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RESEARCH ARTICLE

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The roles of interviewing conditions and individual differences in memory and suggestibility: An online interview study

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Abstract

In existing studies of investigative interviewing, the effects of interviewing contexts have often been measured with little consideration of the reciprocal interviewee's stable characteristics. To clarify the factors and conditions under which adults are likely to retain accurate information and be resistant (or vulnerable) to suggestions during interviews, this study systematically explored the relative contributions of interviewing conditions (i.e., interviewer behaviour and exposure to post-event misinformation) and individual differences (i.e., HEXACO personality traits, perceived parenting styles, social trait and state anxiety). A total of 159 Malaysian adults ($M = 24.70$; $SD = 5.48$) were assessed virtually using the Gudjonsson Suggestibility Scale 1. Hierarchical regression analyses revealed that higher recall accuracy was linked with supportive interviewer behaviour and non-exposure to misinformation. Notably, individual's personality traits and developmental environment emerged as significant predictors of recall and suggestibility. The implications of remote interviewing in investigations are also discussed.

KEYWORDS
individual differences, memory recall, online interviewing, parenting styles, personality traits, suggestibility

1 | INTRODUCTION

Accurate witness testimony is critical to crime investigations and prosecutions. However, human memory is susceptible to biases and errors. Decades of research have shown that factors within an investigative interviewing context, such as post-event misinformation and interviewer behaviour, can give rise to issues such as suggestibility and false memory (e.g., Hritz et al., 2015; Szpitalak & Polczyk, 2020; Zhu et al., 2010).

The misinformation effect occurs when recollection of an original event is interfered with by post-event information. Many studies have shown that post-event misinformation may distort the original details of a memory, weaken the memory trace, and, in some cases, lead to the creation of false memories (Loftus, 2005). Misinformation effects might occur at both memory encoding and retrieval. For example, differing memory loads including the amount and complexity of information to process can impact cognitive resources in witness testimony (Murphy & Greene, 2016).

When a witness is exposed to a large amount of information, attentional resources will be strained, potentially restricting the encoding of information. Past studies on the role of perceptual load in eyewitness memory demonstrated reduced memory performance in a high-load condition (e.g., Greene et al., 2017; Murphy & Greene, 2016). However, this high-load effect may be specific to an individual's cognitive ability, as the impacts of increasing load on memory performance were observed only when memory load was increased beyond a participant's working memory span (e.g., Doherty & Logie, 2016; Farina & Greene, 2020).

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Furthermore, other memory researchers consider false memories to be the result of retrieval errors, primarily influenced by personality and social factors (e.g., Mirandola et al., 2020; Zhu et al., 2010). When cognitive resources are restricted and information is not fully encoded in the first instance, individuals high in cooperativeness and reward dependence are more likely to incorporate post-event information by filling in false details into their recollection (Gordon & Shapiro, 2012; Zhu et al., 2010). The literature suggests the importance of taking personality and cognitive factors into consideration when studying the misinformation effect.

Given the interpersonal and closed nature of investigative interviewing, the conditions under which interviews are conducted can influence the interview outcome. In the context of investigative interviewing, a review by Saywitz et al. (2019) showed that supportive yet non-suggestive interviews are typically more successful in obtaining a more comprehensive and accurate report, indicating that interviewer demeanour plays an important role in facilitating communication and disclosure. Interviewer support refers to the deliberate behaviours by interviewers that facilitate rapport with the interviewee and may foster a feeling of well-being in the interviewee (Burleson et al., 1994). This may enhance an interviewee's resistance to misleading questions, reduce errors in non-suggestive questions, and improve recall accuracy without contaminating their accounts (Gudjonsson, 2018).

In a study by Madsen and Holmberg (2015), interviews conducted in a supportive manner have been found to be particularly helpful in increasing recall for individuals high in neuroticism. This suggests that interviews with a rapport-orientated approach, as opposed to a non-rapport-orientated approach, may mitigate emotional difficulties among individuals high in neuroticism and subsequently improve interviewees' memory performance and make them more resistant to suggestions. Indeed, rapport-building is deemed a vital component in the investigative interviewing process to facilitate communication and increase memory performance, and is recommended by major witness interviewing guidelines (e.g., Bull, 2018; St-Yves, 2013; Vallano & Compo, 2011).

1.1 | Individual differences in memory and suggestibility

A strength in Gudjonsson and Clark's (Gudjonsson & Clark, 1986) theoretical model of suggestibility is that it considers the individual differences factors that determine why people respond differently to leading questions and interrogative pressure. For instance, past studies have reported that cognitive factors such as language ability and intelligence are positively linked with recall and have negative links with suggestibility (e.g., Alm et al., 2019; Polczyk, 2005).

The existing literature has documented limited and mixed findings regarding the impact of personality traits on memory and suggestibility. In the context of investigative interviewing, the Five Factor Model is one of the most widely employed trait approaches to personality in relation to witness memory (Revelle & Loftus, 2014). Some researchers have found that those who score higher on the openness to experience trait report more accurate recall and are less likely to fall prey to suggestions (e.g., Curley et al., 2017; Doughty et al., 2017), but others have found no, or a negative, relationship (e.g., Madsen & Holmberg, 2015; Polczyk, 2005). Neuroticism is shown to be associated with a decrease in the amount of information reported and higher susceptibility to suggestions (e.g., Gudjonsson, 2003; Madsen & Santtila, 2018). While evidence linking agreeableness with memory performance is lacking, existing studies demonstrate only a weak connection between agreeableness and improved recall (e.g., Hock et al., 2014). Extraversion and conscