only to possess abilities and knowledge to navigate the social world, but also to be able to accurately appraise one’s abilities in order to alter them when necessary. The authors examined the effect of alcohol intoxication on the ability to correctly recognise emotions and to accurately appraise one’s ability to do so. Results demonstrated a significant effect of condition on performance in the emotion recognition task, such that alcohol participants demonstrated significantly poorer performance. Furthermore, there was a significant interaction between condition and emotion type. Alcohol participants were significantly worse at identifying fear and sadness compared to placebo participants. Additionally, alcohol participants were significantly worse than placebo participants at detecting emotions at all intensities (40%, 80% and 100%) of the emotional display. Importantly, alcohol participants were significantly less able to distinguish between their correct and incorrect decisions compared to placebo participants. It appears that alcohol impaired participants’ metacognitive regulation such that they were less able to correctly appraise their ability in recognizing emotions.

Further evidence of the effect of alcohol intoxication on metacognition comes from Kleykamp, Griffiths and Mintzer’s (2010) comparison of Trizolam and alcohol on cognitive performance and awareness of impairment. Participants completed psychomotor, attention, working memory, episodic memory and semantic memory tasks after consumption of either Trizolam (TRZ) or alcohol. Participants also completed performance estimation measures. Alcohol significantly impaired performance on the semantic memory task but not on the working memory task. Additionally, alcohol had no impairing effect on divided attention. On most performance measures participants who consumed alcohol significantly overestimated the degree of impairment on performance relative to TRZ participants and controls. These findings suggest that an awareness of the potentially detrimental effects of alcohol intoxication lead to deficiencies in a person’s metacognitive ability to appraise their own ability to perform a task.

Fillmore and Vogel Sprott (1996) elaborate on this notion by explaining that expectancies can be acquired before an individual has experience with drinking based upon social and cultural views on alcohol, and information relating to the effects of alcohol on others. These may be inaccurate compared to the actual effect of alcohol on behaviour and cognition. Their initial study (Fillmore & Vogel-Sprott, 1995) did not find a conclusive link between expected impairment and actual impairment on a task under the influence of alcohol. The authors suggest that this may have been due to individual differences within the subjects and thus, their second study examined alcohol expectancies and performance in novice and experienced drinkers separately. Participants completed a pursuit rotor task on a computer, which required them to use a mouse to keep a crosshair sight over a moving target. The results demonstrated a significant effect of alcohol and a marginal interaction with drinking experience, suggesting the effect of alcohol varied with level of experience. Novice drinkers were significantly more impaired than experienced drinkers. Moreover, experienced drinkers’ expectancies about alcohol were significant predictors of their actual performance under intoxication, accounting for 89% of the variance in performance. Novice drinkers’ expectancies were not significantly related to their actual performance. These findings suggest that, when considering the ability of an intoxicated person to weigh up their level of impairment due to intoxication, or their level of skill on a given task, drinking experience is important. Those who have little drinking history may appraise their own behaviour and cognition based upon social and cultural rules and expectations regarding intoxication (Fillmore & Vogel-Sprott, 1996) at the expense of personal experience.

A survey on academic opinion on the effect of alcohol on metacognition found that 86% of respondents indicated at least ‘somewhat’ that alcohol intoxication has a detrimental effect on metacognition, which did not differ according to the expertise of respondents. Further, 91% of respondents agreed that alcohol intoxication has a detrimental effect on cognitive control. However, experts indicated a lower level of agreement than non-experts (Evans et al., 2017). Evans et al. (2017) also found no effect of alcohol on recall in their research. This suggests that, at moderate levels, alcohol intoxication may not impact upon metacognition. The study did find that participants in the placebo condition were less able to predict their performance on a later recognition task. That is, they had poorer *feeling of knowing*, which may indicate an uncertainty in one’s own ability to perform the task as a result of the belief that they have consumed alcohol. Thus, it demonstrated a metacognitive effect in which participants were less able to appraise the accuracy of their own responses.

The impact of alcohol consumption on metacognition is not limited to an altered ability to appraise one’s own performance. It also influences the effort a person exerts on a given task. One example of this is hypervigilance, people that believed they had consumed alcohol performed better in laboratory studies than those who were knowingly sober (Evans et al., 2017). This is supported by studies involving placebo participants, who often displayed increased performance compared to control participants. The mechanism through which this is said to occur is a compensatory effect employed to overcome the deficits associated with alcohol consumption (Evans et al., 2017).

Fillmore, Mulvihill, and Vogel- Sprott (1994) investigated the effect of caffeine and alcohol placebos on the pursuit rotor task after being given impairing or improving expectancies. That is, participants were told that the substance they consumed would improve performance or would impair performance. There were no pre-treatment differences in group performance. Those in the positive caffeine expectancy condition displayed improved performance after substance administration compared to those in the impairing caffeine condition. Conversely, those in the negative alcohol expectancy group showed greater improvement compared to those in the positive alcohol expectancy group but this difference was not significant. In addition to the objective improvement demonstrated by those in the impairing alcohol condition, the group reported greater desirability to resist the effects of alcohol than those in the impairing caffeine group. Thus, the results demonstrated the ability of a person who believes themselves to be impaired by alcohol to outperform those who are not.

Marczinski and Fillmore (2005) found that placebo participants made fewer errors in an inhibition task compared to sober control participants. These findings suggest evidence of increased vigilance in responding as well as improved performance due to the belief that they were under the influence of alcohol. Testa et al. (2006) used a Stroop test with the addition of a component to manipulate evaluative control where trials were either mostly congruent, i.e. the colour of the word was the same as the word itself, or mostly incongruent where the colour of the word was different to the word itself. Alcohol intoxication increased the error rate on incongruent trials in the mostly congruent trials only, suggesting a deficit of intoxicated participants to use trial specific adjustments in cognitive control. With regards to expectancy, placebo participants had a reduced error rate on incongruent trials suggesting a compensatory effect. Those participants who believed that they were intoxicated outperformed control participants in the critical condition. Research by Schreiber Compo et al. (2011) presents evidence in support of a hypervigilance effect among those who expect to consume alcohol. The authors found that participants in the placebo condition were more likely to report ‘I don’t know’ in their recall than participants who had consumed alcohol. This indicated a lack of certainty in their responding and an increased level of vigilance as a result of the belief that they were intoxicated.

In a more applied measure of the effect of alcohol on eyewitness behaviour, a study used a potential date rape scenario (Abbey et al., 2003, as cited in Testa et al., 2006) in which participants had to read a hypothetical sexual assault scenario. Placebo participants were the least likely to believe that the male cared for the female in the scenario, or that he would stop if she said no. This indicates a ‘hypervigilant’ response whereby participants who believed they had consumed alcohol were more likely to anticipate a date rape scenario occurring. Similarly, Testa, Van Zile-Tamsen and Livingston (2006) compared participants who had consumed alcohol, a placebo or a soft drink on measures of approach and resistance behaviours when reading a dating scenario that contained the risk of sexual assault. Participants in the placebo condition reported the situation as riskier, whilst also reporting that they would use more resistance behaviours. In a measure of expectancy, women who believed most strongly that their behaviour was influenced by alcohol perceived greater risk within the scenario. When women viewed alcohol as having an influence over sexual desire, they were more cautious in their behaviours and intentions. This caution, in the context of a hypothetical date rape scenario indicates a hypervigilance response. Participants, aware of the effects of alcohol and the risks of the situation, behaved with increased vigilance.

Similarly, Flowe et al. (2016) found that participants who were expecting to consume alcohol were significantly more accurate in their recall of a hypothetical sexual assault scenario than those who expected a soft drink. Collectively, these studies support the hypervigilance hypothesis, in which an awareness of the potential detrimental effects of alcohol intoxication makes those who believe that they have consumed alcohol more aware of the details of a scenario, and more vigilant. As Testa et al. (2006) report, when an outcome was perceived to be negative, women who believed they had consumed alcohol behaved more vigilantly to overcome the increased vulnerability associated with alcohol intoxication.

Research into hypervigilance is able to demonstrate that there is an awareness of the potential detrimental effect of alcohol consumption, which may impact our behaviour. In particular, in forensically relevant contexts, those who believe they are at risk to the detrimental effects of alcohol are motivated to act with increased vigilance to counteract any decrements in performance caused by alcohol (Flowe et al., 2016). In so doing, they are demonstrating that beliefs around intoxication may influence a person’s behaviour. It is important, therefore, to consider not only the pharmacological effects of alcohol, but also the effects of metacognitive processes, beliefs and expectancies. These should collectively be acknowledged as mechanisms implicated in the effect of alcohol on behaviour and cognition

**3.3.2 The effect of alcohol consumption on behaviour: Alcohol Myopia Theory**

Whilst it is important to identify the potential mechanisms that underlie a persons’ decision to engage in alcohol consumption, it is also important to outline the mechanisms that underlie a persons’ behaviour as a result of alcohol consumption. In the next section Alcohol Myopia Theory (AMT) will be outlined and its links to alcohol expectancy theory explained.

Lac and Berger (2013) point out that even at low levels of consumption alcohol has a detrimental effect on one’s cognitive processing capacity. The effect that alcohol consumption has on behaviour is, however, not universal. Steele and Josephs (1988) argue that alcohol has the potential to produce varied effects regardless of dosage. This means that a person can consume the same dosage of alcohol on two occasions but display vastly different emotional and behavioural outcomes. This suggests that the effects of alcohol are mediated by external social cues. For instance, Josephs et al. (1990) found that alcohol consumption reduced anxiety responses when participants had to allocate attention to a distractor task. Participants were told that they would have to prepare a short speech about what they disliked about their body. Participants were then asked to sit quietly and wait for their chance to present their speech or rate a series of slides. Intoxicated participants that had to answer complex questions about the slides reported significant anxiety reduction compared to those that answered simpler questions about the slides and those that did no activity. Sober participants did not demonstrate the same anxiety reduction. From this finding Joseph et al. (1990) proposed a three-step attention allocation model. Initially, alcohol impairs a person’s capacity to engage in controlled effortful processing that requires attention whilst having little to no effect on automated, highly practiced processes. Subsequently, alcohol narrows one’s attentional focus to the most salient internal or external cues. Finally, these two processes combine to create alcohol myopia. This has become a key term within the alcohol literature. Alcohol myopia refers to the reduced processing capacity combined with attentional narrowing that occurs as a result of alcohol consumption (Steele & Josephs, 1988). As a consequence, a person will attend to fewer cues and the cues that are attended to are processed less well. Furthermore, the subject finds it more difficult to relate these cues to their existing body of knowledge or schema (Josephs & Steele, 1990).

As previously indicated, three myopic responses have been identified in the literature; relief, self-inflation and excess (Lac & Brack, 2018). Relief refers to a psychological ignorance from distant consequences as a result of alcohol consumption. This is due to a focus on the salient aspects of the present moment at the expense of more peripheral ruminations (Lac & Brack, 2018). Self-inflation refers to the dissipation of self-doubt as a result of focusing on desirable personality traits. Banaji and Steele (1989) found that after the consumption of alcohol participants increased their positive self-evaluations, but only for traits that they had previously identified as important to them. Excess refers to the idea that during intoxication attention is focused on stimuli that provoke certain behaviour, then leading to impulsive and aggressive behaviours at the expense of more socially desirable inhibitory behaviours. Giancola et al. (2011) demonstrate this point with research indicating that participants under the influence of alcohol showed more aggressive behaviours in an electric shock task than those who were sober.

A key component of AMT is how behavioural change occurs as a result of intoxication. It is argued that a specific behaviour is not predicted by the consumption of alcohol (Moss & Albery, 2009). Rather, it occurs as a result of response conflict. This is when a person is faced with competing cues to their behaviour, both inhibiting and impelling. A response that is impelled by a salient cue will also be inhibited by further cues in the environment. However, the task of weighing up these impelling and inhibiting cues requires further processing which alcohol impairs. As such, in a situation where there are strong cues both for and against a given behaviour, the outcomes are determined by the most salient cue at the time (Josephs & Steele, 1990). This idea provides a flexible foundation for explaining behavioural change due to alcohol intoxication as it considers the effect of the environmental context at any given time. For example, if a person were to have a drink spilled on them at a bar, on one day the cues to aggress may be more salient compared to the cues to walk away thus resulting in the person responding with a punch or a hit. On a second given day, the cues to inhibit aggression may be more salient and as a result the person walks away.

The support for response conflict in determining the behavioural outcome that arises as a result of alcohol consumption has been well established in the literature. In their meta-analysis Steele and Southwick (1985) demonstrated that level of response conflict had a significant effect on social behaviour. Under conditions of high conflict and high BrAL (breath alcohol level), a large effect of alcohol intoxication was found on social behaviour. However, under conditions of low conflict neither high nor low BrAL produced a significant effect on behaviour. This asserts that the level of response conflict is a more significant determinant of the specific behaviour than the actual intoxication itself. Marinkovic, Rickenbacher and Azma (2013) provide further support for the effect of alcohol on processing in situations evoking response conflict using neuroimaging. The Erikson-Flanker task, a cognitive test of response inhibition, requires participants to suppress responses in a series of trials where target stimuli are ‘flanked’ by congruent, incongruent or neutral distractors. Participants were required to respond to the colour of the target square, which was preceded by a flanker square that was either the same or a different colour. Responses were recorded by pressing a left-hand button for green or red squares and a right-hand button for blue or yellow squares. Possible responses could therefore be congruent (the target and flanker are the same), stimulus incongruent (the target and flanker are different but are represented by the same button), or response incongruent (the target and flanker are different and represented by different buttons). Results showed that participants who consumed alcohol were significantly slower on response incongruent trials i.e. when the target and flanker were different colours represented by different buttons. Slower reaction times were seen when multiple processes were required, i.e. inhibiting a response and planning and executing a correct response. Similarly, Curtin and Fairchild (2003) found impairment in intoxicated participants during incongruent trials on a colour-naming Stroop task relative to control subjects. This indicated that the response conflict present in these trials resulted in poor performance.

**3.3.3 Interim Summary.**

Alcohol expectancies may influence behaviour due to beliefs around the detrimental effects of alcohol intoxication. Research indicates that in circumstances where a person believes that they have consumed alcohol, they perform better in the task at hand than those who knowingly have not consumed alcohol. Those who believe that they have consumed alcohol may engage in compensatory behaviours to overcome these decrements in performance termed hypervigilance (Evans et al., 2017). Hypervigilance has been demonstrated across a wide range of tasks and stimuli. For example, placebo participants showed enhanced awareness of risk in a sexual assault scenario (Testa et al., 2006) and enhanced recall compared to those who expected to consume a soft drink in a hypothetical sexual assault study (Flowe et al., 2016). In addition, placebo participants showed evidence of compensatory behaviour on incongruent Stroop trials as compared to participants who were intoxicated (Testa et al., 2006). Therefore, the belief that one has consumed alcohol may result in an increased level of vigilance in order to compensate for the potential negative outcomes associated with alcohol consumption. Both theories of metacognition and hypervigilance have implications for our understanding of how intoxication may affect an intoxicated witness. Research into metacognition demonstrates that those who have consumed alcohol expect to show impaired task performance as a result (Kleykamp et al., 2010). Thus, an intoxicated witness may expect themselves to be impaired in their ability to recall a crime due to the expected effects of alcohol (Montez et al., 2017). Indeed, studies demonstrate a lack of confidence shown by intoxicated witnesses which can be taken as evidence of this (Flowe et al., 2017; Harvey, Kneller & Campbell, 2013). Furthermore, this expected impairment has been shown to lead to *hypervigilance* in an attempt to overcome the effects of intoxication. Therefore, an intoxicated witness may not show impairments when compared to their sober counterparts due to their attempts to overcome the detrimental effects of alcohol. When considering alcohol consumption in groups and witness discussion, the metacognitive effects of alcohol may lead a witness to report PEI from a co-witness, due to their beliefs that their own recall is impaired. A hypervigilant response may offer some protection of intoxicated participants from reporting PEI, by creating increased vigilance towards their discussion partner, as seen in Andrews and Rapp (2014).

The effect of alcohol intoxication on behaviour and cognition has been further explained through AMT. Josephs and Steele (1990) explain that alcohol consumption impairs controlled effortful processing whilst simultaneously narrowing one’s attentional capacity to only focus on the most salient environmental or internal cues. These two processes combine to create a myopic effect whereby a person is less able to weigh up impelling and inhibiting cues and thus the most salient of these cues determines behaviour. An important component to this model is the idea of response conflict (Moss et al., 2016). This is the circumstance in which a person is faced with both impelling and inhibiting cues; alcohol thus impairs a person’s ability to weigh up both of these cues which results in a person’s response being influenced by the most salient cue. What AMT theory demonstrates is that controlled, effortful processing is more difficult under conditions of intoxication. In addition, relating incoming information to ones existing body of schema is impaired. The task of being an eyewitness involves first encoding and then recalling the event (Thompson, 2008) as such it is cognitively demanding. Thus, on the basis of AMT, it is likely that performing the task of an eyewitness whilst intoxicated would be more difficult, which may lead to poorer performance.

**3.4 Studies of the effect of alcohol on behaviour: risk taking and aggression**

In addition to research aimed at developing theory, there is a vast body of literature examining how key theories such as Alcohol Myopia can be applied to specific social phenomena associated with alcohol consumption. One such area has been the association of alcohol intoxication to engaging in risk taking. Fernie, Cole, Goudie and Field (2010) found that scores on the BART risk-taking task explained a significant amount of variance in drinking behaviour. In addition, Haan, Egberts and Heerdink (2015) found that risk taking predicted binge drinking and risky alcohol consumption for males. Risk taking significantly predicted being a binge drinker versus an abstainer from alcohol for both males and females, however risk assessment scores only had a significant effect for women. Thus, there is a relationship between alcohol consumption and risk taking generally. Research has also focused on specific types of socially relevant risk-taking behaviours. Risky sexual behaviours were investigated by Zanna, MacDonald and Fong (1996) who found that males who usually reported condom use were less likely to report using condoms the last time they had sexual intercourse if they were intoxicated at the time of the event. Furthermore, in a series of laboratory experiments alcohol intoxication increased the intention of participants to engage in risky sexual practices. The role of alcohol in the decision to engage in risky sexual practices was developed further in research by George et al. (2009) who found that alcohol played a mediating role between subjective arousal levels and the decision to undertake risky sexual behaviours. Consistent with the premise of AMT, they found that when subjective arousal was considered, alcohol no longer had a direct effect on the intention to engage in these risky behaviours. Rather they argued that alcohol resulted in an increase in subjective arousal reports which lead to a greater willingness to engage in unprotected sex. Here the attentional narrowing associated with alcohol intoxication becomes important. In such a high response conflict situation one must weigh up both the impelling and inhibiting cues to engage in risky behaviours. As a consequence of the salience of sexual arousal reported by the participants, their willingness to engage in unprotected sex increased. Such findings demonstrate that, when intoxicated, both behaviour and cognition can be influenced by internal and external cues when response conflict is present. As such, it is possible that, given the cognitive demands of being an eyewitness (Thompson, 2008) their testimony may be affected when in a ‘high response conflict’ situation.

As well as sexual risk-taking behaviours research has also examined the effects of alcohol on violence and aggression. Sixty per cent of reported crimes occur at the weekend around pubs and clubs (Allen et al., 2003) and alcohol is associated in 40% of murders (Addition Resource, 2017). What is the nature of this observed link? A review of meta-analyses by Exum (2006) suggests a clear link between alcohol intoxication and violent and aggressive behaviour. Exum (2006) clarifies that this link is also moderated by external variables such as frustration, provocation and inhibitory conflict. This may increase the likelihood of aggression occurring in a particular scenario. Further, a meta-analysis presented by Ito, Miller and Pollock (1996) aimed to examine the role of situational factors in the moderation of alcohol and violence and aggression. Consistent with the premise of AMT, survey data indicated that participants felt that alcohol sometimes, but not always resulted in aggression. This lack of consistency in the expectation of the effect of alcohol shows that situational factors play a key role in determining whether aggressive behaviour is displayed. The analysis found that in situations of high response conflict intoxicated individuals displayed higher levels of aggression than sober individuals. In contrast to the inhibition conflict model intoxicated participants showed greater levels of aggression in general irrespective of inhibition conflict or dose. When considering other potential moderating factors, the authors found self-focus to be negatively associated with aggression. That is, when intoxicated individuals were focusing on themselves, their aggression levels were consistent with those of sober participants. The Alcohol Myopia framework can explain this as the attentional narrowing associated with alcohol intoxication means that there are insufficient attentional resources leftover to attend to external cues when one is focused on themselves. In other words, attending to one’s self becomes the most salient cue in the environment and the person’s behavioural response is not determined by less salient cues to aggression.

Giancola, Duke and Ritz (2011) looked at the potential for the Alcohol Myopia model to be used as a mechanism for the reduction of alcohol related violence. Using the same electric shock paradigm as Giancola and Corman (2007), intoxicated participants were exposed to either violence promoting or violence inhibiting cues. Consistent with previous research, aggression was operationalized as the duration and intensity of the electric shocks participants administered to a fictitious partner. The findings indicated that exposing intoxicated participants to violence inhibiting cues resulted in them being significantly less aggressive than those exposed to violence promoting cues. Thus, it suggests that external cues have the potential to be used to inhibit undesirable behaviours. The results indicated the potential for using the concepts proposed by AMT as a method of reducing negative behaviours associated with alcohol.

These findings therefore suggest that, whilst there is potential for eyewitness memory to be impaired whilst intoxicated, an intoxicated witness may be able to give accurate testimony under certain circumstances. Giancola et al. (2011) demonstrate that, when the cues to inhibit aggression are most salient, aggression is reduced. Thus, when attention is focused on encoding the event at the expense of other conflicting information, and when the importance of recalling the event is most salient at the expense of other distracting stimuli or sources of distortion, recall should be spared.

**3.5 Summary**

Research has demonstrated that people consume alcohol due to a variety of motives, and that these motives are often informed by peoples’ beliefs about the effects of alcohol. Furthermore, the beliefs about alcohol that people possess may influence a person’s behaviour when they believe themselves to be intoxicated. The detrimental effects of alcohol on behaviour are purported to be based upon the impairing effect of alcohol on controlled effortful cognitive processing, and the inability to weigh up inhibiting and impelling cues as a result of alcohol intoxication (Josephs & Steele, 1990). This leads to behaviours being influenced by the most salient cues under conditions of response conflict; that is when there are equal inhibiting and impelling cues to action, alcohol intoxication impairs a person’s ability to weigh up these cues. This myopic response can also be influenced by alcohol expectancies (Lac & Brack, 2018). Therefore, expectancies can influence not only the intention to drink but also the behavioural outcome associated with alcohol consumption. People may also engage in alcohol consumption as a function of personality characteristics and beliefs about alcohol. In combination with the narrowing effects of alcohol intoxication on attention and the impairment to controlled effortful processing, these beliefs can in turn influence behaviours when under the influence of alcohol.

These theories have considerable implications for the recall of intoxicated witnesses, and their tendency to report PEI. At an individual level, theories of metacognition, hypervigilance and AMT demonstrate not only the potential for one’s recall to be affected by intoxication, but also one’s ability to appraise their ability to recall the event. When considering intoxicated witnesses as a group and any discussion that may occur, such theoretical accounts may also offer insight. That is, because the decision to *knowingly* report PEI depends on one’s perception of themselves and their discussion partner. Such decisions will be informed by motivations for consumption and expectancies (Cooper, 1994; Merrill et al., 2016) which are the beliefs people possess as to the effects of alcohol. The next section of this thesis will present a review of the current literature on alcohol and eyewitness testimony. Research will be discussed based upon its methodology to draw inferences as to the circumstances in which alcohol may affect eyewitness testimony.

**Chapter Four: Literature review of alcohol and eyewitness memory**

The previous chapter has highlighted that people consume alcohol for a wealth of different reasons, and these reasons may be based upon the expected effects of consumption (Montes et al., 2017). The consumption of alcohol is also associated with a variety of outcomes, which may in turn be influenced by the expectations people possess as to the effects of alcohol (Cooper, 1994). In addition, the metacognitive effects of alcohol and the attentional narrowing that alcohol leads to may also influence behaviour when intoxicated (Josephs & Steele, 1990). As noted previously, research has examined the effect of alcohol intoxication in a variety of domains including sexual risk taking (Macdonald et al., 1996) and aggression (Ito et al., 1996). Another important area in which alcohol consumption may be of considerable interest is the reliability of eyewitness testimony. In the process of a trial the testimony from an eyewitness can significantly influence jury decision-making (Wise, Fishman & Safer, 2009). Both the accuracy and credibility of a witness can be affected by the consumption of alcohol. This chapter reviews literature regarding how lay people and criminal justice professionals perceive intoxicated witnesses and also discusses research that has investigated the effect of alcohol on eyewitness memory.

**4.1 Beliefs about intoxicated eyewitnesses**

There is a strong link between the commission of a crime and alcohol intoxication; Felson and Staff (2010) reported the strongest links between alcohol use in the perpetration of violent crimes such as homicide and assault. Additionally, the consumption of alcohol is associated with the increased likelihood of victimisation (Felson & Burchfield, 2006). Palmer et al. (2013) investigated the role of intoxicated witnesses in the criminal justice system and found that intoxicated and sober witnesses were both as likely to provide a description of a suspect, in addition to taking an identification test. This suggests that intoxicated witnesses are treated similarly to sober witnesses and often play an important role in the process of an investigation. Thus, it is important to understand whether intoxicated witnesses can provide accurate and reliable testimony and identifications. Evans, Schreiber Compo and Russano (2009) showed that 53% of law enforcement officers reported encountering intoxicated witnesses as being ‘common’, with a further 12.5% indicating that it was ‘very common’. Importantly, only 17% of respondents suggested that it was ‘unusual’ to encounter an intoxicated witness, suggesting that such witnesses are frequently encountered in the criminal justice system. It is also common to encounter a witness who was intoxicated at the time of the crime but sober upon interview. Police officers are likely to take initial details from a witness at the time of the incident when they are still intoxicated and subsequently conduct the evidential interview when the witness is sober again (see Crossland, Kneller &Wilcock, 2018). Crossland et al. (2018) also showed that cases in which the witness was intoxicated were less likely to go to court and that the witness was perceived by law enforcement as less accurate. As such, intoxicated witnesses and victims might be frequently encountered and as likely to engage in investigative procedures as sober ones, but they might be perceived as less credible, resulting in compromised access to a fair trial.

In assessing the impact that the presence of an intoxicated witness may have on a fair trial, it is important to understand how judges’ beliefs about intoxicated witnesses relate to research evidence on the effect of alcohol on eyewitness memory. Kassin, Tubb, Hosch and Memon (2001) established the extent to which there is acceptance amongst experts in the field on the effects of alcohol on eyewitness memory. Ninety percent of experts surveyed agreed that alcohol impairs eyewitness memory. This finding was extended by Houston, Hope, Memon and Read (2013) who sought to establish the consistency between the beliefs of a sample of judges and those of the experts in Kassin et al. (2001). Judges were introduced to the notion that crimes sometimes occur while a witness is intoxicated and were asked to rate the effect this would have on a witness’ testimony. The results showed that 97% of judges’ responses were consistent with expert opinion on the matter. It seems that the opinion of judges is consistent with experts’ opinions that intoxication may be detrimental to eyewitness testimony.

Further evidence supporting the claim that alcohol intoxication may negatively impact upon the perception of witnesses and victims comes from experimental research by Evans and Schreiber Compo (2010). They examined mock jurors’ perceptions of intoxicated witnesses and jurors’ ratings of witness impairment were significantly related to intoxication. Moderate and extremely intoxicated witnesses were rated as significantly more impaired than sober witnesses, however, there was no significant difference found between moderately and extremely intoxicated witnesses. Impairment ratings were significantly related to participants’ perceptions of witness credibility, which in turn influenced the likelihood of a jury finding a guilty verdict. The findings suggest that jurors are sensitive to the potential effects of alcohol consumption on eyewitness memory but do not distinguish between moderate and high levels of intoxication.

The presence of intoxication has also been shown to influence the perception of victim responsibility, particularly when the victim is female. Ferguson and Ireland (2012) examined victim intoxication and benevolent sexism in a hypothetical rape case. Participants viewed the victim as significantly more responsible for the crime when she was intoxicated as compared to when she was sober. Interestingly, ratings of responsibility also differed for the perpetrator based upon intoxication. Although participants rated the perpetrator as most responsible when they were portrayed as highly intoxicated, the perpetrator who was ‘merry’ was deemed as less responsible for their behaviour than when they were portrayed as sober. Similarly, Sims, Noel and Maisto (2007) reported that a victim who had consumed alcohol prior to a sexual assault scenario was perceived as more responsible for the event than a sober victim, regardless of any resistance to the perpetrator they had demonstrated. Therefore, it seems that not only does alcohol impact upon the perceived credibility of an intoxicated witness; it also negatively impacts upon the perception that a crime took place. This notion occurs in two ways: first, by viewing intoxicated victims as more responsible for the crime that happened to them due to their choice to consume alcohol, and secondly, by viewing perpetrators as less responsible for their own behaviour because of the effects of alcohol. Here it becomes apparent that people’s alcohol *expectancies* may impact upon how they perceive an intoxicated witness.

**4.2 Research into the accuracy of intoxicated witnesses**

Given these issues the question arises as to whether the commonly held beliefs about the credibility of intoxicated witnesses and victims are justified. The field of research into the effects of alcohol on eyewitness memory is relatively new and findings have been conflicting. The present review will outline current research into the effect of alcohol on eyewitness memory. Due to differences in their methodology, laboratory studies and field research will be outlined separately.

Laboratory studies examining the effect of alcohol at moderate doses (<0.08%) have generally found that intoxicated witnesses can still be accurate (La Rooy et al., 2013) although they may recall fewer details than a sober witness (Schreiber Compo et al., 2011) in addition to fewer forensically relevant details pertaining to a mock crime scenario (Read, Yuille & Tollestrupp, 1992). Within the eyewitness memory literature, there is diversity in the methodologies used to examine the effect of alcohol on eyewitness memory. This enables researchers to examine the nature of this relationship in a variety of different domains. As such, this review will address distinctions in retention interval and type of recall to provide a detailed examination of the effect of alcohol on eyewitness memory.

Whilst laboratory studies are able to provide tight control of the degree of intoxication a participant is under, they inherently suffer from a lack of ecological validity. Field studies overcome this problem, and additionally are able to measure the effect of alcohol on eyewitness memory at higher levels of intoxication. Research in the field is able to assess the effect of alcohol on eyewitness memory at BACs of > 0.08% (Altman et al., 2018) in order to establish whether, at such high levels, alcohol begins to have a detrimental effect on memory accuracy. Much like laboratory studies, a diverse range of methodologies has been used in field research, including immediate and delayed recall, as well as identification tasks. Table 4.1 provides a summary of the key research into alcohol and eyewitness memory.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Study** | | **Study Type** | **Dosage** | **Experimental Manipulation** | **Key Findings** |
| Van Oorsouw, Broers and Sauerland (2019) | Field | | Up to 0.16% | -Misinformation acceptance  -Time of testing | -Significant negative effect of BAC on memory completeness, no effect on accuracy regardless of test session  - BAC increased misinformation acceptance and this was greater in the immediate testing condition. |
| Van Oorsouw, Broers and Sauerland (2019) | Field | | Up to 0.20% | -Misinformation acceptance  -Time of testing | -Significant negative effect of BAC and delayed testing vs immediate testing on memory completeness  -Significant effect of previous intoxication on accuracy for repeated testing.  - BAC increased the tendency to adopt misinformation in the delayed only testing condition.  Effect of BAC on misinformation mediated by completeness. |
| Hagsand, ﻿Hjelmsäter, ﻿Granhag, ﻿Fahlke & ﻿Gordh (2017) | Laboratory | | 0.05% | -Retention interval  - number of recall attempts | - No significant effect of BAC on accuracy, but a significant effect of testing session.  - Participants reported new information in the 2nd recall. Repeated recall was superior to only one recall session regardless of intoxication. |
| **Study** | **Study Type** | | **Dosage** | **Experimental Manipulation** | **Key Findings** |
| Altman, Schreiber Compo, McQuiston, Hagsand & Cervera (2018) | Field | | Up to 0.29% | -Higher levels of intoxication on immediate event recall  -Line-up identification. | -BAC significantly, negatively predicted recall completeness.  -BAC significantly, negatively predicted recall accuracy.  - BAC significantly, positively predicted inaccurate recall.  - No significant effect of BAC on line-up choosing behaviour or accuracy. |
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|  |  | |  |  |  |
| Harvey, Kneller & Campbell (2013) | Laboratory | | 0.06% | - Effect of intoxication on eye movement and recall using AMT | - Significantly more peripheral than central details recalled overall.  - Significantly more information recalled from the high salience scene than low salience scene.  - Number of central items recalled significantly higher from the high salience scene than low salience scene.  - Intoxicated participants recalled fewer items overall. |
|  |  | |  |  |  |
| Kneller & Harvey (2016) | Laboratory | | 0.05% | -Effect of intoxication on line-up performance | - No significant effect of alcohol on identification accuracy. Participants more likely to make an inaccurate ID |
| **Study** | **Study Type** | | **Dosage** | **Experimental Manipulation** | **Key Findings** |
| Flowe, Takarangi, Humphries & Wright (2016) | Laboratory | | 0.05%  0.08% | - Effect of alcohol dose on reporting a hypothetical sexual assault  - Effect of delay on recall | - Participants in the high BAC condition reported significantly fewer details than moderate.  - Significant effect of BAC on accuracy, only when I don’t know responses are coded as incorrect.  - Accuracy was significantly greater for central than peripheral details for all participants.  - Accuracy decreased across the retention interval, this was greater for central than peripheral details. |
| Colloff & Flowe (2016 | Laboratory | | 0.06% | - Effect of alcohol intoxication on face recognition. | - Participants were significantly more likely to identify a distinctive face than non-distinctive and this effect was stronger after a delay.  - Participants who had consumed alcohol made more positive identifications than sober participants. |
| Gawrylowicz, Ridley, Albery, Barnoth & Young (2017) | Laboratory | | 0.07% | - Effects of alcohol on misinformation | - Consuming alcohol after witnessing a mock crime but prior to encountering PEI reduces reporting of misinformation. |
| **Study** | **Study Type** | | **Dosage** | **Experimental Manipulation** | **Key Findings** |
| Van Oorsouw & Merckelbach (2011) | Field | | Up to 0.24% | -Effect of alcohol on memory recall of a crime | - Higher BACs were associated with lower completeness for free and cued recall and central and peripheral details.  - Higher BACs associated with greater reporting of errors in the cued recall test only.  - Higher BACs associated with poorer memory accuracy for free and cued recall.  - Moderately and severely intoxicated participants recalled significantly fewer central details, but only severely intoxicated participants recalled significantly fewer peripheral details. |
| Read, Yuille & Tollestrupp (1992) | Laboratory | | Target BAC 0.11% | -Effects of alcohol and arousal on recall and identification performance | - Intoxicated participants had a significantly lower accuracy rate, due to the inclusion of errors or unscoreable information in their recall. |
| Flowe, Colloff, ﻿Karoglu, Zelek, Ryder, Humphries & Takarangi (2017) | Laboratory | | 0.08% | -Effects of alcohol on line-up identification and confidence | - Intoxication was not related to choosing or identification accuracy.  - Intoxicated participants reported lower confidence overall. |
| **Study** | **Study Type** | | **Dosage** | **Experimental Manipulation** | **Key Findings** |
| Read, Yuille & Tollestrupp (1992) | Laboratory | | Target BAC 0.08% | Effects of alcohol and arousal on recall and identification performance | -Higher instance of incorrect information about female intruder recalled by intoxicated participants.  -Alcohol significantly impaired participants reporting of what they did and in which order.  -Alcohol impaired identification performance only in the ‘low arousal’ condition. |
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| La Rooy, Nichol & Terry (2013) | Laboratory | | 0.01%  0.07% | - Effects of alcohol on recall across repeated interviews | - No effects of alcohol or dose on recall.  - no increase in information over repeated interviews. |
|  |  | |  |  |  |
| Altman, McQuiston & Schreiber Compo (2019) | Field | | Up to 0.24% | -Effects of alcohol and identification format | - No effects of alcohol on choosing behaviour.  - Effect of identification format on choosing, such that a false ID was more likely in the line-up than show-up condition. |
| Crossland, Kneller &Wilcock (2016) | Laboratory | | 0.06%  0.09% | - Testing AMT | - No effect of intoxication on accuracy in free or cued recall. |
| **Study** | **Study Type** | | **Dosage** | **Experimental Manipulation** | **Key Findings** |
| Crossland, Kneller &Wilcock (2016) | Field | | Up to 0.23% | -Testing AMT | - Increasing intoxication impaired completeness of both central and peripheral details in free recall.  - No effects of intoxication on recall accuracy.  - High BACs performed more poorly on the recognition test only when ‘I don’t know’ responses taken into account. |
| Sauerland, Broers & Van Oorsouw (2018) | Field | | Up to 0.16% | -Effects of intoxication on identification performance | - The odds of making an ID choice increased by 3.06 times with each successive unit of alcohol.  - Confidence was higher for choosers than non-choosers. |
| Sauerland, Broers & Van Oorsouw (2018) | Field | | Up to 0.20% | -Effects of intoxication on identification performance | -The odds of a correct ID were 3.5 times as large with every unit decrease in alcohol consumption.  - Correct ID 7 times more likely in session 1 than 2. |
| Dysart, Lindsey, Macdonald & Wicke (2003) | Field | | Up to 0.21% | -Effects of intoxication on show-up performance | - No effect of BAC on target present accuracy.  - BAC associated with increased likelihood of false ID in target absent show-up. |
| **Study** | **Study Type** | | **Dosage** | **Experimental Manipulation** | **Key Findings** |
| Schreiber Compo, Evans, Villlalba, Ham, Garcia & Rose (2012) | Laboratory | | 0.08% | - Effects of intoxication on misinformation | - No effect of intoxication on reporting misinformation encountered from experimental confederate. |
| Schreiber Compo, Evans, Carol, Kemp, Villlalba, Ham, & Rose (2011) | Laboratory | | 0.07% | -Testing AMT | - Intoxicated participants reported fewer peripheral details.  - Placebo participants reported more instances of ‘I don’t know’ responses. |
|  |  | |  |  |  |
| Van Oorsouw, Merckelbach & Smeets (2015) | Field | | Up to 0.26% | -Effects of alcohol on suggestibility to misinformation | - Intoxicated participants less complete both immediately and after delay.  - Highly intoxicated participants significantly more likely to go along with suggestions at both time points. |
| Thorley & Christiansen (2018) | Laboratory | | 0.06% | -Effects of alcohol on social contagion | -Beverage consumed had no impact upon the tendency to report contagion items. |
| Hagsand, ﻿Roos-af-Hjelmsäter, Granhag, Fahlke & ﻿Söderpalm- Gordh (2013) | Laboratory | | 0.04%  0.06% | - Effects of alcohol on eyewitness recall | - No effects of alcohol on accuracy of memory reports.  - Highly intoxicated participants significantly less complete. |

*Table 4.1*: Study summary table of research into alcohol’s effects on eyewitness memory.

**4.2.1 Intoxication and retention interval.**

Several eyewitness memory studies in the laboratory have investigated the effect of alcohol intoxication when participants were still intoxicated at the time of recall and thus utilise a minimal retention interval. For example, Schreiber Compo et al. (2011) examined participants who consumed alcohol (BrAC = .07) compared to placebo and control participants in a bar laboratory setting. Participants interacted with a bartender confederate and had to recall this interaction whilst still intoxicated. They found no significant effect of alcohol intoxication on the number of accurate central details reported whilst placebo participants were more likely to indicate uncertainty in their response by including a ‘don’t know’ response. The authors used the *hypervigilance* hypothesis to explain these findings, such that the belief that one had consumed alcohol led to participants exhibiting less certainty in their memory recall. Also, participants who had consumed alcohol reported significantly fewer accurate peripheral details than placebo and control participants. There were, however, no group differences in the number of inaccurate details reported. Thus, while intoxicated witnesses may report fewer accurate details, they were no more likely to report errors in their accounts. Intoxicated participants were also shown to incorporate more subjective unscoreable information into their accounts. Therefore, the utility of a witness’ statement may be compromised by alcohol intoxication through the inclusion of subjective feelings at the expense of forensically relevant information relating to details of the event.

A review of the literature indicates that it is more common for studies to utilise a delayed recall paradigm, in which participants encode an event whilst intoxicated, and subsequently recall their memory for the event after a delay in a sober state. Schreiber Compo et al. (2017) compared the effect of state and delay on recall in an eyewitness memory paradigm to determine the most opportune time to interview an intoxicated witness. Intoxicated (BACs 0.06% - 0.08%), sober and placebo participants witnessed a mock crime. Subsequently they recalled the event either immediately or after a 1-week delay and either in the same intoxication state as during encoding or in a different state. Encoding and recalling the event in the same state had no significant advantage upon one’s memory recall performance. However, intoxicated participants performed better when recalling straight away. That is, there was no effect of alcohol on immediate recall quality but after a 1-week delay participants who consumed alcohol reported significantly less accurate information than control or placebo participants.

The effect of delay was also investigated using an interview methodology by Hagsand, Hjelmsater, Granhag, Fahlke and Soderpalm Gordh (2017). Participants consumed either orange juice or alcohol (BAC 0.05%) before witnessing a mock crime. Recall was tested either immediately and after a 1-week delay, or after a 1-week delay only. The findings showed that alcohol had no impact on the quantity or quality of information reported. Additionally, both sober and intoxicated participants benefited from immediate recall as opposed to recalling after a delay. Thus, the literature consistently demonstrates a benefit of immediate recall, both for those who are intoxicated and sober participants.

This is further purported by Colloff and Flowe (2016) in research that examined the benefits of immediate versus delayed recall with the additional variable of facial distinctiveness. The findings showed a significant effect of alcohol consumption - those who had consumed alcohol were significantly more likely to make a positive identification. This suggests a more liberal response criterion in which intoxicated participants were more likely to make a choice. Additionally, an effect of distinctiveness was found which was stronger after a 24-hour delay. The 24-hour delay also increased the likelihood of making a false identification. These findings suggest that witnesses were more likely to identify a distinctive face; especially after a delay, and that delayed identification increased the rate of false identifications. Similarly, research by Flowe, Takarangi, Humphries and Wright (2016) examined recall of a hypothetical sexual assault scenario whilst participants were either mildly intoxicated (0.04%), highly intoxicated (0.08%), or sober. Recall took place either 24 hours or four months later. Highly intoxicated participants reported significantly less information than moderately intoxicated or control participants. The authors found a significant effect of delay, with a larger decrease in accuracy for peripheral than central details. Thus, the findings affirm the notion that intoxicated witnesses should be preferably interviewed immediately.

Whilst research has asserted that immediate recall may be preferable to recall after a delay, La Rooy et al. (2013) investigated the effect of alcohol intoxication on the accuracy of an eyewitness statement over repeated interviews. The authors compared low doses (0.2g/kg) and moderate to high doses of alcohol (0.6g/kg) with a placebo and recall after the event with a second recall test a day later. The findings showed no significant effect of alcohol on either number of accurate details reported or number of errors reported. All groups, regardless of intoxication level, demonstrated a spontaneous reminiscence effect whereby they produced new, accurate details in the second session that they did not report in the first. There were also more errors reported in the second session, but this did not significantly differ by intoxication level. Thus, although a repeated interview may provide the opportunity for spontaneous reminiscence (La Rooy et al., 2013) it may also reduce the number of accurate details reported for both sober and intoxicated participants (Flowe et al., 2016; Schreiber Compo et al., 2017).

Field studies have also examined the effect of intoxication on recall both immediately and after a delay. One advantage of field research is the ability to investigate participants at higher levels of intoxication than typically studied in the laboratory. To this extent, by using an immediate recall testing procedure it is possible to examine how higher levels of intoxication (> 0.08%) at encoding and retrieval effect eyewitness memory after no delay. Altman et al. (2018) used such an immediate recall method in their field study. The findings demonstrated that BACs (up to 0.29%) significantly predicted the quantity of information recalled and the percentage of accurate information recalled. It seems, therefore, that at higher levels of intoxication not only are intoxicated eyewitnesses less complete in their accounts, they are also significantly less accurate.

In general, field studies have utilised a procedure in which participants were approached in bars to take part in the initial phase of the experiment when intoxicated and then completed the rest of the experiment after a delay when sober. For example, Crossland et al. (2016) recruited participants in a bar and tested their recall seven days later. The findings suggest that participants with low BACs produced significantly more correct decisions and fewer ‘do not know’ responses than those with higher BACs. The completeness of a highly intoxicated witness’ account was also significantly less than those with lower BACs. These findings are consistent with Altman et al. (2018) in that at high levels of intoxication eyewitness’ accounts were less complete and less accurate than those of sober witnesses. This holds true when participants recalled immediately as well as after a delay. The effect of high doses of alcohol on memory accuracy after a delay was further demonstrated by Van Oorsouw and Meckelbach (2012). Participants (BACs ranged from 0.00%-0.24%) were approached in bars and asked to watch a video of a mock crime and were then followed up 3-5 days later. Consistent with previous research, a significant negative correlation was found between BAC and memory completeness – increasing intoxication was associated with decreasing memory completeness. A significant negative correlation was also found between BAC and memory accuracy, such that memory accuracy decreased as intoxication level increased.

Therefore, field studies demonstrate an effect of alcohol intoxication on completeness (the number of details reported), which is consistent with the findings of laboratory studies. However, findings from field research also demonstrate that at higher levels of intoxication than is typically found in the laboratory there is also an effect of alcohol on accuracy. In other words, highly intoxicated witnesses may be both less complete and less accurate than their sober counterparts when recall is tested immediately (Altman et al., 2018) and after a delay (Van Oorsouw & Mercklebach, 2012).

**4.2.2 Applied implications of retention interval.**

Work by Crossland, Kneller and Wilcock (2018) suggests that when police encounter an intoxicated witness, initial details are taken at that time whilst an evidential interview would be taken after a delay when the witness is sober. Research into the timing of recall under conditions of intoxication however suggests that in order to elicit the most complete and accurate account, intoxicated witnesses should be interviewed immediately (Schreiber Compo, 2017). At moderate doses recall may be less complete but no less accurate (Flowe et al., 2016). At high levels of intoxication witnesses are less accurate and less complete even when tested immediately (Crossland et al., 2016). This effect is further exacerbated with a delay. Thus, one applied implication is that an immediate interview is preferable so that the detrimental effects of intoxication are not combined with the detriments associated with delayed recall. There is an effect of retention interval such that accounts are less impaired when recall is immediate. However, there is also a dose effect, whereby moderately intoxicated witnesses are no less accurate when recall is immediate. This thesis aims to understand how co-witness information and intoxication effect eyewitness recall using an immediate recall procedure. In so doing, it will be possible to examine whether, when recalling immediately, if moderately intoxicated participants are no less able than sober ones to provide accurate testimony. Additionally, whether highly intoxicated participants are less accurate even when recalling straight away. The next section of this review will address the impact of alcohol intoxication on suggestibility to misinformation.

**4.2.3 Misinformation**

Whilst eyewitness memory studies have examined the accuracy of memory recall, the tendency towards suggestibility, or to report misinformation has also been examined in both laboratory and field studies.

Thorley and Christiansen (2018) examined the effect of alcohol, placebo or a soft drink on the tendency to report misinformation encountered from a confederate during a recall task. When examined with a free recall test in addition to a recognition test whilst still intoxicated, the authors found no effect of drink consumed on the tendency to report contagion items, which were items reported by the confederate that were not present in the visual scene participants studied. All participants reported contagion items, and this was not increased by the consumption of alcohol. Additionally, research by Schreiber Compo et al. (2012) investigated the effect of alcohol intoxication on the susceptibility to misinformation in a live staged theft with immediate recall. Intoxicated participants (.08g/210L) were no more likely than placebo or control participants to incorporate misinformation in their accounts. Furthermore, BrAC did not predict accuracy rate, percentage of correct, false or don’t know responses. The influence of interview timing was also examined for its impact on witness suggestibility (Evans, Schreiber Compo, Carol, Nichols-Lopez, Holness & Furton, 2018). Participants were assigned to either a control, placebo or intoxicated (0.06-0.08%) condition at encoding. Much like Schreiber Compo et al. (2017), participants were subsequently assigned to one of two recall conditions. In the immediate recall condition, they recalled the video after no delay in the same state. In the delayed condition, they returned 1-week later and recalled the video in either the same state or a different state. After watching the video, participants completed a forced choice recognition test that had correct and incorrect responses circled ostensibly from a previous participant. Participants who were assigned to the delayed recall condition returned after 1-week, consumed their assigned beverage and again completed the forced choice recognition task. There was a significant effect of delay on agreement with suggested responses, such that agreement was higher after a delay than in the immediate recall. Intoxicated participants were significantly more likely to agree with inaccurate suggestions than those who were sober, and this was significantly more so after a delay. Thus, during conditions of immediate recall, intoxication does not increase the tendency to report misinformation, however after a delay, the tendency to report misinformation may increase amongst those who are intoxicated.

Conversely, research has identified potential protective effects of the consumption of alcohol. Gawrylowicz et al. (2017) utilised a cued recall procedure, which exposed participants to erroneous PEI *after* having consumed alcohol, a soft drink or a placebo. Findings demonstrated a protective effect of alcohol whereby those who consumed alcohol after viewing a mock crime but prior to encountering misinformation actually reported fewer misinformation items in their cued recall test than sober or placebo participants. Thus, at moderate doses of intoxication, alcohol may not increase the tendency to report misinformation and, depending on timing, may reduce it. However, in order to examine the effect of intoxication on misinformation at higher doses, studies have also been conducted in the field.

Van Ooursouw, Broers and Sauerland (2019) approached participants in bars and engaged in a short conversation with them. Subsequently a second researcher approached who informed them of the nature of the study and breathalysed all participants willing to take part. Finally, a third researcher gave participants a 10-item memory test about their interaction with the first researcher that also contained pieces of misinformation. This test was also sent via email for participants to complete when sober. The results demonstrated a significant effect of BAC on memory completeness regardless of test session and no effect of alcohol on accuracy was found. The effect of BAC on completeness was not overcome by repeated testing once sober. However, the acceptance of misinformation was greater as alcohol intoxication increased with intoxicated participants being more prone to accepting misinformation during the immediate testing session than in the repeated sober test. Moreover, the tendency to adopt misinformation was mediated by participants’ memory completeness. Thus, participants were more likely to adopt misinformation when their memory accounts lacked detail. In their second study, the addition of a delayed only testing condition revealed that intoxication reduced completeness and increased misinformation in the delayed only and repeated testing conditions as compared to the immediate only testing conditions.

**4.2.4 Applied implications of misinformation**

The current literature on the effects of alcohol on misinformation therefore presents some conflicting findings as to the effects of alcohol on misinformation. The tendency to report misinformation may be influenced by a number of factors including the dose of alcohol administered and the method of encountering PEI. In addition, the timing of recall may also impact upon whether one will report misinformation or accurate information. For example, Van Oorsouw et al. (2019) suggested an advantage of delayed recall in reducing misinformation. At present the research suggests that moderately intoxicated witnesses are no more likely to report false information gained from PEI than a sober one. However, one source of misinformation that has not been investigated is misinformation gained during a dyadic discussion. This would be a forensically relevant source of PEI as it is likely, given how crimes involving alcohol often occur in social places (Allen et al., 2003) that intoxicated witnesses would discuss a crime and therefore potentially expose one another to erroneous PEI. This thesis aims to address the current gap in the literature by examining misinformation that is encountered through social means. As such, it will examine whether intoxicated participants are more or less likely to conform to the memory reports of their discussion partner due to the roles of normative influence, informational influence and source misattribution outlined in chapter two. The next section of this review will discuss the impact of recall format on memory accuracy for participants who have consumed alcohol.

**4.2.5 Recall Format**

Laboratory studies have investigated the effect of alcohol intoxication on eyewitness recall using a variety of different methods of recall. These include open free recall questions, cued recall questions and recognition questionnaires. Studies using open-ended questions have included both written free recall questions in addition to interviews in which participants were asked open-ended questions verbally about the witnessed event. The diversity of methodologies employed demonstrates that the effect of alcohol on memory recall may further be influenced by the recall methodology employed.

Studies utilising free recall methods have found that intoxicated participants may report fewer details, however, were not more prone to reporting errors. Schreiber Compo et al. (2011) found that intoxicated participants were no less accurate in their recall of a ‘bar’ encounter. Similarly, Thorley and Christiansen (2018) found intoxicated participants were no more prone to report social contagion items. Harvey et al. (2013) utilised eye-tracking methodology in addition to a free recall component and found that participants who had consumed alcohol recalled significantly fewer details overall. Conversely, Read et al. (1992) found a significant effect of alcohol on accuracy. Participants were interviewed using a cognitive interview procedure one week after committing a mock theft. The interview was conducted after consuming alcohol or a soft drink. Those who had consumed alcohol were significantly less accurate in their recall than those in the control condition. Specifically, participants who had consumed alcohol included significantly more incorrect details. Furthermore, consistent with Schreiber Compo et al. (2011), intoxicated participants included significantly more unscoreable information in their accounts, which were subjective details reported by participants that did not refer to the actions of the witnessed event. Hagsand et al. (2013) also utilised an interview format in which participants were asked seven open-ended questions 1-week after witnessing a staged kidnapping. The study found that those in the high alcohol condition (0.7g/kg) reported significantly fewer details overall and significantly fewer details of the crime itself. In addition, there was no effect of alcohol on accuracy rate. Thus, a review of the alcohol literature suggests that using a free recall format seems to produce fewer details from intoxicated witnesses although in general they are not less accurate than sober witnesses.

Crossland et al. (2016) utilised both a free recall component in addition to a 40-item recognition questionnaire that participants completed after a one-week delay when sober. When recall was measured using a recognition questionnaire there was no significant difference in accuracy between drinking conditions. This finding persisted when accuracy was calculated controlling for reported confidence. When examining the free recall, there was also no difference between drinking condition on completeness or accuracy. Whilst this finding is somewhat inconsistent with previous research, the scoring system utilised may provide some tentative explanation. The study was interested in the effect of AMT on eyewitness recall. Thus, in the free recall any detail that was not classed as either high or low in salience based upon the results of a pilot study were not analysed. Whilst this approach is justified given the focus of the study, it may have led to differences in the quantity or quality of recall between drinking conditions not being apparent.

In contrast to free recall measures, cued recall measures have been demonstrated to be associated with greater errors in reporting by intoxicated witnesses. Schreiber Compo et al. (2012) utilised both open-ended and cued recall procedures when interviewing participants. The authors found no significant effect of alcohol intoxication on misinformation or accuracy. There was, however, a significant interaction between intoxication and interview format. Intoxicated and placebo participants reported more false answers in the cued recall condition. When taking participants with a blood alcohol level > 0.08%, the same interaction was found for the percentage of false answers given. That is, there were a higher percentage of false answers given for those who were highly intoxicated in the cued recall format. Schreiber Compo et al. (2017) also found in their test of state-dependency that in the cued recall condition intoxicated participants reported significantly more errors, and significantly lower accuracy after a delay than sober and placebo participants. Thus, using cued recall measures may increase the amount of inaccurate information reported as compared to free recall measures.

Flowe et al. (2016) also utilised a recognition questionnaire to examine the effect of alcohol intoxication on memory accuracy. A 30-item recognition questionnaire was used, which provided participants with the option of an ‘I don’t know’ response. The findings showed that highly intoxicated participants had significantly lower accuracy. However, after removing ‘I don’t know’ responses, this effect was not apparent. Thus, intoxicated witnesses may recall fewer details, as evidenced by their increased use of the ‘I don’t know’ response option, but they were not more errorful in the details they did include.

Overall, tests of free recall consistently demonstrate that mild to moderate levels of alcohol intoxication are not detrimental to eyewitness memory but when investigated with a cued recall measure and recognition tests errors and I don’t know responses may increase. This can be explained by the nature of the cued recall that forces participants to attempt to make a response to a detail that they otherwise would be unable to recall. In fact, the tendency to make ‘I don’t know’ responses during cued recall tests may be an indication of the effect of alcohol intoxication on metacognition. Metacognitive knowledge refers to the information people possess about their own emotions and competence (Wells, 2000). Fillmore and Vogel-Sprott (1996) demonstrated that experienced drinkers expected impairment on a task after consuming alcohol that was significantly related to their actual performance on a task. Thus, the tendency of intoxicated participants to report ‘I don’t know’ can be taken as evidence of their ability to regulate their memory and appraise their competence at the given task. Participants under the influence are able to correctly identify a weakness in their memory rather than try to incorrectly recall a detail.

Regarding field research, the most common experimental procedure used is a combination of free recall measures with a cued recall or recognition test. Altman et al. (2018) used an interview procedure, in which participants were asked two open-ended questions followed up with nine specific cued recall questions. Alcohol intoxication significantly predicted the quantity and percentage of accurate information recalled for both open and cued recall questions. However, consistent with previous research, alcohol intoxication only significantly predicted errors in the cued recall questions and not in the open questions. Similarly, Crossland et al. (2016) used a free recall and recognition questionnaire and showed that low BACs produced significantly fewer ‘I don’t know’ responses to the recognition questions and significantly more correct decisions. Van Oorsouw and Merckelbach (2012) also utilised both free and cued recall procedures. Participants were sent both recall questionnaires 3-5 days after viewing a mock crime in the field, with the free recall test being given first. Whilst the study found a significant negative correlation between BACs and completeness and BACs and memory accuracy for both free and cued recall tests, there were also differences that emerged between the recall measures. In the free recall test, there was no correlation between intoxication and errors, whereas in the cued recall condition there were significant correlations between BACs and distortion errors as well as commission errors. Furthermore, in the free recall condition intoxication was negatively correlated with memory accuracy but not with accuracy for central or peripheral recall. In the cued recall test BACs were correlated with total accuracy, central accuracy and peripheral accuracy.

Together this suggests that not only is *timing* of recall important when encountering intoxicated witnesses, the *method* of recall used may also lead to differences in both the quantity and quality of information produced. In a meta-analysis of studies investigating the effect of intoxication on eyewitness memory, it was found that cued recall measures had a larger effect on memory errors than free recall ones (Jores et al., 2019). That is, cued recall measures may increase the number of errors that intoxicated witnesses report.

**4.2.6 Applied implications of recall format.**

An investigation into the types of recall measure used in research studies may provide some procedural applications when encountering intoxicated witnesses. An applied implication that has arisen is that using free recall and open-ended questions are preferable when compared to using cued recall measures for interviewing intoxicated witnesses (Jores et al., 2019). Although free recall measures may lead to less complete accounts from intoxicated witnesses (Hagsand et al., 2013), cued recall measures may increase the number of errors witnesses report (Schreiber Compo et al., 2012). This compromises the utility of a witness’ statement due to the potential for the testimony to contain errors. In order to understand the effects of alcohol and discussion on eyewitness memory reports, studies in this thesis will incorporate both free and cued recall questions. In so doing, it can be determined whether accuracy and completeness are differentially affected by alcohol depending on the recall method used. In addition, it will also be possible to examine whether the tendency to report PEI is influenced by recall format.

Whilst timing and method have been demonstrated to be important in the recall of intoxicated witnesses, studies have also examined the ability of intoxicated witnesses to carry out line-up identifications. The following section will outline research examining how well intoxicated witnesses perform at identifying a suspect from a line-up.

**4.2.7 Identification performance**

In addition to measures of memory recall, laboratory and field studies have also investigated the ability of intoxicated witnesses to correctly identify a suspect from a line-up. For instance, Hagsand et al. (2013) investigated the effect of alcohol intoxication at low (0.4g/kg) and high (0.7g/kg) doses of alcohol consumption. Findings showed that overall accuracy was poor but that this was not influenced by alcohol intoxication. Similarly, Kneller and Harvey (2016) found that intoxicated participants were no less likely to make an accurate identification from a target present line-up than sober or placebo participants. In addition, all participants were more likely to make a false identification than a correct rejection in target absent line-ups and this was not related to alcohol intoxication. These findings suggest that identifying a suspect from a line-up is generally a very difficult task, but that alcohol intoxication does not impact that performance.

In other work Yuille and Tollestrupp (1990) investigated the effect of alcohol on identification in an eight-picture photo spread. Consistent with previous research the authors found that there was no effect of alcohol on ID recognition in the target present condition. In the target absent line-up both intoxicated and sober participants were more likely to be inaccurate although this effect was larger for intoxicated participants. Flowe et al. (2017) also found a preference for target present conditions such that participants were more accurate when the target was present than when they were absent. They found that this was not affected by alcohol condition. Alcohol did, however, have an effect on confidence whereby those who consumed alcohol were less confident than those who did not. Harvey et al. (2013) replicated this finding. Participants made an identification one day after viewing the event, with sober participants reporting significantly higher confidence than intoxicated participants. There was no effect of alcohol consumption on the accuracy of the identification. It seems that under target present conditions intoxicated witnesses are no less accurate, but they may report lower confidence.

Studies in the field have also examined the effect of alcohol intoxication on line-up identification. Sauerland, Broers and van Oorsouw (2018) used an immediate recall procedure in addition to delayed recall in a measure of witness identification. They found that a correct identification was seven times more likely in session one when identification was immediate than session two after a delay, whilst false identifications were twice as likely in session two as in session one. There was also a significant effect of alcohol intoxication with participants being 4.5 times more likely to make a false identification with each successive unit of alcohol. Altman et al. (2018) reported no significant effect on line-up identification despite finding an impairing effect of alcohol consumption on eyewitness recall. There was, however, a significant effect of target presence, such that participants were more accurate for the target present than target absent line-up task and this held true for both sober and intoxicated participants. Additionally, in Altman et al. (2019) participants were asked to complete a line-up identification task consisting of a line-up and show-up[[3]](#footnote-3) procedure. Results showed that for the target present condition neither BAC nor identification procedure could predict choosing behaviour. Additionally, neither alcohol intoxication nor identification procedure predicted accuracy. With regards to the target absent condition, only line-up procedure was able to significantly predict choosing behaviour, with participants significantly more likely to choose a suspect in the line-up than the show-up procedure. This finding contradicts the assertion that show-up procedures are more likely to lead to a false identification (Luria, 2007) although they are consistent with a meta-analysis by Steblay, Dysart, Fulero and Lyndsay (2003) which suggests that show-up procedures actually demonstrate a higher rate of correct rejections than line-ups. Crucially these findings showed that although intoxication reduced the quality and quantity of information recalled it did not significantly impact upon the ability of witnesses to make an identification.

Other research by Dysart, Lindsey, Macdonald and Wicke (2002) found a decrement in performance in the target absent condition, as well as a significant effect of alcohol on identification performance. Dysart et al. (2002) used a show-up procedure in which participants were approached in a bar and asked to identify the experimental confederate from either a target present or target absent show-up. In the target present condition, those with high and low blood alcohol were both as likely to make a correct identification. However, in the target absent condition, those with low BAC were more likely to make a correct rejection than those with high blood alcohol. Participants were also followed up one week later to make an identification of a different confederate from a six-person line-up. Forty-five per cent of participants made a correct decision at both time points while 45% made one correct decision, and 10% made incorrect identifications at both times.

**4.2.8** **Applied implications of identification performance research.**

Laboratory research suggests that intoxicated witnesses were no less able to correctly identify a suspect from a target present line-up than sober witnesses. In general, all witnesses demonstrated poorer performance for target absent identifications regardless of level of intoxication. Intriguingly, despite intoxicated witnesses being no less accurate during ID tasks, they reported lower confidence than their sober counterparts (Harvey et al., 2013). This is an important factor to note for police officers and triers of fact. It suggests that confidence is not a good indicator of accuracy when making identifications. Studies indicate that jurors are swayed by factors such as confidence (Cutler et al., 1990). It may be important to highlight in this context that an intoxicated witness can still be accurate whilst lacking confidence.

Field research echoes the findings of laboratory studies by demonstrating that in target present conditions, sober and intoxicated eyewitnesses were equally able to make a correct identification, even under high levels of intoxication. Identifications under target absent conditions were more difficult for both sober and intoxicated witnesses (Altman et al., 2018) but when using a show-up procedure, high levels of intoxication impaired the ability to make a correct rejection under target absent conditions compared to low levels intoxication (Dysart et al., 2002). This thesis aims to understand how intoxication and discussion affect eyewitness memory reports; however, a key component of eyewitness testimony is identification. The contradictory findings between participants’ ability to carry out an identification and their confidence echoes research on memory recall (Crossland et al., 2016; Harvey et al., 2013) and suggests that despite being able to successfully perform the tasks required of an eyewitness, intoxicated participants’ metacognitive judgements in their ability are impaired (Evans et a., 2017).As a key component of an investigation, it is important to examine the ability of an intoxicated participant to carry out an identification, in order to gain a complete understanding of how alcohol affects eyewitness memory, in both reports and identification.

**4.2.9 Type of detail**

Whilst research into the effect of intoxication on eyewitness memory has examined factors such as accuracy and completeness generally, studies have also focused on the specific type of detail participants’ recall. Based upon the theoretical framework of AMT, the motivation of such studies is to examine whether the attentional narrowing caused by alcohol intoxication results in a tendency to recall details of high salience at the expense of those of lower salience.

Harvey et al. (2013) examined the number of eye movements and fixations on high versus low salience scenes. The findings showed that all participants showed greater fixation on a high rather than low salience video. More specifically intoxication increased the amount of time participants stayed fixated on the central aspect of the scene at the expense of dwell time on the peripheral parts. Despite increased fixation on this area, intoxicated participants were still unable to recall as many details as their sober counterparts. The findings partially replicated those looking at the effect of alcohol on recall generally, which have found a detrimental effect of intoxication on completeness (Hagsand et al., 2013). Also, Schreiber Compo et al. (2011) found that although intoxication had no effect on the number of central details reported, it reduced the number of peripheral details participants recalled. This finding is consistent with the notion that intoxication reduces attentional capacity to the most salient aspects of the scene at the expense of more peripheral details. In contrast, Flowe et al. (2016) did not find the same effect of intoxication on type of detail reported. Instead they reported a general effect of salience such that all participants recalled more central than peripheral information. They suggested some methodological differences to explain the findings. First, participants in Flowe et al. (2016) recalled after a delay when in a sober state. Second, these participants encoded an emotionally charged event in the form of a hypothetical sexual assault. The authors suggested this could have led to all participants elaborating on the event during the retention interval, leading to greater recall. An overall effect of salience that did not differ based upon intoxication was also found in recognition test responses (Crossland et al., 2016). Intriguingly, Van Oorsouw and Merckelbach (2012) found intoxication to reduce the number of central details recalled, whilst having no impact upon those deemed peripheral.

It seems that alcohol intoxication may reduce the number of details from a scene that a witness recalls but the expectation of a clear distinction between items classed as central and peripheral may be too simplistic to capture the nature of the effect of intoxication on witness memory. As Flowe et al. (2016) demonstrated, the emotionality of the scene may impact upon the extent to which both sober and intoxicated witnesses are able to encode it. Furthermore, Schreiber Compo et al. (2012) suggested that the forensically relevant nature of a to-be-remembered event results in it being perceived as important and thus highly salient. This means that intoxicated witnesses are then as able as their sober counterparts to recall it. One key component of AMT theory that has been somewhat neglected in the conceptualisation of how alcohol may influence the type of detail remembered is the level of response conflict present. As outlined in chapter three, intoxication causes a myopic response on behaviour and cognition only when there are competing impelling and inhibiting cues (Moss & Albery, 2009). When no conflict is present, a relationship between intoxication and behaviour is not seen (Steel & Southwick, 1985). As such, in studies examining alcohol’s effects on memory recall, when there is no response conflict present, a myopic response does not occur.

Whilst the expected effect of intoxication and salience has not been consistently found, there is a trend in studies of eyewitness recall for under confidence displayed by those who were intoxicated (Crossland et al., 2016; Flowe et al., 2017; Harvey et al., 2013). This finding suggests that whilst intoxicated participants are able to perform the task, they may have found it more difficult. When looking at the three steps of AMT, it purports that intoxication impairs controlled effortful processing, whilst leaving automated, highly practiced processes relatively unimpaired (Josephs & Steele, 1990). Thus, the lack of confidence shown by participants can be interpreted as an indication of task difficulty that is consistent with the impairment of effortful processing purported by AMT. This thesis will take participant confidence judgements in order to examine whether intoxication impairs reported confidence relative to sober participants. This judgement has two potential functions, first as an indication of metacognitive judgements under conditions of intoxication. Second, previous studies into memory conformity have determined that confidence is influential in leading to conformity (Goodwin et al., 2013, Thorley & Kumar, 2016). As such, lack of confidence shown by intoxicated participants may impact upon their tendency to report PEI.

**4.3 Summary**

When considering the effect of alcohol consumption on immediate recall empirical evidence indicates that at moderate levels intoxicated witnesses are no less accurate (Schreiber Compo et al., 2011), and no more prone to reporting misinformation than sober witnesses (Schreiber Compo et al., 2012). At high levels intoxicated witnesses report both less information, and less accurate information during immediate recall (Altman et al., 2018). Additionally, the literature points to an effect of cued recall on accuracy for both moderately and highly intoxicated individuals, where the number of errors and ‘I don’t know’ responses significantly increase for intoxicated witnesses. At moderate levels of intoxication eyewitnesses are still able to produce accurate testimony. However, this is at odds with literature on juror decision making which suggests that intoxicated witnesses are seen as less credible and their identifications judged as less accurate (Evans & Schreiber, 2010).

Despite the impairments shown in measures of memory recall, witnesses who have consumed alcohol are equally able to identify a suspect from a target present line-up as sober witnesses are (Altman et al., 2018). Target absent line-ups, which require a correct rejection, are more difficult for sober and intoxicated witnesses. This effect may be greater for intoxicated witnesses at higher levels of intoxication depending on the recognition format used (Dysart et al., 2002). At present research findings are somewhat contradictory as to the most appropriate line-up procedure for intoxicated witnesses. Studies have demonstrated a superiority effect of the show-up procedure as compared to a line-up (Altman et al., 2019). Conversely, others show that intoxicated witnesses demonstrate poorer performance than their sober counterparts in target absent show-ups.

Additionally, research demonstrates that moderately intoxicated participants are no more prone to reporting misinformation than their sober counterparts. However, studies conducted thus far have examined the tendency to report misinformation when intoxicated by exposing participants to PEI by non-social means. As such, it has not yet been examined how alcohol influences the tendency to report misinformation when it is socially encountered or encountered by more forensically relevant means like a witness statement. This is important for determining how exposure to co-witness information would influence the testimony of an intoxicated witness.

This thesis aims to add to the literature on intoxicated witnesses by examining the effects of witness intoxication on the susceptibility to misinformation. The current research on alcohol and eyewitness memory is in its infancy and has established that memory recall under intoxication is influenced by multiple factors including recall format, timing of recall and dose. Therefore, in order to ascertain a complete understanding of how alcohol may influence misinformation, the thesis will present three empirical studies that each address specific questions around how alcohol dose of the participant, the source of misinformation and the recall method used influence memory reports. In so doing, the thesis aims to present a complete account of the circumstances under which alcohol may influence the tendency to report PEI. The next chapter presents an empirical study examining whether participants are less likely to report misinformation reported by an intoxicated witness than by a sober witness, and thus whether an intoxicated witness is less likely to be seen as a reliable source of information.

**Chapter Five: Study one, the effect of perceived intoxication on the tendency to report misinformation.**

When considering the factors that are said to lead to memory conformity through informational influence outlined in the systematic review, the beliefs people possess about alcohol’s effects, and the perceptions of witnesses who have consumed alcohol as less credible, may lead to a witness being less likely to report false information gained from an intoxicated source. This chapter presents an empirical study examining whether participants will be less likely to report misinformation from an intoxicated compared to a sober witness.

Studies into the effects of alcohol on others demonstrate a perception of alcohol intoxication as impairing. Lee, Geisner, Patrick and Neighbours (2010) found that university students overestimated the frequency at which negative consequences from drinking alcohol occurred to others. Similarly, Uursberg, Mottus, Kreegipuu and Allik (2012) found that participants who were asked to rate the effects of alcohol on themselves and others, consistently rated the effect on others as less socially desirable, including a more pronounced decrement in conscientiousness than was seen when rating one’s self.

Moreover, studies of police attitudes also report a generally unfavourable response to victims and witnesses of crime who are intoxicated at the time of the event. Sleath and Bull (2017) reported that police attitudes to rape victims adhere to stereotypical attitudes to ‘real rape’ demonstrating rape myth acceptance with a judgement of those who were intoxicated as less credible and as having engaged in risk taking by consuming alcohol. Indeed, an intoxicated victim of rape was more likely to be blamed for the incident occurring than a sober one (Rape Crisis Ireland, 2019). Schuller and Stewert (2000) reported that as victim intoxication increased, their perceived credibility decreased. The study varied complainant and defendant beverage consumption (beer v cola) in a written account of an acquaintance rape on a sample of 212 police officers. The results highlighted that the perceived credibility of the victim decreased as intoxication increased. Additionally, as victim intoxication increased, blame for the perpetrator decreased, while blame placed upon the victim increased. Therefore, people tend to regard others who have consumed alcohol as at risk from its detrimental effects. This suggestion can be explained by alcohol expectancy theory. Both direct and indirect experience with alcohol leads to the development of expectations surrounding the outcomes of alcohol consumption (Merrill et al., 2016). Thus, people perceive that the consumption of alcohol is associated with impairment to one’s cognitive processes.

The belief that a witness who has consumed alcohol is less credible has implications for the misinformation literature as it suggests that a person will be less likely to report misinformation from an intoxicated witness. Previous memory conformity studies have manipulated credibility in other ways (French et al., 2011; Gabbert et al., 2007) and found that when the source of information is less credible than the person receiving it, the tendency to report misinformation is reduced. This suggests that in scenarios where there are multiple witnesses to a crime, a person may be less likely to report misinformation gained from an intoxicated source. Thorley and Christiansen (2018) demonstrated that intoxicated participants were no more likely to report contagion items proposed by a confederate than sober participants were. However, participants were less likely to take on information from a confederate they perceived to be under the influence of alcohol (Thorley & Christiansen, 2018). The perceived ‘intoxicated’ confederate was also viewed as less accurate and trustworthy compared to the sober one. Similarly, Zajac, Dickson, Munn and O’ Neill (2016) manipulated perceived intoxication during a confederate memory conformity task. Their findings indicated that when the misinformation proposed by the confederate was discrepant with the participants’ own judgement, participants were less likely to take on the information proposed by an intoxicated confederate than a sober confederate. Thus, perceived intoxication appears to make a co-witness less credible, which in turn means that their discussion partner might be less likely to take on erroneous information from them.

**5.1.1 The present study**

The present study aims to address whether intoxication and the number of misinformation items the source reports has an effect on the likelihood of a person taking on information from that person and incorporating it into his or her own account of the event. Previous studies have identified a number of factors that influence the tendency to take on information from a co-witness, including relative visual acuity and confidence (French et al., 2010; Gabbert et al., 2007; Goodwin et al., 2013). The present study will examine if participants are less likely to take on information from an intoxicated witness than a sober witness under two levels of objective accuracy. That is, when the witness reports a low number of erroneous details, or a large number of erroneous details. Additionally, the study addresses whether intoxicated witnesses are perceived as less credible, in a misinformation study rather than a juror decision-making study.

Research by Numbers et al. (2014) found that participants were just as likely to report misinformation from a source that was mostly accurate, as they were from a source that was completely inaccurate. Whilst Andrews and Rapp (2014) found that the tendency to report misinformation was reduced when participants knew that their discussion partner was of low credibility. Therefore, the study manipulated the intoxication of the witness to see if it led to a difference in credibility. If intoxicated witnesses were perceived as less credible, then participants should be less likely to report misinformation from the intoxicated source, based upon the findings of Andrews and Rapp (2014). Furthermore, two levels of misinformation were provided in order to examine whether, as in Numbers et al. (2014) participants still reported misinformation from a highly inaccurate source, and how this would interact with the perception of the source as less credible based on their intoxication. The present study also collected confidence data from participants for each of their responses. The confidence data provides an indication of participants’ metacognitive judgements by demonstrating their level of certainty in their responses. Previous studies (Gabbert et al., 2003) have found participants to be less confident in response to misinformation questions. As such the present study examined whether participants were less confident for questions pertaining to misinformation than details gained from the video.

A secondary reason for examining credibility comes from the finding that previous research shows a consistent trend of intoxicated victims being perceived as less credible. However, a limitation of relying on juror decision-making studies which tend to focus on intoxicated victims in cases of rape or sexual battery, is that decisions are inherently tied to general attitudes towards rape. Mason, Rigler and Foley (2004) note a person’s likelihood to judge a written vignette of rape as a crime depends on their adherence to rape myths. Furthermore, a credibility judgement alone only gives us half of the picture. A witness could be judged as a credible source whilst having low levels of accuracy (Porter & Brinke, 2009) therefore it is important to be able to relate a witness’ perceived credibility with their actual accuracy. As such the present study examined whether intoxicated witnesses were perceived as less credible than a sober witness when the information they report is of the same accuracy.

In order to examine these relationships, a moderated mediation model was computed. This model identified whether the credibility rating participants gave the witness mediated the relationship between witness intoxication and reporting of misinformation that has been demonstrated in previous research (Thorley & Christiansen, 2018). Thus, it would examine whether participants were always less likely to report misinformation from an intoxicated witness, or if this tendency was informed by the credibility rating, they gave the witness. In turn, the objective accuracy of the witness was included as a moderator, such that reporting of misinformation was only possible when exposed to erroneous details from the witness. In light of this, the following hypotheses were proposed:

1. Based upon previous research (Thorley & Christiansen 2018; Zajac et al., 2016) it was predicted that participants would report significantly less PEI from the intoxicated witness than the sober witness.
2. Additionally, based upon the findings of Evans and Schreiber Compo (2010) and Wall and Schuller (2006), it was predicted that participants would rate the intoxicated witness as less credible than the sober witness.
3. Based upon the findings of Andrews and Rapp (2014) it was predicted that participants would report less misinformation from the high contradiction intoxicated witness than the low contradiction intoxicated witness.
4. Participants would be significantly less confident in response to questions for which they had received misinformation than when they had not received misinformation.

**5.2 Methods**

**5.2.1 Participants**

Four hundred twenty-three participants took part in the study, who were recruited via the university Research participation scheme system and on social media sites such as Twitter, Facebook and Reddit. After excluding non-completions, 281 participants remained. The final sample had a mean age of 25.84 years (SD = 9.62; age ranged from 18-62) with 25 participants choosing not to provide their age. Two hundred and nine participants were female, 46 were male, 3 indicated that they preferred not to say, and 23 did not provide an answer. An achieved power analysis demonstrated that the sample had a power of 0.59. Further analysis indicated that a sample of 450 complete responses would be required to find an effect with 0.80 power.

**5.2.2 Materials**

**5.2.2.1 Videos.**

Two videos were created depicting an incident outside a pub. These were randomly presented to participants depending on the ‘witness intoxication’ condition to which they were assigned. The two videos showed the same sequence of events: a male and female talking outside a pub, after which a second male attempts to get past them, pushes the first male and walks away. The key difference between the videos lies in the intoxication status of the female witness. In the ‘intoxicated’ video version, the witness is seen ordering a glass of wine from the bar prior to meeting her friend and is later shown stumbling and slurring her words. In the ‘sober’ video version, the female is seen ordering a glass of orange juice and mentioning to her friend that she is driving and thus can offer him a lift home.

**5.2.2.2 Vignettes.**

The study utilised six written vignettes (Appendix A), purportedly written by the female witness as a statement to the police about the incident. The written scenarios differed in two ways, first, depending on the video participants watched, the witness reported either having drunk three glasses of wine or that she had decided to drive and so was drinking orange juice. Second in the objective accuracy of the witness (no contradictions (0 errors) vs. low contradictions (2 errors) vs. high contradictions (4 errors) (see Table 5.1).

|  |  |  |
| --- | --- | --- |
| **Witness scenario** | | |
| **No contradictions** | **Low contradictions** | **High contradictions** |
| Attacker had brown hair | Attacker had brown hair | Attacker had shaven hair |
| Attacker wore green top | Attacker wore black hoodie | Attacker wore black hoodie |
| Boyfriend apologies for  bumping into attacker | Boyfriend apologies  for bumping into attacker | Attacker swore at witness |
| Victim was pushed | Victim was pushed and kicked | Victim was pushed and kicked |

*Table 5.1: outline of contradictions included in the witness statements.*

**5.2.2.3 Memory Tests.**

The study utilised a cued recall questionnaire to assess participants’ memory for the video (Appendix B). Questions related to the appearance of the witness and assailant, as well as to details of the crime. 5 questions were classed as ‘neutral’ i.e. those which no participants received misinformation for, including ‘where were the victim and the witness?’ Whilst 4 questions were ‘critical’, i.e. those for which participants in the low and high contradiction categories will have received misinformation for, including ‘what was the attacker wearing?’. Participant responses on the cued recall test were coded as either ‘correct’ if the response correctly described the events in the video, ‘error’ if it incorrectly described the events in the video, ‘misinformation’ if the response used PEI gained from the vignette, or ‘I don’t know’ if the participant reported that they could not remember the detail. For each question, participants were also asked to indicate their confidence on a one – four likert scale with responses ranging from ‘not at all confident’ to ‘extremely confident’.

**5.2.2.4 Witness manipulation.**

Finally, participants were asked to rate ‘how drunk do you think the witness was’ with the options of completely sober, mildly intoxicated to very intoxicated, as well as ‘how credible do you think the witness was’ with response options not at all credible, reasonably credible to very credible.

**5.2.3 Design**

The study used a 3x2 between subjects designed in which participants were randomly assigned to one of six experimental conditions. The between subject factors were intoxication: intoxicated vs. sober and statement consistency: no contradictions vs. low contradictions vs. high contradiction. The dependent variables were misinformation scores on the cued recall questionnaire, as well as participants’ confidence. The study received ethical approval from the School of Applied Sciences’ Ethics Panel at London South Bank University.

**5.2.4 Procedure**

The present study was accessed by participants via a link and was completed online. Students who took part for (RPS) credits received the link through the London Southbank University RPS website, whilst the remaining participants took part through online advertising on various sites such as Reddit, Facebook and Twitter. On commencing the study, all participants read an information sheet and completed a consent form before they were able to take part. Participants were then randomly presented with either the ‘alcohol’ or ‘sober’ video. Once the video had been viewed, participants read one out of the six ‘witness statements’ depending on their condition. The written scenario always matched the video, thus those who viewed the intoxicated video version were presented with the intoxicated witness statement and those who watched the sober video version were presented with the sober witness statement. After reading the witness statement, participants were asked to complete a ‘spot the difference’ task, which took up to 10 minutes to complete. After the filler task, participants completed a cued recall test about the video, before rating how intoxicated, and how credible they perceived the witness to be. At the end, participants were fully debriefed.

**5.3 Results**

**5.3.1 Manipulation Check**

To ensure the manipulation was successful, participants’ intoxication ratings were analysed with an independent t-test. Participants who saw the intoxicated video rated the witness as significantly more drunk (*M* = 2.20, *SD* = 0.44) than participants who viewed the sober video (*M* = 1.24, *SD* = 0.46) *95% CI [*-1.06, -.85]; *t*(273) = 17.73, *p* <.001, *d* = 2.14.

**5.3.1.2 Credibility Manipulation.**

To investigate whether participants’ credibility ratings differed based upon the accuracy of the witness’ statement and the presence of alcohol, a 2-way ANOVA was run. Effect size was calculated with the benchmarks as small = .01, medium = .06 and large = .14. A significant effect of Statement was found *F*(2,265) = 13.92, *p* < .001, ηp2 = .095. Participants in the no contradiction condition perceived the witness as significantly more credible (*M* = 2.07, *S.E* = 0.06) than in the high contradiction condition (*M* = 1.64, *S.E* = 0.07) *p*<. 001, 95% CI [.26- .60]. Participants who read a low contradiction statement also perceived the witness as significantly more credible (*M* = 2.02, *S.E* = 0.06) than those who read the high contradiction statement (*p* < .001), 95% CI [.21 – .56]. There was no significant difference in credibility between those who read the no contradiction and low contradiction statements. A significant effect of Intoxication was also found *F*(1,265) = 27.20 , *p* < .001, ηp2 = .093. Participants who viewed the witness consuming alcohol perceived them as significantly less credible (*M* = 1.72 *S. E* = 0.05) than participants who viewed the witness drinking orange juice (*M* = 2.09, *S.E* = 0.05) 95% CI [.230- .508]. There was no significant interaction between accuracy and alcohol *F*(2,265) = 0.92, *p* = .399, ηp2 = .007. Thus, participants’ judgements of the witness’ credibility changed according to her accuracy, with the statement containing most errors being perceived as less credible. Additionally, when the witness was reportedly intoxicated, she was also perceived as less credible. However, there was no interaction between accuracy and intoxication on the perception of credibility.

**5.3.2 Misinformation Analysis**

To address the research question of whether participants would be less likely to take on misinformation from an intoxicated witness, a moderated mediation model was computed (Figure 5.1). This model was computed using the regression-based approach (Hayes, 2019 model number 59, using the Process version 3.4 SPSS plugin). The model examined the mediating effect of Perceived Credibility on the relationship between Intoxication and the tendency to report misinformation, which is moderated by the presence of contradictory information in the witness statements. In the analyses using bootstrapping of 1000 samples, there is significant mediation if the 95% bias corrected confidence intervals for the indirect effects do not pass 0. The mediation model chosen examined the number of Statement Errors as a potential moderator between Intoxication and Perceived Credibility, Intoxication and misinformation and Perceived Credibility and misinformation. [[4]](#footnote-4)

‘Statement Contradictions’ was a multi-categorical variable, and as such was re-coded into two variables. *W*1 reports the effect of low contradictions compared to no contradictions, and *W*2 reports the effect of high contradictions in relation to no contradictions.

*A close up of a map

Description automatically generatedFigure 5.1:* Moderated mediation model 59. \* Denotes significance at *p* = .01, \*\* denotes significance at *p* = .001.

The model predicting perceived credibility was significant *F*(5,2695) = 11.18, *p* < .001, *R2 = .17*. Intoxication and Statement Errors predicted 17% of the variance in credibility ratings and were both significant independent predictors of credibility. The interactions between Intoxication and Statements were not significant *b* = - .13 *t*(265) =1.30, *p* = .19, *b* = .04, *t*(265) = .40, *p* = .69 suggesting that Statement Errors did not moderate the relationship between Intoxication and Perceived Credibility.

There was a significant overall model predicting the tendency to report misinformation *F*(8, 262) = 5.28, *p* <.001, *R2* = .14 (Figure 5.1, Table 5.2). Perceived Credibility and being in the high error statement condition were significant independent predictors in the model. However, Intoxication was not a significant predictor of misinformation in the overall model. The interactions between credibility and Statement Errors were not significant nor were the interactions between Intoxication and Statement Condition. Thus, Statement Condition independently predicted misinformation, but did not moderate the relationship between credibility and misinformation, or Intoxication and misinformation. There were no direct effects of Intoxication on the tendency to report misinformation (*p*s >.05). There were also no indirect effects of Intoxication on the tendency to report misinformation (*p =* .309). Thus, viewing a video containing alcohol did not predict misinformation score, and this was not mediated by Perceived Credibility.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **B** | **SE B** | **t** | **sig** |
|  |  |  |  |  |
| **Intoxication** | .08 | .08 | 1.01 | .31 |
| **Perceived Credibility** | .17 | .07 | 2.60 | .01 |
| **Statement misinformation 1** | -.10 | .06 | -1.74 | .08 |
| **Statement misinformation 2** | | .36 | .06 | 5.94 | <.001 |
| **Interaction 1 (intoxication & W1)** | | -.009 | .12 | -.08 | .94 |
| **Interaction 2 (intoxication & W2)** | | .01 | .12 | .11 | .92 |
| **Interaction 3**  **(perceived credibility & W1)** | | .05 | .10 | .53 | .60 |
| **Interaction 4**  **(perceived credibility & W2)** | | .06 | .09 | .69 | .49 |

*Table 5.2:* Coefficients for predictors predicting misinformation from mediation model 59. Statement 1 and 2 refer to the effect coded multi-categorical moderator.

In summary, this analysis suggests that, as one would expect, the number of misinformation items participants were exposed to predicted the amount of misinformation that they reported. The intoxication of the witness was not related to the amount of misinformation reported, nor did it interact with the number of misinformation items participants were exposed to. In addition, the perceived credibility of the witness also significantly predicted the amount of misinformation items reported, and this also did not interact with the amount of misinformation participants were exposed to.

**5.3.3 Accuracy**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | **Correct** | | **Error** | **Misinformation** | | **I don’t know** | **Accuracy rate** |
| **Sober witness** | | No contradictions | | 6.63 (2.13) | 1.50 (1.20) | | | 0.13 (0.35) | 0.75 (1.04) | .81 (.15) |
| Low contradictions | | 7.00 (1.73) | 0.93 (1.10) | | | 0.33 (0.48) | 0.73 (0.88) | .78 (.14) |
| High contradictions | | 5.50 (2.37) | 1.80 (1.87) | | | 0.80 (1.03) | 0.90 (1.10) | .73 (.23) |
| **Intoxicated witness** | | No contradictions | | 6.33 (2.00) | 1.11 (1.05) | | | 0.00 | 1.56 (2.30) | .78 (.20) |
| Low contradictions | | 5.90 (2.38) | 0.90 (1.20) | | | 0.10 (0.32) | 2.10 (2.64) | .75 (.19) |
| High contradictions | | 6.90 (1.70) | 1.10 (1.04) | | | 0.55 (1.04) | 0.37 (0.50) | .76 (.17) |

To examine whether there was an effect of statement errors, or witness intoxication on participant accuracy rate, a 2-way ANOVA was run. An accuracy rate was computed by dividing the number of accurately reported details by the total number of details. Table 5.3 provides a breakdown of the average reporting of details between condition. There was no significant effect of video seen on participant accuracy rate *F*(1, 275) = .55, *p* = .458, ηp2=.002. Additionally there was no significant effect of statement errors on accuracy rate *F*(2,275) = 2.25, *p* = .107, ηp2=.016. There was also no interaction between the two *F*(2,275) = .87, *p* = .421, ηp2=.006. Therefore, other than the propensity to report misinformation, there were no differences between conditions in the accuracy of information reported.

*Table 5.3:* Breakdown of means of each type of detail reported between condition.

**5.3.4 Confidence**

To investigate the effects of Statement read, Intoxication and Question type on confidence a 2x2x3 mixed ANOVA was run with Question type (neutral vs critical), Intoxication (wine vs orange juice) and Statement (no errors, low errors, high errors) as the independent variables. As with the previous analysis, effect sizes were interpreted as small = .01, medium = .06 and large = .14. The results indicated a significant effect of question type on confidence *F*(1,278) = 211.6, *p* < .001, ηp2=.436. Participants were significantly more confident in their response to neutral questions than in response to critical questions. There was no significant main effect of Statement *F*(1,274) = 0.58, *p* = .562, ηp2 = .004 and no significant main effect of Intoxication *F*(2, 274) = 1.5, *p* = .223, ηp2 = . 005. Nor was there a significant interaction between Statement and Question type *F*(1,278) = .001, *p* =.144, ηp2 = .014. There was no significant interaction between Question type and Intoxication *F*(1, 274) = 2.41, *p* = .122, ηp2 = .009. However there was a significant three-way interaction between Question type, Intoxication and Statement *F*(2, 274) = 4.83, *p* = .009, ηp2 = .034. When participants read a statement containing no errors, confidence was higher for neutral than critical questions. However, the difference in confidence reported for neutral compared to critical questions was greater for those who saw the sober video than those who saw the intoxicated video. When participants read a statement containing a low number of errors, confidence was greater for neutral compared to critical questions, however participants who saw the intoxicated video reported greater confidence for both types of questions. This also occurred when participants read a statement containing a high number of errors, with participants who viewed the intoxicated video reporting greater confidence for critical questions than those who saw the sober video. Mean confidence ratings can be found in table 5.4.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Question type** | |
|  |  | **Neutral** | **Critical** |
| **Sober witness** | No contradictions | 3.29 (0.49) | 2.38 (0.50) |
| Low contradictions | 2.75 (0.84) | 2.42 (0.670 |
| High contradictions | 2.72 (1.02) | 2.20 (0.84) |
|  | Total | 2.89 (0.84) | 2.34 (0.68) |
| **Intoxicated witness** | No contradictions | 2.51 (0.76) | 2.44 (0.82) |
| Low contradictions | 2.98 (0.64) | 2.57 (0.69) |
| High contradictions | 2.76 (0.71) | 2.76 (0.63) |
|  | Total | 2.76 (0.71) | 2.60 (0.69) |
| **Total** |  | 2.82 (0.77) | 2.46 (0.69) |

*Table 5.4* Confidence ratings for responses to neutral and critical questions.

To summarise, the credibility manipulations were successful. Participants perceived the intoxicated witness as less credible than the sober witness. The witness statement containing most errors was also perceived as less credible than those that had fewer errors. However, the intoxication of the witness did not predict the amount of misinformation participants reported. Participants reported more misinformation when they read a statement containing more errors, and this was the same when the witness was sober as when she was intoxicated. Perceived credibility did significantly predict the amount of misinformation participants reported, but this did not interact with the amount of misinformation in the witness statement, and it did not mediate the relationship between intoxication and reporting misinformation. Furthermore, participants were significantly less confident in their responses to critical questions and this interacted with both the intoxication of the witness and statement errors.

**5.4 Discussion**

The present study examined whether participants would be less likely to report misinformation from an intoxicated witness than a sober witness, due to a belief that they are less credible. The results showed that participants did in fact view the intoxicated witness as less credible than the sober witness. However, there was no effect of witness intoxication on misinformation. Despite perceiving the intoxicated witness as less credible participants were as likely to report misinformation from the intoxicated witness as the sober witness. Perceived credibility significantly predicted the amount of misinformation participants reported, but it did not mediate the relationship between intoxication of the witness and misinformation. Participants included significantly more misinformation in the ‘high statement errors’ condition, regardless of whether the witness was reportedly sober or intoxicated. Additionally, participants’ confidence in their own responses was significantly higher for neutral questions than critical questions which interacted with witness intoxication and statement read.

The present study also builds upon previous misinformation research by examining the effect of perceived intoxication on the tendency to report misinformation when the source varied in how much misinformation they reported. The findings demonstrate, consistent with Numbers et al. (2014) that participants were no less likely to report misinformation when the source was more errorful and did in fact report more pieces of misinformation. Importantly, the present study found that although the intoxicated witness was regarded as less credible, intoxication had no relationship with the tendency to report misinformation in either the ‘low’ or ‘high’ misinformation condition. Additionally, rather than using a confederate to recall items from household scenes (Thorley & Christiansen, 2018) the current study used a written witness statement as the source of misinformation, which contained contextual details about the crime and is thus, forensically relevant in nature.

Whist the intoxication manipulation led to a lower credibility rating for the witness who had consumed alcohol, this did not lead to a reduced incidence of reporting misinformation from the source. Thus, the intoxicated witness was no less utilised as a source of information than the sober one. Although the present findings add to the breadth of studies suggesting that intoxicated witnesses are rated as less credible it has highlighted key distinctions. The first of these is that, in a misinformation context, an intoxicated witness may still be used as a source of information. Based upon the literature which has demonstrated that intoxicated witnesses and victims are seen as less credible (Schuller & Stewert, 2000), and the importance of credibility in the tendency to report misinformation (French et al., 2011; Gabbert et al, 2007) one would expect that participants would be less likely to report such details from the intoxicated source. However, as noted (Mason et al., 2004) the context in which one encounters the intoxicated witness may be important. Previous studies have examined instances of rape and sexual assault under conditions of intoxication (Evans & Schreiber Compo, 2010), which are prone to influence from a person’s adherence to rape myths. Furthermore, juror decision-making studies require participants to appraise the testimony of a witness in order to decide on a decision of guilt (Lynch et al., 2013). Given these task requirements, the testimony of an intoxicated witness may come under greater scrutiny than in the present study. Thus, in the present study, the testimony of the intoxicated witness may have been given less scrutiny than in a juror decision-making study and therefore led to participants incorporating misinformation from both the intoxicated and sober witness.

The finding that participants were not less likely to report misinformation when it was encountered from the intoxicated source is inconsistent with previous research investigating the effect of perceived intoxication on misinformation (Thorley & Christiansen, 2018; Zajac et al., 2016). Zajac et al. (2016) found that perceived intoxication reduced memory conformity at an individual item level when the confederate’s response was discrepant with the participants’ initial response. However, consistent with the present study, overall susceptibility to misinformation did not differ based upon co-witness intoxication. Therefore, misinformation that comes from an intoxicated source was more likely to be recalled when it referred to a detail that participants could not themselves remember.

The present study did not have a recall phase prior to misinformation exposure and had a distractor task prior to recall. Thus, it is possible that participants had less opportunity to detect the discrepancies between their own memory and that of the witness, thereby leading to participants reporting misinformation when it came from both the intoxicated and sober source. La Paglia and Chan (2019) assert that suggestibility is increased when exposed to misinformation that contains relevant, contextual details. The use of a witness statement as a source of misinformation in the present study may have increased susceptibility to misinformation due to the inclusion of key contextual details in the statement. While Thorley and Christiansen (2018) found a significant effect of perceived intoxication on reporting of misinformation, the study used a very different methodology. Theirs was a social contagion task in which participants recalled household scenes alongside a confederate. Such a recall scenario includes less contextual information and thus, participants may have been better able to detect erroneous confederate suggestions.

**5.4.1 Tendency to report misinformation.**

Participants in the present study included more misinformation in their accounts when they read a statement containing more pieces of erroneous information. Additionally, perceived credibility positively predicted misinformation reporting such that participants who rated the witness as higher in credibility reported more pieces of misinformation from the witness’ statement. The mechanisms through which a witness erroneously takes on misinformation from another source are said to include both normative and informational influence. Normative influence refers to a desire to behave consistently with what are perceived to be group norms. Previous findings have demonstrated that memory conformity is more likely to occur when making judgements in the presence of others, and when working with friends rather than strangers. French et al. (2008) found that memory conformity increased when working with a dyad partner to whom you are acquainted. Therefore, people who conform due to normative pressure to do so are aware that the information they are recalling is inaccurate, and when no longer under public pressure to do so, will switch back to their own recall. Participants in the present study were not required to recall in the presence of the source of the information and therefore, it is unlikely that normative influence could be the mechanism through which misinformation was reported.

Conversely, informational influence refers to the desire to maintain an accurate view of the world. Therefore, witnesses take on information from another person because they believe it to be accurate (Cialdini & Goldstein 2004). Williamson, Weber and Robertson (2013) utilised a confederate procedure to investigate perceived expertise. The findings demonstrated that participants were more likely to conform to the suggestions of an expert compared to a non-expert. Whilst Goodwin et al. (2013) found participants were more likely to incorporate both accurate and inaccurate information from a confident confederate as opposed to an unconfident confederate. The present study found that those who were exposed to more pieces of misinformation reported more misinformation; additionally, perceived credibility predicted the reporting of misinformation. Therefore, if participants incorporated misinformation when they perceived the source as credible, it suggests that participants may have believed the PEI in the statement was accurate.

An additional explanation for the tendency of participants to report misinformation may be that they did so because of a source misattribution error. That is, participants incorrectly attributed the source of the misinformation to the video rather than to the written scenario. As outlined in the systematic review, memory conformity by informational influence occurs when one considers the other sources memory as more reliable than their own. Therefore, rather than knowingly reporting misinformation, participants may have done so unknowingly. The tendency to make such a misattribution is increased when the target and false stimuli are highly similar (Johnson, 1993). The contextual details used in the witness’ statement, and the similarity between the real version of events and the errors may have led to a decreased ability to detect the discrepancies between the two (La Paglia & Chan, 2019), and thus led to participants incorporating the false details into their memory of the original event. As the present study did not include a source monitoring question, this explanation is tentative given the findings, and it is likely that a combination of the three highlighted mechanisms may have led to the tendency to report misinformation.

**5.4.2 Limitations and Future Directions.**

While the present study established a relationship between alcohol intoxication and credibility, credibility was assessed using a single item scale. This was chosen in order to reduce participant attrition, which commonly occurs in online studies (Reips, 2000; Zou & Fishbach, 2013). The single items were sufficient to establish that the alcohol manipulation had resulted in a difference in perceived intoxication and credibility between the two witnesses, and thus establish whether there is a relationship between intoxication and credibility outside of a juror decision-making setting and the link this has to reporting of misinformation. In order to expand upon this understanding, it would be useful to include a questionnaire regarding specific aspects of credibility (Evans & Schreiber Compo, 2010) to produce a more nuanced understanding of the perception of intoxicated witnesses as less credible. It would also enhance the utility of the study to have included a source-monitoring question, in which participants are required to state whether they gained the information for their responses from the witness or the video. In so doing, it would be possible to assert whether the tendency to report misinformation from an intoxicated source is because of a source misattribution error.

**5.4.3 Conclusions.**

The present study has contributed to the literature on intoxicated witnesses by demonstrating that the accuracy of said witness, in addition to their perceived intoxication contributes to the perception of them as credible. Furthermore, it has demonstrated that sober participants were just as likely to report false information from an intoxicated witness as a sober one. This has implications for the criminal justice system as it suggests that witnesses who are exposed to misinformation prior to giving their statement will be as likely to report such information if it was gained from an intoxicated or a sober witness.

However, given the social nature of crimes involving alcohol (Allen et al., 2003) it is possible that both witnesses to a crime may have consumed alcohol prior to witnessing the crime and discussing it. As such, in order to understand ‘the intoxicated co-witness’ it is necessary to examine how alcohol influences the tendency to report misinformation when both co-witnesses are intoxicated. The next chapter sought to address the impact of alcohol intoxication on misinformation when both parties are intoxicated. In order to do so, participants were administered alcohol instead of using perceived intoxication. Whilst study one used misinformation via written narrative, study two builds upon our understanding of how alcohol influences misinformation by examining the effects of alcohol when misinformation is encountered from a discussion partner. Previous research has thus far only examined the effects of alcohol on the susceptibility to misinformation via narratives (Gawrylowicz et al., 2017), leading questions (Van Oorsouw, Merckelbach & Smeets, 2015) or overhearing misleading information (Schreiber Compo et al., 2012). As such, the study contributes a novel addition to the literature and builds upon study one by examining how alcohol influences the susceptibility to misinformation when the source is *actually* intoxicated, and when misinformation is encountered face to face. It also provides the addition of both co-witnesses being intoxicated. Thus, it examines how the intoxication of one’s partner, in addition to the intoxication of one’s self may influence the tendency to report misinformation. In addition, to address the limitations of study one, study two introduced a source monitoring question, such that the mechanisms through which participants were likely to be recalling misinformation could be examined.

**Chapter Six: Study two: The effect of alcohol on memory conformity.**

Study one found that the intoxication of the witness did not influence the tendency of participants to report misinformation. However, study one was conducted online, and therefore suffered from problems such as ecological validity, that are inherent in online studies. Study two sought to overcome this issue by conducting a memory conformity experiment in a laboratory setting. Furthermore, it examined how intoxication affected participants’ tendency to report misinformation, when it came from a similarly intoxicated co-witness. While study one established that a participant was no less likely to report misinformation from a seemingly intoxicated source, study two examined how intoxication affected misinformation during a co-witness discussion. This method is more applicable to real world contexts in which witness discussion may occur.

Research into the effects of alcohol consumption on eyewitness memory accounts has grown exponentially over the last five years. A recent meta-analysis by Jores et al. (2019) including 1,189 participants across 10 studies showed that low to moderate doses (0.03-0.09 BAC) of alcohol reduced the number of correct details recalled in an eyewitness scenario but had no impact on the number of incorrect details recalled. Furthermore, higher levels of intoxication (0.10 BAC and above) exacerbated this effect. At moderate levels of intoxication (0.2g/kg- 0.7g/kg) studies have found no effect of alcohol on accuracy as compared to sober eyewitnesses (Hagsand et al., 2013; La Rooy et al, 2013). However, research has demonstrated an effect of alcohol intoxication on completeness, such that the accounts of intoxicated witnesses contained fewer details overall than their sober counterparts (Hagsand et al., 2013) (See table 4.1 for a summary). Moreover, whilst sober and intoxicated participants both demonstrated a preference for high salience details (Flowe et al., 2016) the selective impairment of peripheral details taken as an indication of AMT has not been found in all studies (Harvey et al., 2013; Van Oorsouw & Merckelbach, 2012).

In addition to questions surrounding veridical recall, the susceptibility of intoxicated witnesses to report false information is also a pertinent question when one considers that intoxicated witnesses play a comparable role to sober ones within the criminal justice system (Palmer et al., 2013). As reported in table 4.1, research into alcohol and suggestibility thus far has reported conflicting findings as to the role alcohol plays in reporting misinformation. Thorley and Christiansen (2018) found that intoxicated participants were no more likely to report contagion items in a confederate recall task than sober ones. Additionally, Schreiber Compo et al. (2012) found that intoxicated participants were no more likely to report misinformation that had been overheard from a telephone conversation in a later interview. Flowe et al. (2019) reported that participants who were intoxicated at the time of engaging with a hypothetical sexual assault scenario were no more prone to reporting misinformation introduced by a written narrative one week after the event. Gawrylowicz et al. (2017) found that the timing of alcohol consumption could lead to a reduced incidence of reporting misinformation by intoxicated participants as compared to sober participants. The study demonstrated that alcohol consumption after witnessing the event but before encountering erroneous information might protect participants from taking on this misinformation. All of the studies reviewed above have demonstrated that alcohol does not lead to an increased reporting of misinformation. However, these studies used doses of 0.06% which is moderate. Field research by Van Oorsouw et al. (2015) in which participants reached BACs of up to 0.26% demonstrated an effect of intoxication on suggestibility, such that at high levels of intoxication participants were more likely to go along with misleading questions compared to sober participants.

Therefore, at moderate doses, intoxicated participants are no more likely to report misinformation, however at higher levels of consumption, suggestibility to misinformation is increased. However, the social nature of consuming alcohol means that, in real life scenarios, it is likely that the source of misinformation may be a similarly intoxicated co-witness. As stated, having a co-witness is common (Skagerberg & Wright, 2008). Thus, it is necessary to understand how alcohol intoxication may impact upon memory conformity in a face to face discussion.

Research has demonstrated that sober and intoxicated individuals are just as likely to report misinformation. However, in previous studies, the sources of such misinformation are narratives (Gawrylowicz et al., 2017), confederates (Thorley & Christiansen, 2018) and misleading questions (Van Oorsouw et al., 2015). As yet, the susceptibility of intoxicated participants to report misinformation has not been tested using co-witness discussion as the source of misinformation. Paterson and Kemp (2006) report that co-witness discussion is a more influential source of misinformation than written sources such as a newspaper report. Thus, the effect of intoxication on eyewitness suggestibility may be different when the source is a similarly intoxicated co-witness.

**6.1 Intoxication and co-witness discussion**

Whilst encountering misinformation from a co-witness is a more influential source of PEI generally (Paterson & Kemp, 2006), specific processes that occur as a result of intoxication may affect memory conformity shown by intoxicated participants specifically. Thus, measuring the tendency to report misinformation by using a face to face interaction is important to gain a complete understanding of how alcohol may influence co-witness discussion in real life contexts.

As established in the systematic review in chapter two, memory conformity is increased when one’s co-witness appears to be of high credibility (Davies & Meade, 2013). Thorley and Kumar (2016) purport that own and other’s self-confidence both influence memory conformity. As such, the lack of confidence intoxicated participants’ exhibit in their own recall (Crossland et al., 2016; Flowe et al., 2017; Harvey et al., 2013), possibly due to the impairment in controlled, effortful processing as a result of intoxication (Josephs & Steele, 1990) may influence the likelihood of intoxicated witnesses to report co-witness information.

Additionally, during a co-witness discussion, there may also be protective effects of group membership that emerge for those dyads who are both intoxicated as compared to sober dyads. The group-monitoring hypothesis suggests that group membership provides a protective mechanism for individuals, such that they are less susceptible to decrements in performance than participants carrying out the same task alone. This has been shown for the impairing effects of fatigue on group performance (Frings, 2011) and also alcohol intoxication on vigilance errors (Frings et al., 2008). With such evidence intoxicated dyads may demonstrate increased vigilance that protects them from reporting misinformation when compared to sober dyads. In addition to the effects of alcohol on confidence, the group-monitoring hypothesis and Alcohol Myopia Theory suggest that intoxicated participants may be less prone to memory conformity than their sober counterparts.

The research presented in this chapter combined a memory conformity paradigm with an alcohol administration paradigm. After consuming alcohol or orange juice, participants watched one of two versions of a mock crime. Subsequently, they engaged in a dyadic discussion where they exposed their discussion partner to PEI. Each individual’s recall was tested to examine how much misinformation they took on from their discussion partner and reported in their own account. In line with previous memory conformity studies, (French et al., 2008; Gabbert et al., 2003) it was predicted that participants in the discussion condition would incorporate misinformation into their final individual accounts. The literature on alcohol’s effects on suggestibility present some conflicting findings as to whether i) alcohol would affect suggestibility and ii) the specific effect it would have. As such a two-tailed hypothesis was presented. It was also predicted that alcohol intoxication would affect the number of misinformation items participants reported (Thorley & Christiansen, 2018).

In addition to examining the effect of alcohol on memory conformity, this study was also interested in contributing to the literature on alcohol and eyewitness memory reports. As such, recall was examined at an individual level. Current literature on alcohol and eyewitness memory has presented conflicting findings as to whether alcohol would affect the salience of detail reported (Flowe et al., 2016; Schreiber Compo et al., 2011). In order to contribute further to this debate, recall was scored according to the salience of details reported. It was predicted that all participants would recall significantly more central than peripheral details. In addition, on the basis of previous research findings (Crossland et al., 2016; Flowe et al., 2017), it was predicted that intoxicated participants would be less complete in their accounts than sober participants. Furthermore, it was predicted that intoxicated participants would be significantly less confident in their accounts than sober participants. In line with the group-monitoring hypothesis, it was predicted that any decrements shown by intoxicated participants would be greater for those who take part alone, compared those who take part in dyadic groups.

**6.2 Method**

**6.2.1 Participants and Design**

One hundred twenty-two participants (106 females and 16 males) took part, with a mean age of 24.10 years (*SD* = 7.67). Participants were psychology undergraduate students who took part in the study in exchange for course credits. Each participant completed a comprehensive screening procedure to establish his or her eligibility to take part in an alcohol administration study. The screening included any medical conditions that would render participants not eligible to take part such as heart, renal and liver conditions and no signs of harmful drinking behaviour. The study used a 2 Discussion condition (dyad vs. individual) x 2 Beverage condition (intoxicated vs. sober) between-subject design. The dependent variables were measures of memory conformity, free recall and cued recall performance, source monitoring and confidence judgments. The study received ethical approval from the School of Applied Sciences’ Ethics Panel at London South Bank University.

**6.2.2 Materials**

**Screening questionnaire.** Participants completed the Alcohol Use Disorders Identification Test (AUDIT) (Saunders, Aasland, Babor, de la Fuente & Grant, 1993). The AUDIT is a self-report measure that assesses hazardous drinking behaviours. The questionnaire consists of ten multiple-choice questions that require the participant to consider the degree to which they have engaged in certain drinking practices over the past twelve months. Scores range from 0-40, with a score of 8+ suggesting harmful drinking behaviour. Participants were also asked to indicate if they had an existing medical condition, were taking any medication, or if there was a chance that they could be pregnant. These criteria indicated ineligibility. One participant was excluded from taking part prior to commencing the study on this basis.

**Drinks and breath alcohol measurement.** The administration of both alcoholic and non-alcoholic beverages in the present study was consistent with the host University’s alcohol administration protocol. Participants in the intoxicated condition were given cups of vodka and orange juice, in a 2:1 ratio. This dose was gender specific and calculated using participants’ bodyweight as 0.6g/kg in order to achieve a target BAC of 0.06% with a maximum allowable dose of 175ml of 37.5% abv vodka. Participants in the sober condition were given orange juice equivalent to the total volume of the alcohol beverage to drink. In order to assess participants’ levels of alcohol intoxication a Lion Alcometer 500 breathalyser was used.

**Mock-crime videos.** The stimuli in the present study were derived from Gabbert et al. (2003). Both videos depicted a student entering an academic office to drop off a book. She looks for a pen to leave a note whereupon she finds a wallet with money inside of it. Both videos depict the same event but shot from different viewpoints and with slightly different details/actions visible. Video A showed the student scrunching a note up and throwing it in the bin and also the title of the student’s book ‘memory disorders’ can be seen. In video B the student can be seen looking at her watch and also carrying out an opportunistic crime (stealing money from the wallet).

**Memory tests.** A recall questionnaire from Gabbert et al. (2003) was used to structure the discussion and individual recall phase (Appendix C, D, E, F). The questionnaire consisted of a free recall section and cued recall questions. Participants were instructed to put themselves in the position of a witness, and to use the questionnaire as an opportunity to think over the event before being interviewed by police. A modified version of this questionnaire was also used to assess participant’s individual recall. This questionnaire asked participants to indicate their confidence in each of their responses using a one to seven Likert scale. The cued recall section consisted of 9 questions, 5 pertaining to ‘neutral’ items as well as 4 questions relating to ‘critical’ items - items seen in one video but not the other. For example, “what was the title of the book seen?” After each question, participants in the dyad condition were required to state whether their answer was based upon the video or their discussion partner, or both.

**6.2.3 Procedure**

**6.2.3.1 Alcohol Administration Phase**.

Prior to commencing the study all participants were advised to not eat for 3 hours. Participants arrived at the laboratory and were provided with an information sheet outlining the details of the study after which they completed a screening questionnaire to ensure eligibility for participation. It was established that participants did not present harmful drinking behaviours, or have medical conditions, which would contraindicate participation. Consent forms were signed, and participants were informed that they would be required to drink either an alcoholic or non-alcoholic beverage after which they were weighed for the purposes of calculating alcohol dosage (to achieve a peak BAC of 0.06%). Participants in the sober condition were told that their drink contained orange juice and were given orange juice. Participants in the intoxicated condition were told that their drink contained vodka and were given a vodka orange juice mixer. All participants were breathalysed prior to the consumption phase to ensure that they were completely sober. Participants were informed that they had to consume their drinks within 30 min but not faster than 20 min (a similar procedure was used by Gawrylowicz et al., 2017; 2018). Participants’ drinks were provided in two cups in order to monitor consumption. After the consumption phase participants were given a small amount of water to rinse their mouths out before being breathalysed. This ensured that there was no contamination of the breathalyser by residual alcohol. After ten minutes participants were then breathalysed, and, if needed, waited a further 5 minutes for the BrAC to reach the desired intoxication level.

**6.2.3.2 Video and Memory Tests.**

***Individual condition.*** Participants in the individual condition were randomly assigned to watch either video A or video B. Participants watched the video alone after which they recalled the details of the video using the recall questionnaire individually. Subsequently, the experimental procedure followed the same for individuals and dyads.

***Dyad condition.*** After the alcohol administration phase, participants in the dyad condition were invited one at a time to watch a short video. Participants were informed that they would be watching the same video but that they must watch it one at a time, as there was only one monitor. Participants were then instructed to work together to generate the most accurate and complete account of the events seen. The recall questionnaire was provided to help the discussion. Participants were given 10 minutes to engage in the discussion phase. Participants were then given a filler task to complete for 15 minutes, after which they were breathalysed again prior to completing their individual recall.

All participants then completed the recall questionnaire individually, which followed the same structure as the first questionnaire, with additional confidence questions. Participants in the dyad condition were also asked to answer further source-monitoring questions. Finally, participants were fully debriefed. Participants in the intoxicated condition were breathalysed again, and those who registered a breath alcohol level of > 0.1mg/l were advised to stay in the laboratory until their BrAC reduced to below this level. Those who wished to leave were asked to sign an exit waiver to acknowledge that they were aware of the risks of doing so.

**6.2.4 Data Scoring**

One coding sheet was produced listing the actions and events of the video as well as details describing the environment and the surroundings seen in the video, a total of 63 details were included. The numbers of correct, errant and misinformation details were recorded for the free recall and cued recall tests separately. A detail was only scored once regardless of whether participants mentioned the same detail multiple times. An item was classed as misinformation if it was not present in the video version the participant had seen but was present in the other video version (e.g. if participants who watched video A described that the female was stealing the money although this was not visible in this version). A detail was scored as correct if it featured in the video version the participant had seen and was accurately described (e.g. the female carried a bag and the bag was visible in the version of the video the participant saw). A detail was scored as error when it featured in the video version the participant had seen but was incorrectly described (e.g. the female wore a red top but in fact the top was grey) or when the detail did not feature in any of the video versions seen (e.g. a second person was present when in fact no person was present in both video versions).

In addition, participants’ accounts were scored according to the number of ‘central’ and ‘peripheral’ details they recalled. The purpose of this was to investigate whether alcohol intoxication differentially affects the type of details recalled by participants. Before commencing data collection, a pilot study was conducted in order to develop to list of items classified as either ‘central’ or ‘peripheral’ for both videos. Participants were told that central items were those that were integral to the sequence of events, whilst peripheral details were those that were not key aspects of the story. A sample of 20 participants watched both video A and video B, after which they recalled all the details they would class as central to the video and all the details they would class as peripheral. Recall from all participants were collated and all of the details recalled were categorised into one ‘central’ and ‘peripheral’ scoring sheet. Two scoring sheets were produced, one for each video, however if a detail that was present in both videos was mentioned by participants as being central in one of the videos, it would be classed as a central detail for both. The same procedure was applied for peripheral details.

|  |  |
| --- | --- |
| **Type of detail** | |
| **Central** | **Peripheral** |
| Female has blonde hair | Yellow pages on desk |
| Takes a book out of her bag | Date is the 18th |
| Finds wallet with cash in it | Does not fold wallet back up after  looking at it |

*Table 6.1*: Example of central and peripheral details from pilot study

To determine intercoder reliability a sub-set of twelve questionnaires (10% of the total sample) were scored by two coders (see Table 6.2). This was to ensure that coding of scripts was consistent with the data scoring sheet. Each rater scored twelve questionnaires according to the data scoring sheet, after which bootstrapped correlations were calculated between each raters’ scripts for the number of details scored as correct, errors and misinformation responses in addition to central and peripheral details. Upon examination of the inter-coder reliability, it was established that the reliability for error coding was much lower than for accuracy and misinformation. A re-examination of the coded scripts identified some discrepancies between the coding sheet and details given a mark as an ‘error’. These were discussed and a consensus decision was reached by both raters as to the appropriate score to give.

|  |  |  |  |
| --- | --- | --- | --- |
|  | ***r*** | ***p*** | ***95% CI*** |
| **Correct** | .88 | <.001 | .70, .98 |
| **Error** | .58 | .047 | .17, .88 |
| **Misinformation** | .88 | <.001 | .16, 1.00 |
| **Central** | .80 | .002 | .46, .95 |
| **Peripheral** | .63 | .027 | .03, .96 |

*Table 6. 2*: Correlation Coefficients between two raters

**6.3 Results**

The primary question of the analysis was whether alcohol intoxication influenced the susceptibility to report misinformation. In addition to this, it was also of interest to establish the effect of alcohol intoxication on accuracy and completeness. Previous research (Thorley & Christiansen 2018) and the study presented in chapter five suggests that intoxicated witnesses are not seen as trustworthy or credible sources. Therefore, it is useful to establish whether, despite intoxication, such a witness can still provide accurate and credible testimony. Other work has also shown that alcohol intoxication may affect free recall and cued recall differently (Jorres et al., 2019), as such, free and cued recall were analysed separately.

**6.3.1Manipulation check*s***

**6.3.1.1 Alcohol Intoxication.**

Consistent with previous research (Gawrylowicz et al., 2017), participants BrACs were converted to BACs using a blood: breath ratio of 2300:1. For the alcohol group, average BAC post consumption was 0.06% (*SD* = .02%). BACs ranged from 0.014% to 0.098%. All control participants had a BAC level of 0.00%. A t-test indicated a significant difference between conditions *t*(60)= 22.1, *p<*.001, such that participants in the alcohol group were significantly more intoxicated than participants in the control group.

**6.3.1.2 Co-witness Influence.**

In total, 86.7% of participants in the discussion condition were exposed to at least one piece of misinformation during the discussion phase. To check that the memory conformity manipulation was successful, a chi-square analysis was run which demonstrated a significant association between Discussion Condition and recalling misinformation χ2 (1, 122) = 25.70, *p* < .001. Participants in the discussion condition were more likely to report at least one piece of misinformation in their accounts compared to those who recalled the event individually. This memory conformity effect was found for sober participants χ2 (1,61) = 15.78*, p* < .001, as well as for intoxicated participants χ2 (1,61) = 10.35, *p* = .001. This shows that the memory conformity manipulation was successful.

To ensure that misinformation items were not more often reported when participants watched one video version than the other version, a chi-square analysis was run. The results show that participants were just as likely to report misinformation if they saw video A than video B χ2 (1,122) = 1.613, *p =* .204.

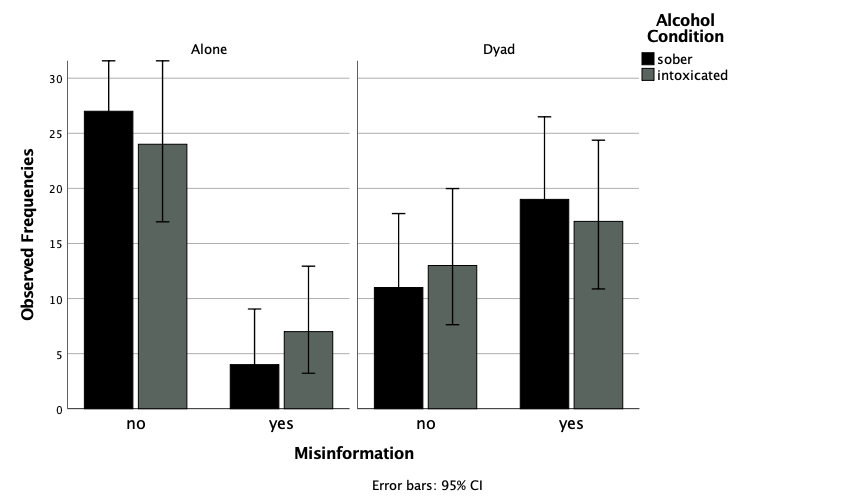
**6.3.2 Alcohol and memory conformity**

To address the question of whether alcohol intoxication was associated with reporting misinformation a log linear analysis including Alcohol condition (intoxicated vs. sober), Discussion condition (discussion vs. individual) and Misinformation reported (yes vs. no) was applied to the free recall data and the cued recall data separately.

**6.3.2.1 Free recall.**

The three-way analysis produced a final model that retained the Discussion x Misinformation interaction. The likelihood ratio of the model was *χ2*(4) =1.28*, p* =. 864. The Discussion x Misinformation interaction was significant, *χ2*(1) = 23.92, *p <.* 001. Participants in the dyad condition were 6.95 times more likely to report misinformation than participants in the individual condition. In total, 60% of participants who had discussed the video reported misinformation compared to 17.7% of those in the individual condition. Intoxicated dyads were not more likely to report misinformation compared to sober dyads. Figure 6.1 graphs the frequencies of participants including misinformation in their response[[5]](#footnote-5).

*Figure 6.1:* observed frequencies of participants reporting misinformation in their free recall.



In summary participants in the dyad were likely to report misinformation. The tendency to report misinformation in addition to the number of misinformation items reported was not influenced by alcohol intoxication.

**6.3.2.2 Cued recall.**

For the cued recall questions, a second log linear analysis was run on the relationship between Intoxication, Discussion and the reporting of Misinformation. Similar to the findings for the free recall data, the three-way log-linear analysis on the cued recall data produced a final model that maintained only the Discussion x Misinformation interaction. The likelihood ratio for this model was *χ2*(4) = 3.95*, p* = .412. The Discussion x Misinformation interaction was significant *χ2*(1) = 28.42*, p <.* 001. This demonstrates that participants who had discussed the video with a partner were more likely to include misinformation in their responses to the cued recall questions. Odds ratios indicate that participants in the discussion condition were 22 times more likely to incorporate misinformation than participants in the individual condition. In total, 40% of participants who had discussed the video reported misinformation in the cued recall questions compared to 3.20% of participants in the individual condition. Intoxicated participants were no more likely to report misinformation than sober participants. Figure 6.2 depicts the frequencies of participants including misinformation in their response[[6]](#footnote-6).

A screenshot of a computer

Description automatically generated*Figure 6.2:* observed frequencies of participants including misinformation in their cued recall tests.

**6.3.2.3 Source monitoring.**

All participants who recalled with a partner were asked to identify for each question in the cued recall test whether the source for their answer was their discussion partner or the video or both. 71.2% of participants were able to correctly identify the source of the information they reported, whilst 28.8% of participants incorrectly identified the source of their information. To investigate whether there was an effect of Intoxication on source monitoring, a chi-square analysis was run. The findings show no association between Intoxication and correct source monitoring, *χ2*(1,61) = 3.17*, p =.* 573*.* Intoxicated participants were as likely as sober participants to identify the source of their memory correctly.

Together these findings indicate a significant effect of Discussion Condition on misinformation - those who discussed the video with a partner were more likely to introduce misinformation than those who took part alone. However, Intoxication had no significant effect on the tendency to report misinformation. Also, sober and intoxicated participants did not differ in the number of misinformation items reported. The findings from the source monitoring questions suggest that participants in general are able to correctly identify the source of their memories and intoxication does not significantly affect a participant’s ability to do so.

**6.3.3 Memory Recall**

**6.3.3.1 Completeness.**

***6.3.3.1.1 Free recall.***

To examine the effect of Intoxication and Discussion on the completeness of participants’ free recall accounts, a 2-way ANOVA was run. As with study one, effect sizes used the following benchmarks: small = .01, medium = .06 and large = .14. There was no significant main effect of Discussion Condition, *F*(1,118) = 1.805*, p = .*182,ηp*2*= .02. There was a significant effect of Intoxication, *F*(1,118) = 4.48*, p= .*036, ηp2 = .037. Participants who were sober reported more details *(M =* 23.19*, SD =* 5.97*)* 95% CI [21.62, 24.73] than those who were intoxicated *(M =* 20.82*, SD* = 6.39) 95% CI [19.27, 22.38]. There was no significant interaction between Intoxication and Discussion *F*(1,118) = 2.20*, p = .*148,ηp2 =. 018*.* Additionally, there were no significant effects of alcohol or discussion on completeness in the cued recall[[7]](#footnote-7). Therefore, participants who were intoxicated reported significantly fewer details in their free recall accounts, but this was not the case for the cued recall questions.

**6.3.3.2 Memory Accuracy.**

An accuracy rate was computed by dividing the number of accurately reported details by the total number of details separately for the free and cued recall components. There were no significant effects of Intoxication or Discussion condition on accuracy in the free recall condition.[[8]](#footnote-8)

***6.3.3.2.1 Cued recall.***

For the cued recall data, there was a significant main effect of Discussion condition on accuracy rate, *F*(1,118) = 4.21, *p* =.044, ηp2 =.034. Individual participants had a significantly higher accuracy rate (*M* = .72, *SD* = .16)95% CI [.68, .76] than those in the discussion condition (*M* =.66, *SD* =.19) 95*%* CI [.62, .70]*.* There was no significant main effect of Intoxication, *F*(1,118) = .097*, p =.*756*,* ηp2 =.001, and there was no significant Discussion x Intoxication interaction *F*(1,118) = .367, *p* =.546, ηp2 =.003.

In summary, the data suggest that under conditions of free recall, neither alcohol intoxication nor discussion are detrimental to accuracy rates. However, during cued recall, participants in the discussion condition had a significantly lower accuracy rate compared to those in the individual condition. This suggests that, depending on recall condition employed; witness discussion may lead to reduced accuracy.

**6.3.4 Participant Confidence**

In addition to the effect of alcohol on accuracy and completeness, research has demonstratedthat intoxicated participants show evidence of under confidence (Crossland et al., 2016; Flowe et al., 2017). As such, the following analysis focuses on the effect of Intoxication and Discussion on participant confidence.

**6.3.4.1 Free Recall.**

Participants were asked to indicate their confidence in their free recall accounts. A 2-way ANOVA revealed a significant main effect of Intoxication on confidence judgements, *F*(1,114) = 9.18*, p* = .003,ηp2 =.075. Participants who were sober reported significantly higher confidence *(M* = 5.44*, SD* =1.0,*) 95%* CI [5.16, 5.72]) than those who were intoxicated *(M =* 4.82*, SD* = 1.67, 95% CI [4.54, 5.11])*.* There was no significant interaction between Discussion and Intoxication, *F(*1,114) = 1.79*,p* =*.*184,ηp2=.015. The main effect of Discussion condition was also not significant, *F*(1,114) =1.04, *p* = . 310,ηp2 = .009*.* Therefore, despite being no less accurate than sober participants, intoxicated participants reported lower confidence in their accounts.

**6.3.4.2 Cued Recall.**

For cued recall, participants were asked to report their confidence in their answer to each question*.* Mean confidence was calculated for correct, incorrect, misinformation or stated as ‘I don’t know’ responses.

A 4 (Response Type: correct, incorrect, misinformation, I don’t know) x 2 (Intoxication: intoxicated vs sober) x 2 (Discussion Condition: individual vs discussion) ANOVA was conducted to examine the effect of response type on confidence levels. Mauchly’s test indicated that the sphericity assumption had been violated, χ2 (5), 14.75*, p* = *.*012, and as such the Greenhous-Geisser correction was used. There was a significant main effect of Response Type, *F*(2.087, 29.215) = 3.42, *p* =.044,ηp2 =.196. Pairwise comparisons indicated that participants were significantly more confident in their correct responses than misinformation responses *(p* = .004) and ‘I don’t know’ responses *(p* = .002*).* None of the main effects of Discussion, *F*(1,14) = 2.84*, p* =.114, ηp2 =.169 or Intoxication, *F*(1, 14) =.13*, p* = .723, ηp2 =.009, nor the interactions between Response Type and Discussion, *F*(3, 29.22) = 0.55*, p* = *.*58*9,* ηp2 = .038*,* and Response Type and Intoxication, *F*(3, 29.22) = 1.33*, p* = .278*,* ηp2 = .087, were significant. Mean confidence ratings for response type can be seen in Table 6.3.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | | **Correct**  **responses** | **Incorrect**  **responses** | **Misled**  **responses** | | **I don’t know**  **responses** | |
| **Alone** | | Sober | 5.71 (.83) | | 4.95 (1.30) | | 5.00 (1.41) | | 3.00 (2.22) |
|  | Intoxicated | 4.54 (1.29) | | 4.14 (1.71) | |  | | 2.09 (2.04) |
|  | | Total | 5.12 (1.23) | | 4.53 (1.57) | | 5.00 (1.41) | | 2.52 (2.15) |
| **Dyad** | | Sober | 5.02 (1.07) | | 4.22 (1.52) | | 4.65 (1.34) | | 2.75 (2.11) |
|  | | Intoxicated | 4.94 (1.13) | | 4.30 (1.35) | | 3.60 (1.65) | | 2.71 (2.73) |
|  | | Total | 4.98 (1.09) | | 4.26 (1.42) | | 4.20 (1.54) | | 2.73 (2.34) |
| **Total** | | Intoxicated | 4.73 (1.22) | | 4.22 (1.53) | | 3.60 (1.65) | | 2.34 (2.33) |
|  | | Sober | 5.37 (1.01) | | 4.59 (1.45) | | 4.70 (1.31) | | 2.87 (2.14) |

*Table 6.3*: Mean confidence ratings by response type, discussion condition and alcohol condition.

**6.3.5 Effect of alcohol and discussion on response type**

For correct responses a 2-way ANOVA revealed a significant main effect of Intoxication on confidence for correct items, *F*(1,118) =10.12*, p* =*.*002,ηp2 =.079. Sober participants were significantly more confident in their correct responses than intoxicated participants *(see Table 6.3).* There was also a significant interaction between Intoxication and Discussion on confidence for correct items, *F*(1,118) = 7.49*, p =.*007,ηp2 =.060*.* The decrease in confidence when intoxicated compared to when sober was greater for individual participants than for those who had discussed with a partner. There was no significant main effect of discussion on confidence for correct items, *F*(1,118) = 0.513*, p =.*475,ηp2 =.004. For all other response types, findings were not significant (*p*s>.05)[[9]](#footnote-9)

The confidence data therefore point to a lowered confidence amongst intoxicated participants. For the free recall data, despite being no less accurate, participants were less confident when they had consumed alcohol. Similarly, whilst confidence was higher for all participants when their responses in the cued recall test were correct, for intoxicated participants their confidence levels for correct responses were significantly lower than their sober counterparts. This was the case more so for individuals than those who had discussed the video with a partner.

**6.3.6 Central and peripheral details**

Consistent with previous research investigating the effect of alcohol intoxication on eyewitness memory (Harvey et al., 2013; Van Oorsouw & Merckelbach, 2012), recall data was scored according to the number of central and peripheral items recalled investigating whether intoxication effects recall for said items differently.

**6.3.6.1 Free recall.**

For the free recall data, it was of interest to establish whether participants reported more central versus peripheral details. The data were not normally distributed, and as such were analysed using a Wilcoxon signed rank test. The ratio of peripheral to central details for intoxicated participants was 0.08 (*SD* = 0.06) and for sober participants was 0.08 (*SD* = 0.08).

The findings demonstrate that there was a significant difference in the type of detail participants reported. Participants reported significantly more central details *(M* =12.46*,* SD= 3.30*)* than peripheral details *(M* = 1.02*, SD* = 0. 87*)* Z = -9.56*, N* =122*, p* <. 001*.* This was true for both sober participants *Z* = -6.84*, N* = 61*, p* <. 001*,* as well as intoxicated participants *Z* = -6.75*, N =* 61, *p* <. 001.

Next, the effect of intoxication on reporting of central and peripheral details was examined separately. A Mann-Whitney U test demonstrated no effect of alcohol intoxication on recall of central details *U* =1650.50*, p* =. 279 or of peripheral details *U* =1802.50*, p* =. 754*.*

**6.3.6.2 Cued recall.**

The cued recall data were similarly not normally distributed, and as such were analysed using non-parametric tests. The ratio of peripheral to central details reported in the cued recall test was 0.34 (*SD* = 0.31) for intoxication participants and 0.43 (*SD* = 0.41) for sober participants. For the cued recall data, as with the free recall data, participants collapsed across alcohol and discussion condition reported greater numbers of central details *(M* =3.02*, SD* =1.22) than peripheral details (*M* =1.06, *SD* = 0.85) *Z* = -8.87*, N* =122*, p*<. 001. Similarly, this was true for sober participants Z = -6.34, *N* = 61, p<. 001, as well as intoxicated participants *Z* = -6.22*, N* = 61*, p* <. 001*.*

Consistent with the free recall, there was no effect of intoxication on the number of central items reported *U* =1717.00*, p* =. 443*.* Additionally, there was no effect of intoxication on the number of peripheral items reported *U* = 1577*.50, p* =. 123*.*

**6.5 Discussion**

The research presented in this chapter investigated the effect of alcohol intoxication and witness discussion on memory conformity. Consistent with the hypothesis, participants who engaged in dyadic discussion incorporated misinformation into their accounts 6.95 times more often than those who recalled alone in the free recall, and 22 times more often in the cued recall. This effect was not influenced by alcohol intoxication. Sober and intoxicated participants were just as likely to include misinformation and did not differ in the amount of misinformation they reported. Whilst study one found that sober participants were as likely to report PEI from an intoxicated source as a sober one, the present study builds upon this by demonstrating that intoxicated participants were no more or less prone to reporting PEI information encountered from an intoxicated source than sober ones. Taken together, both studies demonstrate that the intoxication of the source, and the intoxication of the co-witness does not influence the tendency to report PEI. What study two additionally demonstrates is that, having the source as a similarly intoxicated co-witness does not affect this. Furthermore, whilst study one found that the intoxicated witness was regarded as less credible, study two found that intoxicated participants were no less accurate than their sober counterparts. This contradiction is consistent with the differences between juror decision-making studies and laboratory studies outlined previously (Evans & Schreiber, 2010; La Rooy et al., 2013). It suggests that despite the negative expectancies people possess as to the effect of alcohol (Montes et al., 2017) moderately intoxicated witnesses can in fact be reliable sources. However, participants in the present study were significantly less confident when they were intoxicated than when they were sober. When one considers confidence as an indication of metacognition (Evans et al., 2017), it suggests, as in study one, that the intoxicated participants considered themselves as a less reliable source of information.

The present findings add to the growing body of literature suggesting that mild to moderate doses of alcohol may not increase suggestibility to misinformation (Flowe et al., 2019; Schreiber Compo et al 2012; Thorley & Christiansen 2018) (See table 4.1 for a review). The present study extends these findings by demonstrating that the same effect occurs when misinformation is presented in a dyadic discussion where both partners are intoxicated. Taken together, these findings suggest alcohol may not increase suggestibility to socially encountered misinformation.

The finding that alcohol may not increase the susceptibility to misinformation is in line with other work in the field. Schreiber Compo et al. (2012) previously demonstrated that alcohol does not increase suggestibility. They presented misinformation via a phone call by the experimenter. Suggestibility was assessed approximately 20 minutes later during an interview. There was no relationship between suggestibility and alcohol intoxication. More recent research by Evans, Schreiber Compo, Carol, Nichol-Lopez, Holness & Furton (2019) found that intoxication made individuals only more suggestible to inaccurate suggestions after a one-week delay. Those who engaged in an immediate retrieval attempt were no more suggestible than their sober counterparts. Studies that found increased suggestibility due to intoxication were field studies conducted by Van Oorsouw et al. (2015; 2019). Severely intoxicated participants (MBAC = 0.16%) were more likely to go along with misleading questions immediately and after a 3-5-day delay compared to sober participants (Van Oorsouw et al., 2015). Similarly, Van Oorsouw et al. (2019) showed that as intoxication levels increased so did acceptance to misinformation (study one). In line with findings by Evans et al. (2019), higher BACs led to increased suggestibility only in the delayed testing condition and not the immediate testing condition (study two). It is important to note that Van Oorsouw et al. (2015; 2019) tested bar tenants and therefore achieved higher BAC levels than other laboratory-based studies. Thus, on the basis of the limited existing research on the impact of alcohol intoxication on suggestibility, it could be argued that low to moderate intoxication levels have no or only little effect on an individual’s likelihood to incorporate misinformation in their subsequent memory reports. However, higher levels of intoxication may make individuals more prone to accept misinformation. Moreover, Van Oorsouw et al. (2019) highlighted that memory completeness mediated acceptance of misinformation in two of three comparisons in their study. They argue that this is in line with the discrepancy-detection principle (Peterson, Rothfleisch, Zelaso & Pihl, 1990; Schooler & Loftus, 1986). That is, individuals find it harder to detect inconsistencies between one’s actual memory and suggested misinformation when memory for the original event is poor.

The present study found that consumption of alcohol was also not associated with a decrease in accuracy rate. This suggests that intoxicated individuals are able to give an account that is as accurate as that of a sober person and reflects previous findings in the field (La Rooy et al., 2013; Hagsand et al., 2013). Research by Schreiber-Compo et al. (2017) found that when comparing state at encoding and retrieval, for intoxicated witnesses, recall is least impaired when tested straight away rather than with a delay. Thus, in the present study, recalling an event in an intoxicated state after only minimal delay had no detrimental effect on accuracy. Surprisingly, in the cued recall condition, there was an effect of discussion on accuracy rate. Those who had engaged in discussion were less accurate than those who had only recalled alone. Whilst this could be considered a result of the tendency of dyads to report misinformation, the effect was specific to the cued recall condition, with participants who had discussed the video not differing from those who had not in their free recall accounts. These findings may indicate a potential detrimental effect of group membership aside from the potential for misinformation.

Whilst the recall of intoxicated participants was no less accurate than that of their sober counterparts, it did differ in quantity. Intoxicated participants recalled fewer details overall, regardless of which discussion condition they were in. This is consistent with previous research by Hagsand et al. (2013) and Flowe et al. (2017), which found that alcohol intoxication reduced the number of details reported. The present findings suggest that whilst still under intoxication, alcohol consumption may lead to less completeness in a witness account. Interestingly, for the cued recall questions, there was no effect of alcohol consumption on completeness. This is consistent with Jores’ et al. (2019) meta-analysis that showed an effect of completeness on free recall but not cued recall under conditions of intoxication. Whilst previous research (Altman, et al., 2018) has found that cued recall may reduce the quality and quantity of reporting for both intoxicated and sober participants, the present findings suggest that intoxication will not increase any decrement in performance associated with cued recall.

Whether this alcohol related difference in recall completeness is due to poor memory for the original event or due to changes in one’s metacognitive beliefs about their memory performance is unclear. The confidence data suggest that alcohol does have an impact on participants’ metacognition. Alcohol had a significant effect on participants’ confidence judgements. Intoxicated individuals showed a tendency to be less confident compared to their sober counterparts although they were no less accurate. Additionally, for correct responses in the cued recall, intoxicated participants were significantly less confident than sober participants. These findings are in line with previous research, which found a trend of under confidence in intoxicated participants, despite intoxication having no effect on recall accuracy (Crossland et al., 2016; Harvey et al., 2013).

The present study’s findings are consistent with much previous research looking into the effects of alcohol on eyewitness memory and suggestibility. The results indicate that when the source of misinformation is a similarly intoxicated dyad partner, it does not alter the tendency to report misinformation. So why did intoxication not impact upon memory conformity? The design used in the study might provide some tentative explanation. In the study discussion pairs were either intoxicated or sober. That is the design did not include any mixed dyads. The fact that sober and intoxicated participants were equally likely to engage in memory conformity, suggests that the source of the information (a discussion partner) did not impact upon the tendency to report misinformation when their credibility was similar to their own. The systematic review presented earlier in this thesis, demonstrates how informational influence occurs when a person knowingly reports misinformation from their co-witness due to a belief that it is correct. Many studies have shown that increasing the credibility of the co-witness can be successful in increasing memory conformity. French et al. (2011) report findings in support of *relative credibility* leading to increased or decreased susceptibility to misinformation. When pairs of participants were given the same type of glasses, individual participants were no more or less likely to report misinformation. Conversely, when pairs wore different types of glasses, the participant who believed their visual acuity had been increased was less likely to report misinformation, whilst the participant who believed their visual acuity had been decreased was more likely to report misinformation. Previous studies have found that memory conformity is increased when one’s discussion partner is highly confident (Goodwin et al., 2013) and when their discussion partner is confident, but they themselves are not (Thorley & Kumar, 2016). In the present study, intoxicated participants were significantly less confident than their sober counterparts. Therefore, dyads of intoxicated participants were both lacking in confidence in their own memory. Thus, during dyadic discussion with two intoxicated participants, each dyad member was not sufficiently confident to lead their partner to be more prone to report PEI, whilst also not being confident enough in their own memory to resist reporting PEI from their dyad partner. The tendency to report misinformation was the same as when it was encountered through other sources such as misleading questions or written narratives (Schreiber Compo et al., 2012; Van Oorsouw et al., 2015).

**6.5.1 Group behaviour**

Participants who had previously recalled in a dyad were less accurate in their cued recall than participants who completed the experiment individually. These findings suggest an impairing effect of group membership. Memory collaboration requires an individual to balance the demands of the task with the demands of collaboration itself (Andersson & Ronnberg, 1995). Previous research has shown that groups do not perform at their optimum in recall tasks, a term called collaborative inhibition (Weldon & Bellinger, 1997). The retrieval disruption hypothesis proposes that retrieval strategies applied by one group member may disrupt retrieval strategies used by another group member, thus impairing overall group recall performance (Basden et al., 2000). The impairing effect of collaboration is typically overcome in later recall trials when participants recall individually (Finlay, Hitch & Meudell 2000). This is not consistent with the present findings, which indicated a detrimental effect of discussion condition on individual recall. A second explanation for this finding could be social loafing. It is well established that group members are less motivated to contribute to a task than when the task is completed individually (Brandimonte & Ferrante 2008). In the dyadic discussion, group members recalled the event together despite watching two different versions of the same event. In a task where group members are exposed to erroneous information that they cannot recall seeing themselves, they may regard their own contributions as somewhat redundant. This could lead dyad participants to be less motivated to contribute and so withhold details relating to their own memory of the event. Therefore, these memories do not benefit from the extra rehearsal phase that discussion provides. This may have led to the lower accuracy rates seen for dyad participants in their cued recall.

**6.5.1.2 Normative versus Informational Influence.**

In total, 86.7% of participants in the discussion condition were exposed to misinformation during the discussion phase. However, in the individual recall phase, 70% of participants in the discussion condition reported misinformation which means that, of the 86.7% of participants who included events that they did not see during the discussion phase, 16.7% did not do so when no longer under the influence of their discussion partner. This suggests the presence of normative influence (Nolan, Schultz, Ciladini, Goldstein & Griscevicius, 2008). In other words, despite a participant not actually seeing a particular detail, they were willing to include it in their joint account of the events but did not include it in their own account. Thus, it may be that, during the discussion phase, participants felt social pressure to agree with their discussion partner.

When considering the remaining participants who did include misinformation in their accounts, the results may be a combination of all three processes. That is, participants although completing their recall individually, may still have felt under normative pressure to report the information gained from their dyad partner. The second of these is informational influence, where a person knowingly includes information from another source because they believe it to be accurate (Cialdini & Goldstein, 2004). The third mechanism, source misattribution, (Gabbert, et al., 2012), points to an error in which participants are unable to locate the source of their memory, erroneously reporting the information as their own. The inclusion of source-monitoring questions in the present study demonstrates that 71.2% of participants who discussed the video with a partner were able to correctly identify the source of the material they included in their recall questions. This suggests that, despite 70% of participants in the discussion condition reporting at least one piece of misinformation, in general, participants were able to correctly identify that this information came from a partner. This points to informational influence as the candidate mechanism through which memory conformity occurred in the present study. Participants were aware that the details came from their discussion partner, however, chose to report them when under no social pressure to do so. Importantly, there was no significant association between alcohol intoxication and source attribution. Intoxicated participants were equally as able to locate the source of their memories as sober participants were. The present findings are consistent with research by Jack, Zydervelt and Zajac (2014) who found that discussion participants were able to locate the source of their memory.

**6.5.2 Alcohol Myopia Theory**

The findings of the present study demonstrate that all participants, regardless of intoxication reported more central than peripheral details. Importantly, there was no effect of intoxication on recall of central versus peripheral details. This is consistent with Flowe et al. (2016) however inconsistent with Schreiber Compo et al. (2012) who found that intoxicated participants specifically were less able to recall peripheral details. Moss and Albery (2009) state that a myopic response occurs under conditions of response conflict, that is, when there are competing cues both inhibiting and impelling behaviour. Thus, the present findings are unsurprising given the lack of response conflict and reflect a preference by all participants for details that are most salient. Additionally, the under confidence of intoxicated participants can be taken as an indicator of task difficulty. Suggesting that, under conditions of intoxication the task places greater demands on controlled effortful processing (Steele & Josephs, 1990), resulting in lower confidence than for sober participants.

**6.5.3 Limitations**

One limitation of the present study is the lack of mixed intoxication dyads. Studies have shown that sober participants are less likely to report contagion items proposed by a perceived intoxicated confederate (Thorley & Christiansen, 2018). By including mixed dyads, the examination of how the intoxication of one’s partner may influence memory conformity could be investigated. In addition, asking participants to indicate how trustworthy or credible they found their discussion partner to be, would be useful in helping to explain why intoxicated participants were not more or less prone to reporting misinformation from their discussion partner. Finally, laboratory studies typically reach BAC concentrations of < 0.08%. The mean BAC reached in the present study was 0.06%, which can be considered a low to moderate dose of alcohol. This level of intoxication has been shown to cause changes in cognition in other domains such as driving hazard perception (West, Wilding, French, Kempi & Irving 1993) and sustained attention (Magrys & Olmstead 2014). However, is a much lower dose of alcohol intoxication than would typically be seen in real world drinking scenarios. As such future research should investigate the effect of memory conformity at higher doses (> 0.10%) to examine the impact this may have on memory conformity.

**6.5.4 Practical Applications and Conclusions**

This research examined the impact of alcohol on memory conformity. The findings suggest that alcohol intoxication did not make individuals more susceptible to incorporate misleading information obtained from a mock co-witness. In line with previous research, alcohol did impact recall completeness but not accuracy. Furthermore, intoxicated individuals were less confident in their accurate responses compared to their sober counterparts. Thus, contrary to the commonly held belief that alcohol might have a negative impact on individuals’ memory reports, the study found that mild to moderate doses of alcohol did not make individuals more suggestible to misinformation provided by a co-witness. The findings have several practical implications: Firstly, witnesses who are intoxicated to levels often seen in the real world can produce memory accounts that are as accurate as those by sober witnesses are. Secondly, there is the potential for all witnesses who discuss a crime with a co-witness to report information that they did not see but have just heard about from the other witness. Alcohol does not seem to exacerbate this memory conformity effect. It is therefore of utmost importance to prevent co-witness discussion from happening, regardless of whether witnesses are intoxicated or sober. Thirdly, police, judges and jurors should be aware that intoxicated witnesses might report fewer details and be less confident in their accounts; however, the content of their accounts might not be less accurate than that of a sober witness.

The research presented in this chapter found that, although less confident and complete in their accounts, intoxicated witnesses were still able to report accurate testimony. What’s more, they were no more or less prone than their sober counterparts to report memory conformity items suggested by their discussion partner. However, the study was limited in its ability to only administer a moderate dose of alcohol. Moreover, the lack of effect of intoxication on memory conformity may have additionally been influenced by the fact that dyads recalled with same-state partners. The next chapter will investigate the effect of intoxication on misinformation at higher doses, by conducting research in the field. In addition, by using an always sober video witness, it is possible to examine how alcohol effects the tendency to report PEI when it is encountered from a sober source. Whilst study two found a significant effect of discussion condition on accuracy in the cued recall test, aside from the tendency to report PEI, participants who engaged in discussion were no less accurate in their free recall. As such, in order to gain a complete understanding of the possible effect of discussion on memory reports for witnesses who have consumed alcohol, it also aims to examine whether there are any benefits of collaboration. Finally, chapter four discussed the importance of eyewitness identifications, and the conflicting evidence around the ability of intoxicated witnesses to do so. Study three sought to add to the literature on intoxicated witnesses by examining the ability of participants to complete a show-up identification.

**Chapter Seven: Study three the effect of alcohol on eyewitness memory in the field**

Studies one and two found that sober participants were no less likely to report misinformation from an intoxicated witness than a sober witness, and that intoxicated dyads were no more or less prone to reporting misinformation than sober dyads. Thus, discussion has the potential to lead to witnesses reporting false information gained from a co-witness, regardless of either party’s intoxication. However, as yet, this thesis has not examined a likely scenario in real life co-witness situations, which is an intoxicated witness being exposed to PEI from a sober source. What’s more, at moderate doses of alcohol intoxication (BAC = 0.06%), intoxicated participants were less complete in their recall, but were no less accurate. Despite intoxication not impairing memory accuracy, it did significantly impact upon eyewitness confidence. That is, participants who consumed alcohol were significantly less confident than those who were sober, despite being no less accurate. Whilst the findings add to the literature to demonstrate that moderate doses of alcohol may not be detrimental to the accuracy of eyewitness testimony, laboratory studies inherently lack ecological validity. As such, the research presented in this chapter sought to overcome this problem by taking place in the field. In addition, as participants in study two were no less accurate in their free recall after discussion, it also aimed to examine the potential benefits of co-witness discussion as well as the risks associated with reporting misinformation.

**7.1.1 Benefits of field research**

Most laboratory studies have previously focused upon the effect of alcohol on eyewitness memory at moderate doses (0.2-0.7g/kg) (La Rooy et al., 2013; Hagsand et al., 2013). The majority of these studies showed that, at moderate doses, alcohol consumption is not detrimental to recall accuracy in an eyewitness context (Crossland et al., 2016; La Rooy et al., 2013; Schreiber Compo et al., 2011). Whilst intoxicated witnesses have been found to be no less accurate in laboratory studies, they do show a decrement in the amount of information they can recall (Crossland et al., 2016; Hagsand et al., 2013). Laboratory studies on misinformation also suggest that intoxicated participants are no more or less prone to misinformation. (Schreiber Compo et al., 2012; Thorley & Christiansen, 2018). Whilst Gawrylowicz et al. (2017) demonstrated that consuming alcohol after witnessing a mock crime but before encountering misinformation can actually protect intoxicated participants from reporting misinformation. Thus, in the context of reporting misinformation, the findings suggest that low to moderately intoxicated witnesses are no more prone to report false information than a sober witness would be.

Although conducting such experiments in the laboratory provides benefits in that it enables researchers to control the amount of alcohol that participants consume, research has also been conducted in the field to provide greater ecological validity and to examine higher levels of intoxication than would be possible in a laboratory setting (Altman et al., 2018; Van Oorsouw & Merckelbach, 2012). At present, there are relatively few field studies that have examined the effects of alcohol on eyewitness memory (See table 4.1 for a more comprehensive outline of the specific methodology used in these studies).

Crossland et al. (2016) recruited patrons from a bar and found that participants with a low BAC (0.05%) produced significantly more correct decisions, and significantly fewer do not know responses to a recognition test sent a week after watching a mock crime than those with a higher BAC (0.14%). The authors also found an effect of confidence in which participants with the lowest BACs reported the highest confidence in their decisions. Furthermore, participants’ free recall was significantly less complete for those with higher BACs. A field study by Van Oorsouw and Merckelbach (2012) recruited participants in bars and sent them free and cued recall tests 3-5 days later. The results showed that BACs (up to .16%) were negatively correlated with memory completeness and accuracy. Furthermore, higher BACs were related to fewer correctly recalled central and peripheral details in both cued and free recall. No significant correlations between BACs and errors were found in the free recall test, however in cued recall, higher BACs were associated with greater commission and distortion errors. At higher levels of intoxication (up to 0.29%) Altman et al. (2018) demonstrated that alcohol intoxication was associated with the recollection of fewer items and was predictive of accuracy. While Altman et al. (2019) similarly found that at BACs of up to 0.24%, intoxication led to reduced quality and quantity of information recalled. Van Oorsouw et al. (2015) also conducted field research into the effects of alcohol on eyewitness memory and suggestibility. Participants were approached in bars and asked to commit a mock crime. Their suggestibility was assessed immediately and after a 3-5-day delay. Participants’ intoxication ranged from 0-0.16% BAC, and the results showed that moderate and severely intoxicated participants reported fewer correct details immediately, and after a delay as compared to those who were sober. Furthermore, those who were most intoxicated were significantly more likely to go along with the erroneous suggestions put to them in the cued recall test, both immediately and when tested after a delay. Thus, the field research conducted so far suggests that at higher levels of intoxication than seen in the lab, participants showed poorer accuracy and completeness, as well as an increased tendency towards suggestibility.

**7.1.2 Line-up identification**

As well as measuring the impact of alcohol on memory recall, some studies have also examined how alcohol impacts line-up identification performance. Such studies expose participants to a mock crime before asking them to pick a suspect out of a target present or absent line-up. A target present line-up is one in which the target is in the line-up, whereas in a target absent line-up, only filler faces are included. Studies have found that, while making a correct identification under conditions of target presence is possible after the consumption of alcohol, target absent line-ups are more difficult. Yuille and Tollestrup (1990) found no effect of alcohol consumption on target present identifications, however for target absent identifications, alcohol increased the rate of false IDs. Conversely, Kneller and Harvey (2016) found intoxication at moderate doses (0.6ml/kg) did not affect identification accuracy or confidence in responding. Harvey et al. (2013) found no significant differences between sober and intoxicated participants in their identification accuracy. However, consistent with Crossland et al. (2016) there was an effect of confidence, such that sober participants were more confident in their judgements than those who were intoxicated. Consistent with this finding, research by Flowe, Colloff, Karoglu, Zerek, Humphries and Takarangi (2017) showed that women in the alcohol condition reported significantly lower confidence than those in the tonic water condition. Research by Hagsand et al. (2013) also found no effect of alcohol intoxication on identification performance on either a target present or target absent line-up. Similarly, field research by Altman et al. (2018) found in a line-up identification task that intoxication did not impair performance.

In contrast, research by Dysart et al. (2002) examined show-up identification in the field at higher levels of intoxication (0.04% - 0.21%.). The findings demonstrated no effect of alcohol intoxication on target present show-ups, however in target absent show-ups, as alcohol intoxication increased, participants were less able to correctly reject the photo. Thus, there is evidence of a detrimental effect of alcohol on suspect identification in this study. Research suggests that the chances of making a false identification using a show-up procedure are substantially higher due to the nature of the procedure, in which participants are only offered the opportunity to look at one photo (Luria, 2007), which may account for the lack of correct rejections by intoxicated participants. However, Eisen, Smith, Olaguez and Skerritt- Perta (2017) indicate that show-ups were used in 30-70% of identification cases and were the most likely identification method to be used in the field at the time of the incident, and thus when the victim is intoxicated. Furthermore, a meta-analysis by Steblay, Dysart, Fulero and Lyndsay (2003) suggests that, whilst line-ups and show-ups have similar rates of correct identifications in target present identification conditions, in target absent conditions, show-ups actually demonstrate a significantly higher rate of correct rejections than line-ups. Whilst false IDs are similar across the two methods, participants show a significantly higher rate of choosing in line-up identifications than in show-ups.

Whilst show-ups have been shown to have a lower rate of false IDs, when investigating this notion in intoxicated samples the results are somewhat more conflicting. Overall, both laboratory and field research suggest that intoxicated participants are able to correctly identify a suspect in target present identification conditions (Hagsand et al., 2013: Altman et al., 2018). However, in target absent conditions, for both line-up and show-up tasks, there is evidence to suggest that alcohol intoxication impairs performance (Dysart et al., 2002; Yuille & Tollestrup 1990).

**7.1.3 Costs and Benefits of witness discussion**

Research into intoxicated witnesses demonstrates that they are no more likely than their sober counterparts to incorporate misleading information in their accounts at moderate doses (Schreiber Compo et al., 2012; Thorley & Christiansen, 2018) whilst they may become more suggestible at higher doses (Van Oorsouw et al., 2015). Whilst research into misinformation has firmly established the tendency for people to report erroneous information when exposed to it, it has also established that, aside from the reporting of misinformation, groups do not report more errors than those who recall individually (Gabbert et al., 2003; Paterson et al., 2009). Due to the costs associated with erroneous eyewitness identification, research interest has, understandably, focused on the potential deficits of memory associated with witness discussion. However, there is research evidence that suggests that collective remembering may have benefits that have gone unexplored in the eyewitness literature in general, and the intoxicated eyewitness literature specifically. This sentiment is echoed by research that demonstrates that although the potential pitfalls of witness discussion are acknowledged by police officers, they also report recognising that witness discussion has potential benefits (Paterson & Kemp, 2005). Yarmey and Morris (2006) found a benefit of dyadic discussion on memory recall for a crime as well as line-up identifications as compared to dyads that discussed non-criminal matters and non-discussion controls. This research therefore alludes to potential benefits associated with witness discussion.

The benefits of collective memory have been explored more completely outside of the eyewitness context. Collaborative memory research has demonstrated that collaborative inhibition occurs when people recall together (Barber & Rajaram, 2011). The mechanism through which this is said to occur is due to a retrieval disruption in an individual’s own idiosyncratic retrieval strategy caused by exposure to other group members’ own retrieval. This line of thought is an extension of the concept of part list cueing causing retrieval disruption in individual recall (Rajaram & Periera-Pasarin, 2007). This can be increased when recall relies on a person’s own subjective recall organisation (Barber & Rajaram, 2011). As such inhibition is often not present in cued recall (Finlay, Hitch & Meudell, 2000). Despite inhibition being found in collaborative groups, individual recall post collaboration benefits from the collaborative phase. Harris, Barnier and Sutton (2012) purport that recalling collectively benefits group members by providing a re-exposure phase. Research indicates that the more an individuals’ retrieval strategy is aligned with the group, the greater these post collaborative benefits (Harris et al., 2012). Additionally, both groups that engaged in turn-taking and consensus reaching during collaboration showed enhanced recall compared to non-collaborating individuals in a subsequent individual recall (Harris et al., 2012). Collaborative groups demonstrate in their individual recall evidence of ‘picking up’ items during group recall that they did not report in their first individual recall, which they later recall in their final individual recall as compared to individuals who do not engage in collaborative recall. That is, collaborative recall exposes group members to items they may not otherwise have recalled. Whilst witness discussion undoubtedly carries the risk of exposing group members to erroneous PEI, it may also result in benefits by providing re-exposure to items individuals may have otherwise forgotten.

**7.1.4 The present study**

The present study extends the already existing suggestibility fieldwork by investigating the tendency to report misinformation from a sober video witness. In so doing, it builds upon studies one and two by examining a third likely scenario in crimes involving alcohol, that is an intoxicated witness encountering PEI from a sober source. In addition, this study also aimed to examine the costs and benefits of exposure to co-witness information. Previous studies (Harris et al., 2012; Yarmey & Morris, 2006) have found that the opportunity to collaborate enhances later memory recall, however this has not been examined with intoxicated participants. Furthermore, misinformation research (Harkness et al., 2015; Paterson & Kemp, 2006) has demonstrated that exposure to correct PEI increases participant accuracy on later recall. Harkness et al. (2015) found that ego depletion led to participants being as likely to report incorrect PEI, but less likely to benefit from the correct PEI they had encountered compared to participants who had not engaged in ego depletion. Study two found that intoxicated participants were as likely to report erroneous PEI as sober ones. The present study therefore investigated whether intoxication had an effect on the ability of intoxicated participants to benefit by reporting correct PEI in addition to erroneous PEI. To investigate the effects of both correct and incorrect PEI, participants viewed a video of a witness reading a prepared statement, which contained both correct details as well as errors, thus allowing recall to be compared for correct details and erroneous details. PEI was encountered via video witness in the present study in order to ensure that the source of PEI was always sober, and because engaging in ‘live’ discussion with a confederate would be logistically implausible in a field setting. However, the general experimental procedure followed that of studies one and two, in which participants viewed a mock crime, encountered PEI and subsequently recalled their memory for the original event after a short delay.

Whilst study two found that intoxication had no effect on misinformation, the dose used was moderate (0.06%). Some research (Van Oorsouw et al. 2015; Van Oorsouw et al., 2019) has found that, at higher doses, intoxication increases suggestibility to misinformation. Thus, the present study took place in the field in order to encounter participants at a range of BACs, which can reach higher levels of intoxication than in the lab. The study also included an identification task in the form of a show-up. Chapter four highlighted some conflicting reports as to the ability of an intoxicated witness to correctly identify a suspect (Altman et al., 2019; Dysart et al., 2003), therefore an identification task was administered in order to add to our understanding of how intoxication affects eyewitness memory. Previous research has been critiqued for using the show-up method, suggesting that it is inherently suggestive, (Cicchini & Easton, 2010) however as it is the method most likely to be used in the field and thus, when a witness is intoxicated, it is important to understand the effect intoxication has on identifications for this method. The study sought to answer the following research questions:

1. Is increasing intoxication associated with a decrease in accuracy of recalled information?
2. Are there benefits of discussion, demonstrated by a higher accuracy rate on details for which participants have been exposed to correct co-witness information?
3. Is increasing intoxication associated with an increased tendency to report misinformation from one’s co-witness?
4. Are intoxicated participants able to correctly perform a show-up identification procedure?

Consistent with chapter six, the metacognitive effects of intoxication were also examined by looking at participants’ confidence ratings in their recall answers, and their source monitoring ability.

Based on previous research it was predicted that there would be a significant effect of alcohol intoxication on accuracy, such that accuracy would decrease as intoxication increased. It was predicted that participant accuracy would be significantly greater for correct details mentioned by the co-witness than when incorrect information or no information was presented. Based upon the findings of Van Oorsouw et al. (2015) it was predicted that the tendency to report misinformation would increase as intoxication increased. Finally, based upon research by Altman et al. (2019) and the meta-analysis by Steblay et al. (2003) it was predicted that intoxication would not affect the ability of participants to perform the show-up identification.

**7.2 Method**

**7.2.1 Participants**

Sixty-seven participants were sampled opportunistically from a pub between 2- 8pm during the course of data collection. The sample consisted of 36 males and 26 females, with 5 participants choosing not to state their gender. The mean age was 33.4 years (*SD* =11.90).

**7.2.2 Materials**

**7.2.2.1 Videos.**

Participants were presented with two videos created for the present study. The first, lasting approximately 3 minutes depicted an opportunistic crime occurring at a pub. The video included three females and depicted the theft of a purse by one of the females when the other left the room to take a phone call. The second video showed a witness to the incident being interviewed and giving their statement of the events that occurred in the video. This witness provided 4 pieces of accurate information, such as the victim had a black bag, and four pieces of inaccurate information, including that the barstools were green.

**7.2.2.2 Recall Test.**

The study included a free recall component and twelve cued recall questions (Appendix G). The free recall question asked participants to recall the content of the video of the incident in as much detail as they could remember. The cued recall questions tested participants’ memory for specific items in the first video. These questions were divided into three groups; the first were questions for which participants have received erroneous information from the witness in the second video. The second were questions for which participants have received correct information from the video. Finally, the third category referred to details for which the participant has not received any kind of re-exposure.

**7.2.2.3 Show-up task.**

Participants were also presented with either a target present or target absent show-up identification task. For the target absent show-up, a pilot test was run which asked participants to rate the similarity of five lure faces to the target face. Participants (n = 10) rated the similarity of five faces to the suspect. From this, a lure face was chosen to represent the innocent suspect in the target absent show-up condition, based upon the frequency of participants choosing the face as most similar to the suspect. (See Appendix H).

**7.2.3 Design**

The study used a mixed design with ‘Confederate Information’ as a within subjects’ factor with 3 levels: correct information, incorrect information, no information. ‘Show-up type’ was a between subjects’ factor with 2 levels: target present and target absent. Participant Intoxication was a predictor variable. Dependent variables were memory accuracy, completeness and misinformation as well as identification accuracy. The study received ethical approval from the School of Applied Sciences’ Ethics Panel at London South Bank University.

**7.2.4 Procedure**

Testing took place over multiple sessions between 2pm and 8pm. This was in order to avoid recruiting participants who were substantially intoxicated so as to ensure researcher safety, and the ability of participants to consent to take part in the experiment. With the consent of premise operators, participants were approached by the researcher and asked if they would be interested in taking part in a study on the effect of alcohol on eyewitness memory. Once they agreed to take part, participants were taken to a quiet area of the pub, where they then completed the study individually on a laptop. After giving consent, participants watched both of the videos, after which they engaged in an unrelated ‘spot the difference’ filler task for 10 minutes. Participants were then asked to complete the free and cued recall questions, reporting their confidence after each of their responses. After completion of the cued recall task, participants were asked whether they responded to the questions based upon their memory from the events of the video, the video witness’ account of the video or both.

Subsequently, participants were asked to complete the show-up task, where they were asked to identify whether the photo presented was the suspect from the video. After which, participants respond to a remember/ know question, being given instructions adapted from Lane and Zaragoza (1995): *Sometimes when we remember things, we can recollect what happened at the time very vividly; other times we might know with certainty that something happened, but can't consciously recall the specifics of the episode in which it occurred. For the suspect you identified, I am going to ask you to tell me whether you remember seeing that person or whether you know you saw that person. "Remembering" an item means that you can consciously recall seeing that person. In other words, you can remember some aspect or aspects of what happened or what you experienced at the time the picture was presented. "Knowing" a person was presented means that although you believe the person was present, you cannot consciously recollect what happened or what you experienced at the time you saw the picture.*

After completion of these elements, participants completed the AUDIT (alcohol use disorders questionnaire) and self-reported how many drinks they have consumed. Their breathalyser reading was then taken by the researcher, after which they were fully debriefed and thanked for their time.

**7.2.5 Data scoring**

A scoring sheet describing the video was produced, containing 53 details that referred to the surroundings, events and people in the video. The free recall data was scored according to whether the detail reported was correct, an error, unscoreable information or misinformation. A detail was scored as correct if it accurately described the events in the video e.g. ‘the walls in the pub were red’. A detail was described as an error if it incorrectly described a detail from the video e.g. ‘the first female had blonde hair’. Information was unscoreable when it referred to subjective feelings or opinions of participants e.g. ‘I think she looked shifty’. Finally, misinformation referred to erroneous details reported by the video confederate that participants incorporated into their accounts. For the free recall data, the total number of details in each category was recorded. Additionally, an accuracy rate was computed by dividing the number of accurate details, by the total number of details reported. To determine inter coder reliability, a subset of seven (> 10% of the total sample) of the free recall data was coded by two raters. The correlation coefficients between raters are reported in Table 7.1 below and demonstrate good reliability.

|  |  |  |  |
| --- | --- | --- | --- |
|  | ***r*** | ***p*** | ***95% CI*** |
| **Correct** | .89 | .018 | .32, .99 |
| **Error** | .87 | .025 | .45, 1.00 |
| **Misinformation** | 1.00 | < .001 | 1.00, 1.00 |

*Table 7.1*: correlation coefficients between raters.

For the cued recall data, each question was scored as either ‘correct’ ‘incorrect’ ‘misinformation or ‘I don’t know’. Responses were grouped according to whether the questions referred to details in which the confederate gave correct information, incorrect information or no information. Thus, an accuracy rate was computed for each category in the same way as above.

**7.2.6 Subjective and objective consumption of Alcohol**

The mean number of alcoholic drinks participants reported having consumed was 2.45 (*SD* = 2.02) with a range from 0 to 9. The mean BAC was 0.03%, with a range from 0.00 to 0.19 %. The number of drinks participants reported consuming was significantly, positively correlated with their BAC reading *r* = .61, *N* = 67, *p* <.001, *95% CI* [.47, .75]. Graph 7.1 depicts the frequencies of blood alcohol concentrations among participants.

*Figure 7.1:* Frequencies of Blood alcohol concentrations

A close up of a mans face

Description automatically generated

**7.3 Results**

**7.3.1 Free Recall**

For the free recall data, correlations with bootstrapping of 1000 samples were run examining the relationship between Intoxication and memory completeness, accuracy and the number of misinformation items reported.

*Completeness:* There was a significant, negative correlation between Intoxication and completeness r = -.64, N = 63, *p* <. 001, *95% CI* [ -.83, -.20].

*Accuracy:* There was a significant, negative correlation between Intoxication and accuracy rate *r* = -.52, *N* = 66, *p* <. 001, *95% CI [*-.68, -.32].

*Misinformation:* The correlation between Intoxication and misinformation was not significant *r* = -.07, *N* = 66, *p* = .553, *95% CI [-.28, .18].*

To summarise, greater intoxication was related to poorer accuracy and less complete accounts; however, there was no relationship between intoxication and the tendency of participants to report misinformation in their free recall accounts.

**7.3.2 Cued Recall**

**7.3.2.1 Confederate Influence.**

In order to examine the potential benefits of exposure to correct PEI a separate accuracy rate was computed for each participant for questions pertaining to correct details that the video witness reported, questions pertaining to errors the video witness reported and questions for which the video witness provided no information.

A mixed linear model was computed to examine the effect of video witness Information Type (correct information, incorrect information, no information) and Intoxication on each accuracy rate. Confederate Information was added as a fixed factor and Intoxication was added as a fixed covariate in the model. Each accuracy rate was computed by dividing the number of accurate details recalled by the total number of details. Information type significantly predicted accuracy rate *F*(2,198) = 30.49, *p* <.001. Participants’ accuracy rates were significantly higher for questions where the witness had given accurate information (*EMM* = .856, *S.E* = 0.02) *95% CI* [.82, .85] than for questions about details where the witness had given no information (*EMM* = .50, *S.E* = 0.04 ) *95% CI* [.43, .57] or when the witness had given false information (*M* = .54, *S.E* = 0.03) *95% CI* [.48, .59] (*p*s <.001). Intoxication also significantly negatively predicted each accuracy rate *F*(1,198) = 77.73, *p* <.001. However the interaction between Intoxication and Information Type did not significantly predict accuracy rate *F*(2,198) = 1.16 *p* = .317. Table 7.2 presents the coefficients and confidence intervals.

In summary, the accuracy data shows evidence of beneficial effects of exposure to PEI, such that participants’ accuracy rate was higher for details that the video witness provided correct information for. Additionally, each accuracy rate was negatively impacted by participant intoxication, however there was no interaction between co-witness influence and intoxication.

|  |  |  |  |
| --- | --- | --- | --- |
|  | ***b*** | **SE** | ***95% CI*** |
| **No confederate Influence** | -.03 | .058 | -.15, .08 |
| **Correct confederate Influence** | .28 | .04 | .19, .37 |
| **Intoxication** | -.89 | .16 | -.12, -.57 |
| **No confederate x Intoxication** | -.06 | .26 | -.57, .45 |
| **Correct confederate x Intoxication** | .23 | .19 | -.15, .62 |

*Table 7.2:* Coefficients and confidence intervals for the effect of intoxication and question type on accuracy rate in the cued recall.

**7.7.3.2.2 Misinformation.**

During the free recall, 16% of participants reported a piece of misinformation from the video witness in their account, whilst 31.3% of participants reported at least one piece of misinformation in response to the cued recall questions.

In the cued recall, there was no significant correlation between Intoxication and reporting of misinformation *r* = .23, *N* = 67, *p =* .064, *95% CI* [ -.14, .51].To sum up, greater intoxication was related to less accurate responses. However, participants were as likely to report misinformation regardless of their intoxication level.

**7.3.2.3 Confidence.**

A mixed linear model was also computed to examine the relationship between Intoxication, Question Type and participant confidence with Question Type as a fixed factor and Intoxication as a fixed covariate. Question type significantly predicted participant confidence, *F*(2, 133.26) = 7.93, *p* = .001. Participants were significantly more confident in responses to questions for which the witness had provided correct information (*M* = 4.35, *S.E.* = 0.08) *95% CI* [4.19, 4.51] than for questions where the witness had provided no information (*M* = 3.76, *S.E* = 0.11) *95% CI* [3.55, 3.97] or questions for which the witness reported misinformation (*M* = 3.86, *S.E* = 0.09) *95% CI* [3.67, 4.04] (*ps* < .001). Intoxication was also a significant predictor of participant confidence *F*(1, 177.12) = 15.15, *p* <.001. There was no significant interaction between Question Type and Intoxication on confidence reports *F*( 2, 133.63) = .67, *p* =.515. Table 7.3 presents the coefficients.

|  |  |  |  |
| --- | --- | --- | --- |
|  | ***b*** | **SE** | ***95% CI*** |
| **Neutral information** | -.22 | .18 | -.58, .14 |
| **Correct information** | .42 | .16 | .11, .72 |
| **Intoxication** | -1.73 | .54 | -2.81, -.64 |
| **Neutral x Intoxication** | .93 | .83 | -.72, 2.57 |
| **Correct x Intoxication** | .58 | .71 | -.82, 1.97 |

*Table 7.3:* Coefficients and confidence intervals for the effect of intoxication and information type on confidence for the cued recall data*.*

**7.3.2.4 Source monitoring.**

All participants were asked to indicate whether the information they used in response to the cued recall questions came from their own memory, the witness, or both. In total, 85.1% of participants reported only using their own memory, whilst 14.9% reported using both their own memory and the witness’s statement. None of the participants reported using only the witness’ statement.

It is not possible to state whether those who incorporated accurate information reported in the witness video relied on the witness’ account or used their own memory of the event. However, misinformation reported by participants could only have been encountered from the witness. Therefore, a chi-square analysis was run to examine the association between reporting misinformation and source monitoring ability. There was a significant association between misinformation and source monitoring χ2 (1) = 38.27, *p* <.001. Participants who reported at least one piece of misinformation were significantly more likely to incorrectly state that their responses came from their own memory than to correctly identify that they had used information from the witness. Participants who did not report any misinformation were significantly more likely to correctly identify the source of the information reported. Additionally, a logistic regression showed no relationship between intoxication and source monitoring accuracy χ2 (1) = .03, *p* = .863.

Thus, participants who reported misinformation were more likely to incorrectly identify the source of the information they reported than those who did not report any misinformation. Intoxication level did not relate to one’s source monitoring abilities.

**7.3.3 Show-up Identification**

In total, 74.6% of participants made a correct decision at the show-up. For those in the target present condition, this meant correctly identifying the suspect. For those in the target absent condition, this meant correctly stating that the suspect was not present. A logistic regression was conducted to examine the effect of target presence and Intoxication on show-up identification. Three models were computed. The first examined whether there was a relationship between Intoxication and Identification. In model two, Target Presence was added to examine whether accuracy differed based upon the show-up condition. Finally, the addition of an interaction between Intoxication and Target Presence was added. Model one was not a significant predictor of show-up accuracy χ2 (1) = .09, *p* = .759. Model two was also not significant χ2 (2) = 2.61, *p* = .271. Finally model three was not significant χ2 (3), 3.51, *p* = .320.

Therefore, participants performed well at the show-up identification. Neither intoxication, nor target presence condition predicted accuracy on show-up performance.

**7.3.3.1 Show-up Confidence.**

Whilst there was no relationship between Target Presence and Intoxication on show-up accuracy, a linear regression was run to examine the relationship between Target Presence and Intoxication on identification confidence.

Intoxication was entered in block one, whilst Target Presence was added in block two. The overall model was not significant *F*(2, 61) = 1.16, *p* = .321. Intoxication accounted for 0.6% of the variance in participant confidence and was not significant *F*(1,62) = 0.37, *p* = .548. Adding Target Presence explained an additional 3.7% of the variance, and was not significant *F*(1, 61) = 1.95, *p* = .168.

**7.3.3.2 Remember/ know judgements.**

In total, 70.1% responded that they ‘remembered’ whether or not the target in the show-up was the suspect, whilst 29.9% reported ‘knowing’ whether or not it was her. A Chi-square analysis indicated that there was no relationship between show-up accuracy and remember/ know judgement χ2 (1) = .78, *p* = .377.

To examine the relationship between Intoxication and remember/ know judgement a logistic regression was run. In block one, Intoxication did not significantly predict remember/ know judgements χ2 (1) = .966, *p* = .326. In block two Intoxication, Accuracy Rate and Show-up Confidence were added to the model. Model two could not significantly predict remember/ know judgement χ2 (4), = 5.77, *p* = .217.

More participants reported a remember than know decision in regard to the show-up. This decision however was not related to intoxication, show-up accuracy or confidence.

**7.3.4 Summary**

To summarise, in the free recall, alcohol intoxication was related to lower completeness and accuracy rate. However, it had no effect on the tendency to report misinformation. In the cued recall, alcohol intoxication and co-witness influence significantly predicted accuracy rate. Participants were most accurate for questions relating to correct information gained from the witness, and alcohol intoxication negatively predicted accuracy. Alcohol intoxication and question type also significantly predicted confidence, such that participants were most confident in response to questions relating to correct information gained from the witness, whilst alcohol intoxication negatively predicted confidence. Much like the free recall, intoxication had no relationship with the amount of misinformation reported in the cued recall questions. The tendency to report misinformation was significantly associated with source monitoring ability, with participants who reported misinformation more likely to make a source monitoring error. Alcohol intoxication did not relate to the ability to correctly source monitor.

The majority of participants were able to make a correct identification on the show-up task. Target presence and alcohol intoxication had no relationship with the accuracy of identification, or the confidence participants reported in their identification. Additionally, more participants reported ‘remember’ as opposed to ‘know’ and this was not related to accuracy or intoxication.

**7.4 Discussion**

The present study examined the impact of co-witness information and alcohol intoxication on eyewitness recall in a field setting. It also explored the effect of alcohol intoxication on the ability to make a correct identification in a show-up. It was predicted that alcohol intoxication would significantly reduce the accuracy and completeness of participants’ testimony, whilst also increasing the tendency of participants to report misinformation. Finally, it was predicted that intoxication would not affect the ability of participants to complete a show-up identification task.

The findings showed that alcohol intoxication had a detrimental effect on the accuracy and completeness of participants’ free recall, whilst also affecting the accuracy of participants’ responses to the cued recall questions. Participants reported significantly more misinformation in response to questions that related to details for which the video confederate had given false information. However, consistent with the findings of study two in chapter six, there was no effect of alcohol on the tendency to report misinformation. Furthermore, the video witness had a beneficial effect on recall, such that participants’ accuracy was significantly higher for questions that related to details for which the video witness had given correct information.

The finding that alcohol reduced the number of details reported in free recall conditions is consistent with the findings of study two, and both laboratory and field research into the effect of alcohol on eyewitness memory. Hagsand et al. (2013) found using an interview paradigm including seven open-ended questions that at higher doses of alcohol (0.07% BAC) participants reported significantly fewer details. Similarly, Harvey et al. (2013) also found that intoxicated participants reported significantly fewer details in free recall tasks. In field settings, research by Altman et al. (2018) further asserts that intoxication significantly reduced the number of details participants reported. Thus, when asked to recall an event using free recall measures, alcohol intoxication significantly reduces the number of items participants report. This finding occurs in laboratory settings at moderate doses of alcohol (<0.08%) and persists at higher levels of intoxication (> 0.08%). At BACs of up to 0.19% the present study found that participants reported significantly fewer details in addition to less accurate recall.

The finding that alcohol is associated with decreased accuracy has also been found in previous studies. Whilst laboratory research has typically found no detrimental effects of alcohol consumption on accuracy (La Rooy et al., 2013; Schreiber Compo et al., 2011) field studies have found that higher doses of consumption are associated with a decrease in accuracy rate. Altman et al. (2018) found that at intoxication levels of up to 0.29%, BAC significantly predicted the percentage of accurate information reported. Similarly, Altman et al. (2019) also found that BAC could significantly predict the number of accurate and inaccurate details reported. BACs in the present study reached 0.19% and thus, the findings suggest a dose dependent effect of intoxication on memory accuracy.

In the free recall task, 16% of participants reported a piece of false information gained from the video witness in their own account. In the cued recall task, 38% of participants reported at least one piece of false information. Thus, participants were more prone to falsely report details gained from the video witness in response to cued recall questions than under conditions of free recall. Previous research has shown that cued recall questions have a larger effect on reported errors than free recall tasks for those who have consumed alcohol (Jores et al., 2019). It suggests that, when interviewing witnesses, free recall approaches may be preferable in reducing the likelihood of incorporating misinformation in their accounts.

Crucially however, as in study two, the present study did not find a significant effect of alcohol on the tendency to report misinformation. Whilst some research has found that alcohol increases the susceptibility to misinformation (Van Oorsouw et al., 2019) this tendency is also affected by delayed and repeated testing. Similarly, Van Oorsouw et al. (2015) found that intoxication increased the tendency to go along with one of two false choice answers given in a cued recall test, however this was also influenced by the amount of correct recall participants reported. Thus, it suggests that intoxication impaired encoding of the event, which made participants more vulnerable to going along with a false suggestion. However, the methodology employed required participants to refute both of the false option choices offered to them by the experimenter. Thus, the increased susceptibility to misinformation seen by intoxicated participants may also be interpreted as a decreased ability to dispute details, which is understandable given its relationship to poorer memory performance in general. In the present study, participants were exposed to erroneous details via the video statement given by the confederate witness but chose to incorporate a piece of misinformation in their account. This means that the mechanism through which the reporting of misinformation occurs is likely to be informational or a source misattribution error, i.e. those who report misinformation are under no social pressure to do so. When considering the methodological differences between the present study and Van Oorsouw et al. (2015), the findings are consistent with much of the previous research examining the relationship between alcohol intoxication and the tendency to report misinformation (Schreiber Compo et al., 2012; Thorley & Christiansen, 2018).

The present study found that in general, participants performed well on the identification task. Importantly, there was no effect of intoxication or target presence on participants’ performance on the task. Some studies have found that performance is impaired in target absent identification conditions (Flowe et al. 2017; Kneller & Harvey, 2016). Altman et al. (2019) report that in target present conditions, alcohol intoxication and identification type did not predict accuracy. However, in target absent conditions, choosing behaviour was related to line-up type, such that participants were significantly more likely to make an identification in the line-up rather than show-up condition. This suggests that show-up procedures reduce the rates of false identifications found in target absent line-up identifications and is consistent with the present study’s findings. There is however some inconsistency in the literature, as Dysart et al. (2002) report that participants who were highly intoxicated were significantly more likely to make a false identification in a target absent show-up. Thus, the exact effect alcohol has on this ability may as yet be unclear. However, based upon the present findings and meta-analysis by Steblay et al. (2003) show-up procedures may be superior in their ability to reduce a false I.D, and may be a viable identification approach for those witnesses who have consumed alcohol.

**7.4.1 Co-witness Influence**

One aim of the present study was to examine the possible costs and benefits of exposure to co-witness information on an eyewitness’ testimony. Sixteen percent of participants included misinformation in their free recall accounts, whilst 38% of participants included at least one piece of misinformation in their cued recall responses. While many participants did not include a single piece of misinformation, the findings demonstrate that exposure to co-witness information has potential costs, in the form of reporting erroneous information that the witness themselves did not see (Paterson et al., 2012). Furthermore, those who reported misinformation performed more poorly on the source-monitoring task. That is, participants would incorrectly state that their recall was based upon their memory of the video, when in fact it contained details encountered from the co-witness. When one considers the mechanisms through which memory conformity is said to occur, it suggests that participants were reporting misinformation as part of a source misattribution error. That is, participants incorrectly attributed the details gained from the co-witness to their own memory of the event (Johnson, Hashtroudi & Lindsay, 1993).

The findings showed that increasing intoxication had no relationship with the tendency to report misinformation. Given that confidence decreased as intoxication increased, it suggests that participants’ belief in their own memory decreased with intoxication. Based upon the premise of informational influence (Wright et al., 2009) the doubt participants demonstrated in their own memory should have increased the tendency to report misinformation. Studies (French et al., 2011; Gabbert et al., 2007) have shown that in circumstances when one co-witness has lower credibility than the other, they are more prone to reporting misinformation. The finding that it did not suggests that, although participants’ belief in their own memory may have been low, their belief in the co-witness’ suggestions may also have been low. Thus, increasing intoxication did not lead to an increased tendency to report misinformation. However, previous studies have examined the role of credibility through manipulating perceived visual acuity (French et al., 2011) encoding duration (Gabbert et al., 2007) or feedback on performance (Monds, Howard, Paterson & Kemp, 2019). The field setting of the present study means that an experimenter did not manipulate the administration of alcohol. Therefore, a decrement in belief in one’s own memory would be based upon each individual’s perception of the effects of alcohol. As research indicates, (Uursberg et al., 2012) people rate the negative effects of alcohol as greater on others than themselves, and the effects of alcohol are rated as significantly less negative as drinking experience increases (Merrill et al., 2016) therefore despite being less confident after intoxication, participants may not have perceived their own memory as more impaired than the video witness.

Intoxication had no relationship to the tendency to report misinformation, or the ability of participants to monitor the source of the information that they reported, however in general source monitoring was poor. Participants who reported misinformation were more likely to erroneously state that this information came from their own memory than the witness’ video. Consistent with studies one and two and in line with the discrepancy detection principle (Loftus, 2005) the testimony of the video witness contained correct contextual detail in addition to errors, which would make distinguishing between information gained from the original video versus the witness’ statement more difficult.

The findings demonstrated that 38% of participants reported at least one piece of false information from the co-witness, whilst 91% of participants reported at least one correct piece of information. This finding may be indicative of post *collaborative benefits,* whereby individual recall is increased in those who have had the opportunity to collaborate prior to recall, compared to those who have not (Rajaram & Pereira- Pasarin, 2007). Vredeveldt, Groen, Ampt and van Koppen (2017) found that pairs remembered as much as individuals during their collaborative interview, but also made fewer errors. Pairs did show retrieval disruption during collaborating, whereby old information that had been recalled in the first, individual interview was omitted during discussion. Furthermore, after a 1-week delay Vredeveldt, Hildebrandt and van Koppen (2016) found that collaborative couples recalled fewer errors than did those who only recalled alone. The findings are also consistent with previous research (Harkness et al., 2015, Paterson et al., 2006) that demonstrates that participants can benefit from reporting correct PEI encountered from a co-witness in addition to the reporting of erroneous PEI. Whilst Harkness et al. (2015) found that ego depletion reduced the ability of participants to benefit from exposure to correct PEI, the present study found that intoxication made participants no more prone to reporting erroneous PEI, and as able to benefit from correct PEI as their sober counterparts. Thus, the results from the present study demonstrate that after exposure to correct information, accuracy about those details may be greater. However, it is unclear whether re-exposure provides post collaborative benefits, or whether participants are merely reporting information that they did not see because they believe it to be correct. Participants were under no social pressure to report either correct or incorrect information from the witness, which suggests correct PEI was either knowingly reported due to a belief that it is correct, or unknowingly incorporated into their memory for the original event. Source monitoring for all participants in the present study was poor, which means that participants were likely unable to identify whether the information they reported came from their own memory or the video witness. Whilst enhancing the memory of a witness is beneficial in increasing the accuracy of a witness’ account, there are additional risks to consider. One such risk is that corroborating witness accounts are likely to be persuasive to a jury (Cutler et al., 1990). If one witness, did not in fact remember such details, but recalled them after a discussion, they are still reporting information that they did not see (Paterson et al., 2012). Despite the details in fact being correct, the recall is not their own memory.

Given the prevalence of co-witness discussion amongst witnesses (Skagerberg & Wright, 2008) witness discussion may be considered an estimator variable that cannot be controlled by policy and thus must be researched so that it’s effects may be understood. What the present findings suggest is that although such discussion may lead to memory distortions, it may also offer some enhancement to a witness’s recall. Whether this enhancement is due to discussion reminding witnesses of details they would otherwise forget, or demonstrative of the tendency of witnesses to report details gained from discussion in their own accounts despite not recalling the detail themselves is unclear. What is indicated however is that intoxication does not increase the tendency to report erroneous PEI or reduce the ability of witnesses to report correct PEI in their own accounts.

**7.4.2 Alcohol intoxication**

The results demonstrate that alcohol intoxication impaired accuracy and completeness, whilst also negatively affecting confidence. The suggestion that intoxicated persons are less confident can be explained by the theory of metacognition. *Metacognition* refers to the way a person appraises their own knowledge and abilities (Flavell, 1979) and research has shown this process to be influenced by intoxication. Studies have found an impairing effect of alcohol on memory performance (Kleykamp et al., 2010) but participants who had consumed alcohol overestimated the degree of impairment they experienced as a result of alcohol consumption. Therefore, one can consider the detrimental effect of intoxication on confidence to be evidence of the influence of intoxication on metacognition. Fillmore & Vogel-Sprott (1996) found that, when controlling for drinking experience, expected impairment as a result of alcohol intoxication significantly predicted the actual impairment seen. In the present study, alcohol significantly impaired participant’s accuracy, and their confidence in their responses. Thus, it appears as those participants’ metacognition in the present study was accurate.

In addition, the theoretical framework provided by AMT may also elucidate on the effect of alcohol on confidence. Whilst AMT suggests that automated processes are relatively unaffected by the consumption of alcohol, controlled effortful processing shows decrements as a result of consumption (Josephs & Steele, 1990). The negative affect of intoxication on confidence can be considered as an indication that participants who had consumed alcohol found the task to be more difficult. Previous studies have found that alcohol has a negative effect on confidence regardless of its effect on accuracy (Crossland et al., 2016; Flowe et al., 2016). The theories of metacognition and AMT can provide a complimentary explanation of the effect of alcohol on confidence. At low to moderate doses, although performance is not impaired by alcohol, the attentional narrowing associated with alcohol consumption means the task is more difficult, leading to lower confidence, whilst accuracy is unaffected. This was demonstrated in study two, in which participants were less confident in their accounts despite being no less accurate. However, at high levels of intoxication, the negative affect of alcohol on confidence is matched by its impairing effect on performance. Thus, metacognition at moderate doses of intoxication may be informed by participants alcohol expectancies (Fillmore & Vogel- Sprott, 1996), but does not match participants ability to perform the task. However, at high doses, those same expectancies may be informing participants’ metacognition, which is consistent with the impairment they are exhibiting in performing the task. This was seen in the present study, in which the increase in alcohol intoxication led to impaired accuracy and completeness in addition to reduced confidence.

**7.4.3 Limitations**

Whilst the present study examined the effect of alcohol and co-witness information on recall after a small delay, it would be beneficial to include a greater delay condition where participants are sober at recall. Studies have shown that recall for moderately intoxicated participants is better after no delay (Schreiber Compo et al., 2017) whilst susceptibility to misinformation can increase after a delay (Van Oorsouw et al., 2015). By including a delay condition, it would be possible to examine the impact co-witness discussion has on recall in a sober state, and whether the benefits of co-witness influence remain. In addition, whilst the present study sought to investigate the effect of exposure to co-witness information, this was administered by a videoed witness giving a statement rather than a dyadic discussion. A dyadic discussion would be most similar to how co-witness information would be encountered in a real-life scenario and thus would make the findings more applicable to such contexts. However, conducting an experiment in which participants expose each other to misinformation via discussion would be very difficult in the field due to the degree of experimental control required to administer a memory conformity methodology as used in study two.

**7.4.4 Conclusions and applied implications**

The findings of this research chapter suggest that, at higher levels of intoxication, in the field rather than a laboratory, both completeness and accuracy are negatively affected. However, intoxication does not affect the tendency to report misinformation under conditions of immediate recall. Furthermore, the findings suggest some benefits of witness discussion, such that accuracy increases when exposed to correct details about the crime. Therefore, although exposure to co-witness information brings with it the risk of reporting erroneous information, it may also increase accuracy through the reporting of correct PEI. This finding also occurs at all levels of intoxication, meaning that those who have consumed alcohol can report correct PEI whilst being no more prone to reporting erroneous PEI. Finally, using a show-up procedure may be preferable as it reduces the risk of false identifications irrespective of alcohol intoxication.

**Chapter eight: General discussion**

**8.1 Introduction**

The beginning of this thesis highlighted how the social nature of crimes involving alcohol means that it is likely that such a crime will have multiple witnesses who may have consumed alcohol. One possible consequence of this is the potential for witnesses to report erroneous information in their own account that they gained from their co-witness. Therefore, the thesis was interested in examining the effect of two variables on eyewitness memory, namely alcohol intoxication and discussion. Whilst considerable research has been conducted on the effects of discussion on eyewitness memory, the investigation of alcohol’s effects on eyewitness memory is still in its infancy. In particular research examining the impact of alcohol on suggestibility for socially encountered misinformation is still sparse. The findings presented in this thesis extend previous research and contribute new knowledge to the growing literature on the impact of alcohol on eyewitness memory performance. It is imperative to raise awareness that witnesses, and victims usually do not recall incidents in isolation, but are frequently confronted with PEI provided in a social context, such as during a co-witness discussion. Given the strong link between alcohol and crime, it is paramount to investigate how the consumption of alcohol influences one’s susceptibility to incorporate socially encountered PEI. Not only is it important to understand better how likely it is that witnesses take on misleading PEI from intoxicated co-witnesses, but also how likely it is that intoxication makes oneself more suggestible to socially encountered PEI. The current thesis addresses both of these research queries.

The thesis posed several research questions to be addressed through its’ empirical chapters:

* How have studies of memory conformity contributed to our understanding of how informational influence, normative influence and source misattribution errors lead to memory conformity? (Chapter two)
* Will a person be less likely to conform to the memory of an intoxicated person? (Chapter five, study one)
* Is the credibility of a witness related to their accuracy? (Chapter five, study one)
* How does alcohol affect susceptibility to misinformation during a dyadic discussion? (Chapter six, study two)
* Are there beneficial effects of collaborative discussion for intoxicated witnesses? (Chapter seven, study three)
* Does intoxication affect the susceptibility to misinformation in a naturalistic setting? (Chapter seven, study three)

To address these questions, a systematic review and three empirical studies were conducted. Study one examined whether participants would be less likely to report misinformation from an intoxicated rather than a sober witness when they report two or four pieces of misinformation. Study two examined the effect of alcohol on memory conformity during a dyadic discussion with two intoxicated individuals or two sober individuals. Study three examined the costs and benefits of exposure to correct and incorrect co-witness information in a field setting, in which participants have consumed higher doses of alcohol than typically seen in the lab. The results of the studies will be outlined below, with specific reference to relevant previous research and applied implications.

**8.2 Study results**

**8.2.1 The intoxicated co-witness.**

The overarching aim of the thesis was to determine how discussion may affect the recall of intoxicated witnesses and it did so in three empirical studies and one systematic review. The systematic review presented in chapter two examined the current memory conformity literature to identify how such studies have contributed to our theoretical understanding of the underlying mechanisms contributing to memory conformity. Three mechanisms have been identified: normative and informational influences and source misattribution. Regarding normative influence, studies have demonstrated that memory conformity is increased when responses are made in the presence of one’s discussion partner (Goodwin et al., 2013; Schneider & Watkins 1996; Shaw et al., 1997) or when partners are required to reach a consensus decision on their responses (French et al., 2008). Thus, in circumstances where recall is completed in the presence of another, or when an agreement is necessary, the normative pressure one feels to conform is increased.

Memory conformity studies have demonstrated that conformity due to informational influence represents the decision to report information gained from one’s co-witness *knowingly* due to a belief that the information is correct. Memory conformity due to informational influence is more likely to occur when one’s partner is perceived to have a high level of credibility. Similarly, memory conformity increases when participants know their discussion partner. Both Hope et al. (2008) and Mori and Mori (2008) found that participants included significantly more misinformation when recalling with a friend or romantic partner. In Hope et al. (2008) it was found that 79% of those who recalled with a stranger believed themselves to be more accurate compared to their partner, whilst when participants recalled with a friend or romantic partner, this proportion was reduced to 46%. Thus, it seems that knowing one’s discussion partner increased their perceived credibility relative to the witness and therefore, increased the likelihood of reporting misinformation.

When participants demonstrate memory conformity due to social influences, they are doing so knowingly, such that they are aware that the memory did not come from the original event. Conversely, source misattribution occurs when a person mistakenly reports information from their co-witness as their recall of the original event. Research has demonstrated that a source misattribution error was more likely when recall occurred after a delay (Paterson et al., 2009) and when the expectancy of the items was high. That is, when the items recalled by the co-witness were schematically consistent with the original memory (Andrews & Rapp, 2014; Davies & Meade 2013; Numbers et al., 2014; Roediger et al., 2001; Szpitalek et al., 2015). In such a situation, the ability of a person to differentiate between the original memory and the PEI was more difficult given their similarity. The systematic review examined previous research for its contributions to our understanding of how normative influence, informational influence and source misattribution lead to memory conformity. However, more than one of these processes may occur during different phases of the same experiment, as such it is difficult to disentangle the relative contributions of each. Moreover, in a real-life discussion situation, it is likely that all three mechanisms may occur and contribute to the tendency of witnesses to report information gained from their co-witness.

Given the findings of the review, one aim of the thesis was to further examine the mechanisms through which misinformation was reported in scenarios related to alcohol intoxication. Collectively the findings suggest that intoxication does not influence the tendency to report misinformation when 1) a sober participant encounters PEI from an intoxicated source; 2) when two intoxicated dyads expose each other to PEI; and 3) when intoxicated participants hear PEI from a sober video witness. In addition to examining a variety of sober- intoxicated relationships and sources of misinformation, the thesis also identified that alcohol dose (up to .19%) had no impact on the tendency to report misinformation. Whilst the thesis found that intoxication did not influence the tendency to report misinformation in any of the studies, the mechanism through which participants were reporting misinformation may be different in each study. In studies one and three, participants were not required to recall their memories in the presence of another person or reach a consensus judgement. Therefore, any misinformation reported would be attributed to informational influence or a source misattribution error rather than a perceived normative pressure. Study two included an initial discussion phase, during which participants recalled their memories together and therefore may have felt normative pressure to conform to their partner. They subsequently completed their final recall individually, where they were no longer under any normative pressure to conform and as such, any misinformation reported at this point would be due to informational influence or a source misattribution error as in studies one and three.

Normative influence proposes that a person takes on erroneous information from their co-witness because of perceived social pressure to do so (Deutsch & Gerard, 1955). It represents an outward compliance as opposed to a change in memory. In studies one and three, participants never recalled in the presence of another person and as such, were not under normative pressure to conform. Thus, it suggests that sober participants are as likely to report misinformation from a perceived intoxicated source as a sober source when under no normative pressure to do so. Whist intoxicated participants (at doses of up to .19%) will report misinformation from a sober source in their own accounts without normative pressure. Importantly alcohol intoxication of the source of information, or the participant, has no effect on the tendency to do so.

When looking at the tendency of sober participants to report PEI from a perceived intoxicated source, this suggests that participants either reported PEI knowingly due to a belief that it was correct, or unknowingly, due to a source misattribution error. The findings showed that despite the intoxicated witness being rated as less credible, intoxication of the source had no relationship with the amount of misinformation reported. Therefore, this could be indicative of a source misattribution error. Moreover, credibility significantly predicted the amount of misinformation reported which is indicative of participants reporting PEI due to a belief that it is correct. Thus, more than one process may be influencing the tendency to report PEI when under no normative pressure to do so and witnesses may be reporting misinformation knowingly or unknowingly.

However, in study two, participants discussed the video with a dyad partner and had to initially work together to create an account of the events. This represents a likely real-life scenario in which intoxicated witnesses may discuss a crime together prior to having their statement taken and thus, may experience normative pressure to conform with their co-witness’ accounts. The findings showed that, at moderate doses, an intoxicated person was no more likely to report PEI encountered from a similarly intoxicated co-witness after a discussion. This is consistent with much of the previous literature examining alcohol’s effects on the tendency to report misinformation at moderate doses (Schreiber Compo et al., 2012; Thorley & Christiansen, 2018). This thesis builds upon the current understanding of alcohol’s effects on misinformation by demonstrating that having the source of misinformation as a similarly intoxicated dyad partner does not influence the tendency to report PEI. The effect of alcohol on confidence may provide some explanation as to why intoxicated participants did not differ from sober ones in their tendency to report PEI. Studies have found that memory conformity is increased when the participant works with a highly confident confederate (Goodwin et al., 2013). The decrement in confidence shown by intoxicated participants meant that both dyad partners may have appeared less confident to each other, whilst simultaneously doubting their own memory ability. As highlighted by Gabbert et al. (2012) informational influence requires a person to weigh up his or her own memory ability with their discussion partner’s. Thus, the impairments in memory to each dyad partner ‘balance out’ and leave them equal to each other in their confidence in their own memory.

Furthermore, this thesis has added to our understanding of how and why misinformation is reported by also identifying that intoxicated participants did not differ from their sober counterparts in the mechanisms through which they were reporting PEI. Studies two and three built upon the findings of study one by including a source monitoring question, in order to determine whether PEI was reported knowingly or unknowingly. In study two, 16% of participants who reported misinformation during the dyadic discussion did not do so in the individual recall. This figure included both sober and intoxicated participants, and there was no significant difference in the number of sober and intoxicated participants who did not report misinformation in their individual account after reporting it during discussion. This suggests that those 16% felt normative pressure to agree with their discussion partner but reverted back to their own memory when they recalled individually. 70% of participants that were exposed to misinformation subsequently reported misinformation in their individual recall. Given that source monitoring was accurate for 71.2% of participants, it suggests that many of those who reported misinformation did so knowingly. This is consistent with the premise of informational influence and suggests that participants who discuss an event with a co-witness may knowingly report information gained from that witness, that they did not see themselves because they believed it to be correct. 28.8% of participants were incorrect in their source monitoring, which suggests that they were reporting misinformation unknowingly. Importantly, alcohol had no relationship to whether misinformation was reported knowingly or unknowingly. This suggests that dyads of both intoxicated and both sober participants were as likely to choose to report PEI from their discussion partner which demonstrates that alcohol had no effect on the tendency to believe one’s partner’s account of an event over one’s own (Wright et al., 2009).

Similarly, in study three, alcohol had no relationship with whether misinformation was reported knowingly when participants of varying alcohol doses were exposed to misinformation from a sober video witness. Whilst some previous literature has found an effect of alcohol on misinformation at higher doses (Van Oorsouw et al., 2015; 2019) this thesis is the first to examine this tendency by using a video co-witness rather than leading questions (Van Oorsouw et al., 2019) and found that as with study two, participant intoxication did not influence the tendency to report misinformation. Those who reported misinformation from the video co-witness were more likely to make a source misattribution error than to correctly identify where the information came from regardless of their intoxication. This suggests that some people who are exposed to false information during a discussion will incorporate it into their memory of the original event, and thus unknowingly report it in their accounts. The source-monitoring framework refers to how people differentiate between memories from different sources. The task of recalling the source of one’s memories requires a person to examine the temporal, auditory and spatial characteristics of the memory to differentiate it from other memories. These decisions rely on average differences in the characteristics between memories in order to locate its source. Errors in source monitoring are likely to occur when the two sources of information are perceptually similar, given in the same modality or have similar semantic content (Lindsay, 1994). During the discussion in study two, and during exposure to the video witness in study three, participants would have been exposed to correct information about the original memory, in addition to false information that is semantically similar to the actual details of the event. As such, it becomes more likely that participants would make a source misattribution error. In addition, although study one did not include a source monitoring question, the correct, contextual details embedded within the written narrative could have made discriminating between the original memory and the misinformation more difficult as the similarity between the video and witness statement makes detecting the discrepancies between the two sources more difficult (La Paglia & Chan, 2019).

The tendency to report misinformation is a risk when co-witnesses discuss an event (Gabbert et al., 2003; Paterson et al., 2012) and should be a concern when triers of fact such as judges and jurors are assessing the reliability of a witness’ testimony. Conversely discussion may also have some benefits. Research into collaborative benefits has demonstrated that groups who collaborate do not recall as much information as a nominal group. When tested individually however, those who previously collaborated show enhanced recall compared to those who have only recalled alone. This phenomenon is referred to as post–collaborative benefit (Weldon & Bellinger, 1997) and it suggests that there may be some advantages to allowing witnesses to discuss a crime prior to having their individual statement taken. Study three found that, in addition to reporting misinformation, participants showed significantly greater accuracy in response to questions for which the video witness had provided correct information. Thus, in their individual recall, they showed a beneficial effect of having been previously exposed to correct co-witness information. These participants may have benefited from re-exposure (Harris et al., 2012) whereby the suggestions of the video-witness strengthened participants’ original memory for details that they may have otherwise forgotten.

Conversely to study three, in study two, participants who had previously discussed the video were no more accurate under free recall conditions and showed diminished accuracy under cued recall conditions. Whilst this can be partially explained by the methodology employed and thus the propensity of participants to expose each other to misinformation; this does not explain why recall accuracy was impaired in the cued recall test specifically. An alternative explanation for this finding is that the exposure to misinformation from one’s discussion partner led to retrieval disruption for some details of the video. Retrieval disruption refers to the finding that each individual adopts their own organisational strategy when encoding and retrieving information. During recall, the suggestions of one’s discussion partner may disrupt the individual organisation of a person’s recall of the event (Barber & Rajaram, 2011) leading to lower recall ability. As such these details do not benefit from the re-exposure that discussion provides. The findings from study three extend the assertion by Paterson and Kemp (2005) that allowing witnesses to discuss the crime may have possible benefits, however, study two also demonstrates that at times discussion may also impede later recall.

**8.2.2 Summary.**

This thesis aimed to understand how alcohol influenced the tendency to report PEI encountered via a co-witness. The findings demonstrate that a participant will be as like to report PEI if it came from an intoxicated source as a sober one. Similarly, at moderate and at high doses of intoxication, participants are no more or less likely to report PEI than sober ones, when the source is a similarly intoxicated partner or a sober source. As such, the findings suggest that discussion amongst witnesses may lead to the reporting of PEI regardless of the intoxication of either co-witness. This thesis has built upon previous literature that has examined alcohol’s effects on misinformation by focusing on ‘social’ means of encountering this misinformation. Previous studies have used leading questions, or written narratives, whilst the present thesis has identified that encountering PEI from an in-person co-witness, or a video co-witness similarly does not influence the tendency to report PEI. In addition, this thesis aimed to examine the mechanisms through which misinformation was reported. In three different empirical studies, participants were exposed to different sources of misinformation and slightly different procedures, to better understand the different circumstances in which co-witness information may be encountered in real life. In so doing, it established that normative influence, informational influence and source misattribution may account for the tendency to report misinformation in different circumstances. However, this was also not influenced by intoxication. Thus, sober and intoxicated witnesses are equally likely to 1) report misinformation when under perceived normative pressure to do so; 2) knowingly report misinformation when under no normative pressure; and 3) to unknowingly report misinformation due to a source misattribution error. This presents a novel contribution to the alcohol and eyewitness memory literature which, as yet has not introduced source monitoring questions in order to understand whether intoxicated participants are reporting PEI knowingly. Thus, the findings extend the current understanding of memory conformity by demonstrating that intoxicated participants were no more likely to be prone to either normative or informational influence than their sober counterparts, or to make a source misattribution error.

**8.2.3 How alcohol affects eyewitness memory reports.**

Whilst the aim of the present thesis was to contribute to the literature on how discussion affects eyewitness memory reports when intoxicated, it has also added to the current understanding of how alcohol affects eyewitness recall at an individual level. The studies in the present thesis looked at three core areas: accuracy, completeness and confidence. These will be discussed below with reference to relevant theory.

***8.2.3.1 Completeness***

The studies presented in this thesis found that the consumption of alcohol was associated with a decrement in the amount of information recalled. That is, participants who had consumed alcohol recalled significantly fewer details than those who were sober. The difference in intoxication levels between studies two and three demonstrate, consistent with previous research (Crossland, Kneller & Wilcock, 2016; Schreiber Compo et al., 2017) that this negative effect of alcohol on recall completeness occurs at both moderate and higher doses. Based upon the findings of Jores et al., (2019) the present thesis used both free and cued recall measures to assess participant recall. In so doing, it was possible to contribute to the growing body of literature on alcohol and eyewitness memory to further assert that intoxication impairs recall in free rather than cued recall measures, and at moderate in addition to high doses. This suggests that intoxicated witnesses may report fewer details in their account even if they are not highly intoxicated. Furthermore, whilst it seems to suggest that cued recall measures should be used to overcome this, such measures have been associated with higher reporting of errors under intoxication (Jores et al., 2019) and thus may provide a source of distortion in the accounts of intoxicated witnesses.

***8.2.3.2 Accuracy***

Whilst alcohol was shown to have a detrimental effect on recall completeness regardless of dosage, a dose effect on recall accuracy emerged in the thesis. Whilst study two used a moderate dose of alcohol and found no effect of alcohol on accuracy, study three found that at higher levels of intoxication (up to 0.19%) accuracy and completeness were both negatively affected. As participants’ intoxication level increased their accuracy and completeness decreased in the free recall. In the cued recall, their accuracy also decreased with increasing intoxication. Previous field research has similarly found an impairing effect of alcohol intoxication on accuracy (Altman et al., 2018; Crossland et al., 2016). It suggests that at low to moderate doses, an intoxicated witness can still report accurate information (La Rooy et al., 2013; Schreiber Compo et al., 2011), but as these doses increase, the quality and quantity of information recalled begins to suffer.

The lack of impairment in recall accuracy at moderate doses could be explained by the hypervigilance hypothesis. Participants in study two reported lower confidence in their own responses, indicating a lack of certainty in their memory recall. However, they performed at an equivalent level to sober participants in terms of their accuracy and tendency to report misinformation. Fillmore, Mulvihill, and Vogel- Sprott (1994) found that placebo participants who had been given negative expectancies about the impairing effects of alcohol performed at a statistically equivalent level to those participants who had been given positive expectancies about the enhancing effects of alcohol. Furthermore, participants who were given these negative expectancies reported a greater desire to overcome them than participants given negative expectancies as to the impairing effects of caffeine. The performance of participants in study two could therefore be a demonstration of a hypervigilant response, however, at present this explanation is speculative and future research is needed including measures of alcohol expectancies to verify these alternate explanations. What the findings do demonstrate is that a moderately intoxicated witness is no less accurate than their sober counterpart, however a highly intoxicated witness is impaired in their recall accuracy.

Whilst studies in this thesis looked at recall accuracy, study three also examined the ability of intoxicated witnesses to successfully identify a suspect from a show-up identification task. The effect of alcohol on the ability to perform a show-up task is somewhat under researched and as such, the inclusion of it adds to the debate around the ability of intoxicated participants to perform an identification task and the use of a show-up versus a line-up procedure. In addition, the thesis included a novel contribution by measuring participants’ confidence in their identifications and taking a remember/ know judgement. The results showed that overall identification was high, with neither intoxication nor target presence negatively impacting upon identification performance. Moreover, participant confidence was not influenced by intoxication or accuracy in the show-up task. Whilst previous studies have found that intoxication does not negatively impact upon performance in target present line-ups, intoxication has shown detrimental effects on target absent trials. Although, findings from Altman et al. (2019) suggest that in fact show-ups may reduce false identifications in target absent trials as compared to line-ups. The findings from study three support this and suggest that the show-up method as a means of identification may be the most appropriate to reduce the risk of a false identification.

The reduced ability of intoxicated persons to incorporate incoming information into their existing body of knowledge purported by AMT (Josephs & Steele, 1990) may provide further support for the use of a show-up versus a line-up procedure. In study three, participants who were intoxicated were equally able to make a correct decision as sober participants in both the target present and target absent conditions. This finding supports that of Altman et al. (2019) who found that intoxication only increased false IDs in target absent conditions for a line-up as opposed to a show-up. A tentative explanation using AMT may be that the impairment in the ability of intoxicated people to attend to multiple cues in the environment and relate these to one’s own memory of the actual suspect means that having to make an identification in a line-up of 6 faces may create more cue conflict and is therefore more difficult than a show-up of one. In the show-up, the task requires witnesses to compare one face to their memory of the event, whereas a line-up requires a comparison of six, which is cognitively more demanding. As the meta-analysis by Steblay, Dysart, Fulero and Lyndsay (2003) purports, false identifications are lower in show-ups than line-ups, and this benefit may be even greater for witnesses who have consumed alcohol.

***8.2.3.3 Confidence***

The studies in this thesis included confidence measures for all recall tasks and demonstrated an impairing effect of alcohol on confidence. This occurred both at moderate doses in study two and higher doses in study three. This finding is consistent with much previous research in the area (Harvey et al., 2013) and the present thesis has added to the existing knowledge by considering the effect of intoxication on confidence from a theoretical point of view. First, the impairing effect of alcohol on confidence can be seen as evidence of the impairment to the controlled effortful processing outlined in AMT (Josephs & Steele, 1990). Alcohol Myopia Theory purports that alcohol intoxication impairs controlled, effortful processing whilst leaving automated cognitive and behavioural processes relatively unimpaired (Moss & Albery, 2009). Intoxication leaves those who have consumed alcohol less able to attend to cues in the environment, and impaired in their ability to relate these cues to their existing body of knowledge. Specifically, AMT purports that when there are both impelling and inhibiting cues, known as response conflict, behaviour and cognition is determined by the most salient of these. Intoxicated participants witnessed a mock crime and were subsequently exposed to both correct and incorrect information. The difficulty in relating these details to their existing schema of the event did not manifest in the accuracy of participants’ testimony but did lead to intoxicated participants reporting lower confidence in their judgements than those who were sober. Many previous studies examining the effect of alcohol on eyewitness memory have also reported lower confidence judgements in those who have consumed alcohol, and it may indicate that task difficulty was greater for intoxicated persons, which is consistent with the idea of AMT that controlled, effortful processing is impaired after the consumption of alcohol (Moss & Albery, 2009).

The lack of confidence exhibited by participants who have consumed alcohol can also be explained by the concept of metacognition. As proposed by Wells (2000) metacognitive knowledge includes information that people possess about their own internal states, including their competence on a given task. Metacognition requires a person to monitor and regulate his or her own thinking, memory and decisions. Studies two and three showed that the consumption of alcohol was associated with significantly lower confidence judgements in participants’ recall responses. Thus, when appraising their own memory of the event, intoxication resulted in lower certainty of their own memory. In study three, the lower confidence of intoxicated participants was matched by impaired performance on the task. Thus, the confidence judgements can be taken as an accurate metacognitive judgement of expected performance on the task. However, in study two, although participants reported fewer details, they were no less accurate in their recall and therefore, the confidence given did not accurately match performance. This was also found by Kleykamp et al. (2010), who showed that participants who had consumed alcohol tended to overestimate the degree of impairment they exhibited on a given task. Thus, the consumption of alcohol was detrimental to their metacognitive ability to appraise their own competence. Thus, intoxicated participants were demonstrating a lack of certainty in their own memory despite its accuracy not being impaired. This finding can be explained by alcohol expectancy theory. That is, the expectations people possess about the outcomes of alcohol consumption. These expectancies can be either positive or negative (Anthenien et al., 2017). A negative expectancy relating to the impairing effect of alcohol on behaviour and cognition may have led intoxicated participants to doubt their own memory recall ability after consumption, despite the fact that their recall was equivalent in accuracy to those who were sober. Experience can improve metacognitive judgments of competency as demonstrated by Fillmore and Vogel-Sprott (1996). They found that experienced drinkers were able to accurately predict the degree of impairment they would exhibit on a task as a result of consuming alcohol.

In study three, intoxication significantly negatively predicted confidence, it also negatively predicted accuracy. Thus, participants’ confidence in their own responses was in line with their actual performance. Much like Fillmore and Vogel-Sprott (1996) intoxication did not significantly impair participants’ abilities to appraise their own memories. When considering the apparent differences in alcohol’s effects on metacognition in the two studies, the methodologies employed can be of use. Whilst negative alcohol expectancies may have led participants who have consumed alcohol to report lower confidence in their own memories, moderate intoxication as seen in study two did not significantly impair the recall accuracy of those who consumed alcohol. In study three, those same alcohol expectancies may have been present, but at higher doses of alcohol, intoxication did significantly impair memory accuracy. Thus, in order to possess accurate metacognition, participants in study two would have needed to demonstrate an understanding of the effects of dosage. Merrill et al. (2016) note that alcohol expectancies are based upon both direct and indirect experience with alcohol. However, the consequences of alcohol consumption differ based upon experience, with those who were less experienced drinkers regarding the negative consequences of consumption as significantly more negative. Additionally, Evans and Schreiber Compo (2010) found in their juror decision-making study that, although an intoxicated witness was deemed less credible, participants did not discriminate between dosage. Therefore, it suggests that the understanding that lay people possess of the effects of dosage on performance are poor. In study two, the sample was taken from university undergraduate students with a mean age of 24.10 years (*SD* = 7.67). Whilst all participants reported being social drinkers, the years of experience participants’ may have had of alcohol consumption may have been less than in study three where participants were recruited from pubs in which they were already engaging in social drinking. These participants had a mean age of 33.40 years (*SD* = 11.90). It could be argued that participants in study three had greater direct experience of alcohol consumption. Consistent with Fillmore and Vogel- Sprott (1996) these participants may have been better able to appraise their performance under conditions of intoxication. This explanation, although consistent with previous research, (Filmore & Vogel- Sprott, 1996) is tentative. The findings may also reflect two separate effects of alcohol on one’s recall performance: 1) a decrease in confidence resulting from consuming a moderate dose of alcohol as observed in study two and three and 2) a decrease in accuracy as a result of consuming higher doses of alcohol as seen in study three.

One key distinction between study two and three is the context in which drinking occurred. Whilst study two administered alcohol to participants in the laboratory, with a specific target BAC, study three utilised participants who had been drinking alcohol in a pub. The difference in metacognitive accuracy between study two and three could be somewhat influenced by the context in which consumption occurred. Wall et al. (2000) demonstrated the importance of environmental context in their study, whereby students who took part in an on-campus bar predicted greater positive effects of alcohol than those who took part in a laboratory. Thus, the alcohol expectancies participants possess may be more salient when in an environment that is typically associated with alcohol consumption as in study three. Including an assessment of expectancies in the future in both laboratory and field-based studies would enable a meaningful comparison between the different environmental contexts and the potential effects this has on memory performance and confidence judgements.

**8.2.4 Summary.**

This thesis, in addition to examining the effects of alcohol on misinformation, also looked at the effects of alcohol on individual memory recall. The studies included measures to examine three areas important to an understanding of alcohol’s effects on memory recall: accuracy, completeness and confidence.

By examining both moderate and high doses of accuracy, the thesis has identified an effect of dosage on accuracy, such that moderately intoxicated participants are no less accurate than their sober counterparts. This may be indicative of hypervigilance, in which moderately intoxicated participants exerted greater effort to overcome the detrimental effect of alcohol on recall. However, at higher doses, intoxicated participants were significantly less accurate in their recall. Despite being less accurate in their recall at high doses, intoxicated participants are no less able to perform a show-up identification than their sober counterparts regardless of target presence. This finding is consistent with previous research (Altman et al., 2019) and may indicate a superiority of the show-up method for identifications, particularly when the witness is intoxicated.

Although no less accurate in their accounts, completeness was negatively affected by intoxication at both moderate and high doses. Thus, it suggests that an intoxicated witness will be no less accurate but will report fewer details even at moderate doses, whilst at high doses, such a witness will be less complete and less accurate. Moreover, the confidence judgements made by participants similarly demonstrate an impairment of alcohol at both moderate and high doses. This may be a demonstration of alcohol’s effects on metacognition, or an indication of the task difficulty as a result of the impairment to controlled, effortful processing associated with alcohol consumption.

**8.2.5 Overall summary.**

This thesis examined how alcohol and exposure to co-witness information influence eyewitness memory reports.

The systematic review outlined how people report misinformation due to three broad reasons; normative influence, informational influence and source misattribution. Thus, this thesis explored how intoxication would influence the tendency to do so. In three empirical studies it was found that intoxication had no effect on the tendency to report misinformation. Sober participants were as likely to report misinformation from a perceived intoxicated source as a sober one. Moderately intoxicated participants were as likely to report misinformation from a similarly intoxicated discussion partner as sober ones and highly intoxicated participants in the field were no more prone to report misinformation via a video co-witness. Therefore, the reporting of misinformation is a risk for those who are exposed to it, but it is not exacerbated by intoxication.

Although intoxication had no effect on the tendency to report misinformation, it did have an effect on memory recall. At all doses investigated, intoxication had negative effects on completeness and confidence. That is, intoxicated participants reported fewer details, and were less confident in the information that they did report than their sober counterparts. Further effects of intoxication were also discovered at higher doses. Increasing intoxication was associated with decreased accuracy, whilst moderately intoxicated participants were no less accurate than their sober counterparts. This demonstrates that intoxicated witnesses are no more likely to report misinformation, but they may be less complete and confident in their accounts and, depending on dose, less accurate.

**8.3 Applied implications of the findings**

**8.3.1 Witness discussion.**

When considering the tendency of witnesses to report information gained from a co-witness that they did not see (Paterson et al., 2012) the thesis suggests that a witness will be as likely to report erroneous information from an intoxicated as a sober co-witness. Additionally, when both co-witnesses are in the same state of intoxication, both sober and intoxicated co-witness dyads are as likely to report false information from one another. However, for the majority of cases, such witnesses will be doing so knowingly, and thus are able to distinguish between information they recalled themselves and information gained from their co-witness. Crucially, both sober and intoxicated witnesses are equally able to do this at moderate doses of alcohol. What the findings also tentatively suggest is that there may be some benefits to collaboration. That is, having a co-witness may provide a re-exposure phase that leads to increased recall when tested individually. Such benefits occur for both sober and intoxicated witnesses and suggest that having the chance to discuss the crime with one’s fellow witnesses prior to having an evidential interview may offer benefits.

Thus, having a co-witness means that each person is at risk of reporting false information gained during a discussion that they did not see themselves. However, such witnesses may be doing so knowingly and as such, can identify the source of their memories when probed. Kebbell and Milne (1998) report that eyewitnesses typically provide the key leads in criminal investigations. Therefore, the opportunity to gain as much detail from a witness as possible, through allowing them to discuss the crime could significantly help the process of an investigation. Conversely, the risk of following up a false lead as a result of witness discussion could also significantly impair an investigation. Whilst witness discussion may not always be subject to the control of investigators, having a clear understanding of the potential consequences of discussion when encountering a witness who has discussed the event would be useful in order to advise investigators how best to proceed.

**8.3.2 Intoxicated witnesses.**

In conjunction with examining the effects of discussion on memory for intoxicated eyewitnesses, the present research sought to add to the breadth of studies looking at the effects of alcohol on eyewitness memory. The results suggest that witnesses who are moderately intoxicated (< 0.08%) may report fewer details, however, they are no less accurate than sober witnesses. Intoxicated witnesses may also be less confident in their memory recall. This may lead to co-witnesses being less likely to report information gained from them due to their lack of confidence. Moreover, study three found that at higher doses of alcohol, intoxication led to reduced completeness and accuracy. Thus, witnesses who were highly intoxicated (up to 0.19%) not only recalled fewer details but were also less accurate in their recall than sober witnesses. Inaccurate testimony has considerable implications as the Innocence project reports that incorrect eyewitness testimony is the leading cause of wrongful convictions (The Innocence Project, 2019). As such, the statement of a highly intoxicated witness may be problematic due to its lack of accuracy.

Intriguingly, although less accurate in their testimony, highly intoxicated participants were no less able to perform the show-up task. This has implications for the criminal justice system as it suggests that an intoxicated witness is equally able to correctly identify a suspect from a target-present show-up, and correctly state that the suspect is not present in a target-absent one. Based upon the findings by Altman et al. (2019) my findings suggest that a show-up procedure may be preferable to a traditional line-up in reducing false IDs. Thus, an intoxicated witness may be less accurate at higher doses, and less confident at both moderate and higher doses. The accuracy of a witness is undoubtedly important when conducting their evidential interview and at trial, whilst the confidence of an intoxicated witness may have its own set of issues for a successful investigation and trial in terms of credibility ratings by jurors and judges. Cutler et al. (1990) purport that jurors place a considerable amount of weight on the confidence of an eyewitness. Thus, although no less accurate, an intoxicated witness may be problematic due to their lack of confidence. From an applied perspective it might be useful to point this discrepancy between confidence level and actual performance at different alcohol doses out to Criminal Justice professionals, so that they can instruct jurors and other lay people accordingly.

**8.4 Methodological Challenges**

Whilst the thesis has conducted empirical research to address the main research questions, the studies presented were subject to methodological challenges, which will be outlined below.

**8.4.1 Alcohol Administration.**

Due to ethical considerations, the target BAC for study two was 0.06%. Whilst this level of intoxication has been shown to lead to impairment in sustained attention (Magrys & Olmstead, 2014) and driving hazard perception, (West, Wilding, French, Kempi & Irving, 1993) it is under the UK drink drive limit. The low dose and laboratory administration of alcohol undoubtedly undermine the ecological validity of the experiment. Study three attempted to rectify this problem by conducting research in the field and thereby encountering higher doses of alcohol than would be routinely encountered in the lab, in addition to investigating eyewitness memory in a context that is associated with the consumption of alcohol. However, the nature of field research means that one has to sacrifice experimental control over the timing of consumption, and as a result, the limb of the alcohol absorption curve participants are on when completing their recall task (Moss & Albery, 2009). In an investigation of the effect of limb on recall, Södurland, Parker, Schwartz and Tulving (2005) found alcohol impaired encoding regardless of limb, whilst retrieval was only negatively affected by alcohol in the ascending limb of the absorption curve. Furthermore Vogel-Sprott (1979) found impairment on a pursuit rotor task on the ascending limb of the absorption curve, but not the descending limb. Thus, in addition to the dose of alcohol consumed, individual participants recall may be impacted by the limb of the absorption curve they are on at the time of recall. Thus, future research could examine the effect of alcohol intoxication on memory conformity on both limbs of the alcohol absorption curve. That is, whether the specific limb participants are on during encoding and retrieval influences the tendency to report misinformation.

In addition to the methodological challenges associated with administering and measuring alcohol intoxication, the assignment of control groups deserves consideration. Study two utilised a knowingly sober control condition and a knowingly intoxicated experimental condition. As a result, the study did not control for the potential behavioural effects of expectancy that can be seen through the use of a placebo (Testa et al., 2006). Using a fully balanced placebo design as seen in Flowe et al. (2017) and Gawrylowicz et al. (2018) enables researchers to control for these expectancy effects and is something that should be investigated in future research. In this design participants are assigned to one of four groups. Participants in such a design expect alcohol and are given alcohol, expect alcohol and are given a soft drink, expect a soft drink and are given a soft drink or expect a soft drink and are given alcohol. This design presents a methodologically rigorous method for separating the expectancy effects of alcohol from the psychopharmacological effects of consumption. However, when encountering intoxicated witnesses in real life contexts, they are typically knowingly intoxicated, albeit they may not be capable of accurately appraising their own intoxication level.

**8.4.3 Stimuli.**

The studies presented in this thesis aimed to have applications to the study of eyewitness memory. However, the logistics of conducting such research meant a reliance on the use of written vignettes and mock crime videos, which inherently lack ecological validity. Whilst some eyewitness studies have used live incidents such as staged thefts (Schreiber Compo et al., 2012) and interactions with researchers (Van Ooursouw et al., 2019) a large number have used similar stimuli to those presented in this thesis. Thus, the issue of ecological validity and applicability of the stimuli is not specific to the present thesis, but one that is pertinent to eyewitness research as a whole (Bornstein & Meissner, 2008). Whilst live staged incidents may offer greater ecological validity, they also present methodological challenges regarding believability and experimental control. Moreover, Aguinis and Bradley (2014) purport that vignette methodology can be useful in order to conduct experimental research without sacrificing external validity. Thus, the methodological challenges associated with the stimuli used in this thesis are part of a wider discussion on the balance between ecological validity and experimental control in research, which aims to have practical implications for the criminal justice system.

**8.5 Implications for future research**

An examination of the present findings in relation to the current literature has brought to light questions that remain unanswered by the present studies, in addition to further questions that are important for a more complete understanding of the effects of alcohol intoxication on co-witness discussion. In light of these, future studies will be suggested below, with an outline of the questions they could answer.

**8.5.1 Mixed dyads.**

Studies two and three examined the tendency of intoxicated participants to report misinformation when under no normative pressure to do so. However, the systematic review highlighted that a key determinant of memory conformity through informational influence is relative credibility. In study two, both dyad members were in the same state of intoxication and thus of equal credibility. In order to further investigate the role that credibility plays in the tendency to take on misinformation from one’s co-witness, it would be preferable to add mixed dyads, such that one member of the dyad would be sober whilst the other would be intoxicated. Based upon previous research into the credibility of intoxicated witnesses (Evans & Schreiber Compo, 2010; Kassin et al., 2001) including mixed pairs would manipulate relative credibility in a similar way to previous memory conformity studies (Andrews & Rapp, 2014; Davies & Meade, 2013). By including a credibility questionnaire, it would also be possible to examine whether the intoxicated dyad partner is regarded as less credible. Moreover, it would be possible to examine whether a co-witness is regarded as less credible when they propose more pieces of misinformation during a discussion, and if this would ultimately affect the tendency of co-witnesses to report misinformation gained from each other.

**8.5.2 Benefits of discussion.**

Study three found that participants showed a significantly greater accuracy rate when answering questions for which they were exposed to correct information from the video co-witness regardless of intoxication. To further investigate the role of memory collaboration in more forensically relevant contexts than the original studies which looked at recall of words and pictures (Weldon & Bellinger, 1997), future studies should seek to examine the benefits of collaboration when recalling a mock crime with a real-life confederate. Paterson and Kemp (2006) found that exposure to correct PEI from a confederate resulted in significantly greater accuracy scores after a 1-week delay compared to control participants who received no misinformation. Furthermore, confederate information was a more influential source of PEI than leading questions or misleading media reports. Similarly, Harkness et al. (2015) found exposure to correct information via a confederate led to significantly more accurate recall than for those who experienced no discussion. However, in their study half of the participants were asked to complete an *ego-depleting* task prior to discussion. This depletion led those in the experimental condition to be as prone to report incorrect PEI as those in the non-depleted condition, whilst reporting fewer correct pieces of PEI than those who were not depleted. Thus, the benefits of discussion were lessened whilst the costs of discussion were the same. Future research should use a similar paradigm to investigate the potential effects of intoxication on the ability to benefit from witness discussion. Whilst study three found no interaction between intoxication and accuracy rate, the studies outlined suggest that encountering information via a confederate may be more influential than other sources (Paterson & Kemp, 2006).

As such, utilizing a confederate to provide both accurate and inaccurate PEI to sober and intoxicated witnesses would provide greater understanding as to the costs and benefits associated with witnesses who have consumed alcohol discussing a crime.

**8.5.3 Delay.**

Both studies two and three investigated the effects of alcohol and discussion on eyewitness memory under conditions of immediate recall. Research by Schreiber Compo et al. (2017) suggests that immediate recall is preferable for intoxicated witnesses as it reduces the further detrimental effects of delay on memory. This advice is not in line with current practice as demonstrated by a survey with English police officers conducted by Crossland, Kneller and Wilcock (2018). They found that although initial details from a witness may be taken whilst intoxicated, an evidential more substantive interview is usually conducted once the witness is sober at a later date. This practice seems to be at odds with what is found in most recent research (Evans et al., 2018; Hagsand et al., 2017; Schreiber Compo et al., 2017). In order to conduct research which has the clearest applications to forensically relevant situations, intoxicated and sober participants should watch a mock crime and engage in a discussion immediately, thus while intoxicated, but complete their individual recall after a delay in a sober state. This would enable the researchers to examine the extent to which the tendency for intoxicated participants to report misinformation is influenced by delay. Studies into the effects of alcohol intoxication on the tendency to report misinformation have generally found that intoxicated participants are no more or less prone to reporting misinformation than sober ones (Flowe et al., 2019; Schreiber Compo et al., 2012). Although research by Van Oorsouw et al. (2015) found that intoxication increased suggestibility, which was further exacerbated after a delay. This may be specific to the methodology employed in the study. However, given the potential costs to an investigation that arise from a witness reporting erroneous information gained from their discussion partner, it highlights the need to further investigate this issue.

Moreover, whilst study two found that individuals source monitoring abilities were mostly accurate, study three found that those who reported misinformation were more likely to exhibit incorrect source monitoring. This means that witnesses who report information gained from a co-witness may be unable to identify which details they did not recall themselves. Based upon the discrepancy detection principle (Loftus, 2005) the ability to correctly monitor the source of one’s recall may decrease with delay and as such, investigating how intoxication affects this ability is useful.

**8.6 Conclusions**

This thesis aimed to examine the effects of alcohol and discussion on eyewitness memory. Reviews of the literature identified that such effects may be influenced by alcohol expectancies people possess, as well as social influence processes including normative and informational influence and source misattribution errors. The findings of the studies presented in this thesis suggest that sober witnesses are as likely to report false information gained from a sober as an intoxicated witness. Thus, when witnesses have discussed a crime, they are likely to report information gained from their co-witness, regardless of their co-witness’ intoxication state. Similarly, the intoxication of the witness themselves does not affect the tendency to report misinformation. From this, we can tentatively conclude that although an intoxicated witness is no more prone to report misinformation, co-witnesses to a crime who have discussed the event prior to having their interview may incorporate details from their co-witness in their own account. Given the prevalence of intoxicated witnesses (Crossland et al., 2018) and the frequency of discussion amongst witnesses (Skagerberg & Wright, 2008) such a scenario is likely to occur in real life settings.

Intoxication was associated with decreased confidence and completeness at moderate doses. At higher doses completeness and confidence were similarly negatively affected as well as recall accuracy. Intoxication did not impair the ability to perform accurately on a show-up identification. Furthermore, whilst there are undoubtedly risks associated with witnesses discussing a crime with one another, there are also some benefits in the form of increased accuracy.

The findings have direct implications for the criminal justice system. Although intoxicated witnesses are deemed less credible than sober ones, they are not less accurate than sober witnesses at moderate doses of alcohol consumption, although moderately intoxicated witness accounts may lack detail. However, at high doses of consumption intoxicated witnesses’ memory lacks detail in addition to being less accurate, and jurors should be cautioned of this. This dose dependent effect of intoxication on memory accuracy lends itself to the suggestion that breathalysing witnesses to crimes at the scene may be beneficial in understanding any impairments to their memory that they may exhibit. This practice is not currently undertaken in the UK according to survey-based research (Crossland et al., 2018) but may offer advantages in understanding the likely impairment of a witness who has consumed alcohol.

Coming back to the original main research question posed in this thesis, whether intoxicated co-witnesses are more susceptible to incorporate socially encountered PEI into their memory accounts compared to sober co-witnesses, the answer is ‘no’. Sober and drunk individuals are equally likely to take on PEI from perceived as well as actual sober and intoxicated sources. Thus, law enforcement professionals should be made aware of the general negative and positive impacts of co-witness discussion on eyewitness memory performance regardless of the intoxications state of the witness.

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**Appendices**

**Appendix A: Witness statement vignettes for study 1**

Sober witness, low contradiction:

Kate had met up with her boyfriend at a local pub for a few drinks at the time of the alleged assault. Kate had decided to drive and so was drinking orange juice during the incident. She described the bar as being fairly busy, and as the weather was sunny, her and her boyfriend decided to go outside.

She describes walking out of the bar to an outdoor area where her boyfriend, a medium build male with light brown hair, was waiting for her. As she began speaking to him she recalls one male walking past her. Kate describes the male as being medium build, tall in height and wearing a black hoodie. She thinks this male had brown hair. The male bumped into her boyfriend who apologised, at which point she thinks the male lunges and pushes and kicks her boyfriend. The male then ran away as the victim reeled back.

Intoxicated witness, low contradiction:

Kate had met up with her boyfriend at a local pub for a few drinks at the time of the alleged assault. Kate had decided to drive and so was drinking orange juice during the incident. She described the bar as being fairly busy, and as the weather was sunny, her and her boyfriend decided to go outside.

She describes walking out of the bar to an outdoor area where her boyfriend, a medium build male with light brown hair, was waiting for her. As she began speaking to him she recalls one male walking past her. Kate describes the male as being medium build, tall in height and wearing a black hoodie. She thinks this male had brown hair. The male bumped into her boyfriend who apologised, at which point the male lunges and pushes and kicks her boyfriend. The male then ran away as the victim reeled back.

Sober witness, high contradiction:

Kate had met up with her boyfriend at a local pub for a few drinks at the time of the alleged assault. Kate had decided to drive and so was drinking orange juice during the incident. She described the bar as being fairly busy, and as the weather was sunny, her and her boyfriend decided to go outside.

She describes walking out of the bar to an outdoor area where her boyfriend, a medium build male with light brown hair, was waiting for her. As she began speaking to him she recalls one male walking past her. Kate describes the male as being medium build, tall in height and wearing a black hoodie. She thinks this male had a shaven head. The male bumped into her boyfriend who apologised, at which point she said the male shouted ‘piss off!’. The male then lunges and pushes and kicks her boyfriend in the jaw. The male then ran away as the victim reeled back.

Intoxicated witness, high contradiction:

Kate had met up with her boyfriend at a local pub for a few drinks at the time of the alleged assault. Kate had decided to drive and so was drinking orange juice during the incident. She described the bar as being fairly busy, and as the weather was sunny, her and her boyfriend decided to go outside.

She describes walking out of the bar to an outdoor area where her boyfriend, a medium build male with light brown hair, was waiting for her. As she began speaking to him she recalls one male walking past her. Kate describes the male as being medium build, tall in height and wearing a black hoodie. She thinks this male had a shaven head. The male bumped into her boyfriend who apologised, at which point she said the male shouted ‘piss off!’ The male then lunges and pushes and kicks her boyfriend in the jaw. The male then ran away as the victim reeled back.

**Appendix B: Cued recall questionnaire for study 1**

* What was the colour of the Victim’s hair?
* What was the witness drinking?
* What colour top was the attacker wearing?
* How tall was the attacker?
* How many people were in the video?
* How was the victim attacked?
* What did the attacker say?
* What hairstyle did the attacker have?

**Appendix C: first recall questionnaire Individual**

**INSTRUCTIONS**

* Please think back to the video and imagine you had witnessed this scene occurring in real life. Imagine that you have been asked to stay and wait for the police to arrive so that you can provide them with information about what you have seen. You are told they will be here in 5-10 minutes to take statements from you. You have the chance to prepare for this by thinking over your memories for the event. To encourage you to do this some questions concerning what you have seen are on the following page for you to answer.

1. Using the space below please list the **sequence of actions and events** from the girl entering the room, to her leaving it. Try to be as thorough and accurate as possible. It is *not* necessary to provide a facial description of the person in the video, simply describe the events in the order in which they occurred.

(You do not have to use each pointer, alternatively, if you need more space please continue over the page).

1. Why did the girl enter the room?
2. Please describe any jewelry the girl was wearing.
3. Did you notice if she was left-handed or right-handed?
4. What colour was her bag?
5. How many drawers did she open?
6. Where did she get the notepad from?
7. What did the girl have with her?

**Appendix D: first recall questionnaire dyad**

**INSTRUCTIONS**

* Please think back to the video and imagine you had both witnessed this scene occurring in real life. Imagine that you have both been asked to stay and wait for the police to arrive so that you can provide them with information about what you have seen. You are told they will be here in 5-10 minutes to take statements from you. You have the chance to prepare for this by discussing your memories for the event with the other witness. To encourage you to do this some questions concerning what you have both seen are on the following page for you to answer *as a pair*. You can discuss each question as much as you like until you reach an answer that you are both happy with. You need only provide a single written answer between the two of you. The aim is to provide the most accurate collaborative notes as possible.

1. Using the space below please list the **sequence of actions and events** from the girl entering the room, to her leaving it. Try to be as thorough and accurate as possible. It is *not* necessary to provide a facial description of the person in the video, simply describe the events in the order in which they occurred.

(You do not have to use each pointer, alternatively, if you need more space please continue over the page).

* Why did the girl enter the room?
* Please describe any jewellery the girl was wearing.
* Did you notice if she was left-handed or right-handed?
* What colour was her bag?
* How many drawers did she open?
* Where did she get the notepad from?
* What did the girl have with her?

**Appendix E: Second recall questionnaire Individual**

* Please think back to the video you watched. In the space below please can you now write as full a statement as possible about the sequence of events that occurred. Please treat this task as if you had witnessed the scene in real life and are now providing information for the police. (You do not have to use each pointer, alternatively, if you need more space please continue over the page).

**How confident are you that you have provided a full & accurate statement?**

***Not very confident* 1 2 3 4 5 6 7 *Very confident***

* Please can you now answer the following questions. They are asking about specific things that you may not have thought of describing in any detail previously.
* **Please describe the clothes the girl was wearing.**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Please describe any jewellery the girl was wearing.**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Please describe the girl’s bag.**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was the title of the book that was seen?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was the girl doing with the notepad?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Where did the girl get the notepad from?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was on the desk in the office?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Why, in your opinion, did the girl turn back before leaving the room?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was the date that the event took place?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

**Appendix F: Second recall questionnaire dyad**

* Please think back to the video you watched. In the space below please can you now write as full a statement as possible about the sequence of events that occurred. Please treat this task as if you had witnessed the scene in real life and are now providing information for the police. (You do not have to use each pointer, alternatively, if you need more space please continue over the page).

**How confident are you that you have provided a full & accurate statement?**

***Not very confident* 1 2 3 4 5 6 7 *Very confident***

* Please can you now answer the following questions. They are asking about specific things that you may not have thought of describing in any detail previously.
* **Please describe the clothes the girl was wearing.**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Please describe any jewellery the girl was wearing.**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Please describe the girl’s bag.**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was the title of the book that was seen?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was the girl doing with the notepad?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Where did the girl get the notepad from?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was on the desk in the office?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **Why, in your opinion, did the girl turn back before leaving the room?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

* **What was the date that the event took place?**
* *How confident are you with this answer you have provided?*

*Not very confident* 1 2 3 4 5 6 7 *Very confident*

**Please go back and consider your answers to the previous questions. Next to your response please indicate whether you recalled your answer from the video or your partner discussion**

**Appendix G: Cued recall questions for study 3**

1. What was the first female doing at the bar?
2. What colour was the bar stool she was sat on?
3. What colour was her coat?
4. What colour was her bag?
5. How many women were sat at the bar during the video?
6. What colour was the second female’s bag?
7. Where did the first female go?
8. What did the second female do when the first female left?
9. What did the second female steal?
10. What colour were the walls in the pub?
11. What colour was the first female’s dress?
12. What was in the first female’s bag

**Appendix H: Target and lure faces for the show-up identification task**

**A person looking at the camera

Description automatically generated**

*Picture 1: target*

*A person posing for the camera

Description automatically generated*

*Picture 2: chosen lure*

A person looking at the camera

Description automatically generated

*A close up of a person

Description automatically generated*

**A person smiling for the camera

Description automatically generated**

**A person posing for the camera

Description automatically generatedA person posing for the camera

Description automatically generated**

1. As a point of reference, the current drink drive limit in the United Kingdom is 0.8g/kg. [↑](#footnote-ref-1)
2. Participants were required to count the instances of the word ‘the’ in a written passage. [↑](#footnote-ref-2)
3. A show-up procedure asks a witness to look at one photo and state whether this was the person that they saw committing the crime. In contrast, a line-up typically displays 6 faces simultaneously, and requires a witness to identify which person out of the 6 is the perpetrator. [↑](#footnote-ref-3)
4. Two other models were also tested, with Statement Contradictions as a moderator only between Perceived Credibility and misinformation, and only between Intoxication and Perceived Credibility. Both models found a significant effect of Perceived Credibility and Statement Contradictions on misinformation, with no interactions. [↑](#footnote-ref-4)
5. Alcohol also had no effect on the number of misinformation items reported *U* = 378.00*, p* =. 240. [↑](#footnote-ref-5)
6. As for the free recall, there was no significant difference between sober and intoxicated participants for the number of misinformation items reported to cued recall questions *U* = 380, *p* = .227. [↑](#footnote-ref-6)
7. For the cued recall, there was no significant main effect of discussion condition *F*(1,118) = .747, *p* =.389, ηp*2*=.006, There was also no significant main effect of alcohol condition *F*(1,118) =1.97, *p* =.164, ηp*2*=.016. Additionally, there was no significant interaction between alcohol condition and discussion condition *F*(1,118) = 1.46, *p* =.230, ηp*2*=.012. [↑](#footnote-ref-7)
8. The free recall data shows no significant effect of Discussion condition on accuracy rate *F*(1,118) = 1.686*, p* =.197, ηp2 =.014. Additionally, there was no significant effect of Intoxication on accuracy rate *F*(1,118) = .384, *p* =.537 , ηp*2*=.003. There was also no significant interaction between Discussion and Intoxication *F*(1,118) = 2.71, *p* =.102, ηp2 =.022. [↑](#footnote-ref-8)
9. For incorrect responses, a 2-way ANOVA revealed no significant main effect of alcohol consumption on confidence *F*(1,107) = 1.72, *p* =.193*,* ηp2 =.010. There was also no significant interaction between alcohol and discussion *F*(1,107) = 2.50*, p* =.117, ηp2 =.016 and no significant main effect of discussion *F*(1,107) = 1.03*,p =.*313,ηp2 =.023*.* For misinformation responses, there was also no significant main effect of alcohol on confidence *F*(1,22) = 2.87*,p* =.104, ηp2 =.115and no main effect of discussion *F*(1,22) =.095*, p=.*761, ηp2 =.004. For confidence to ‘I don’t know’ responses, the data were not normally distributed. Therefore, a Mann-Whitney test was run on the effect of alcohol consumption on confidence, collapsed across discussion conditions. There was no significant effect of alcohol consumption on confidence for I don’t know responses *U* = 872.50*, p* =. 083. Collapsing the data across alcohol condition revealed no significant effect of discussion condition on confidence for I don’t know responses *U =*1043.00*, p =.* 765. [↑](#footnote-ref-9)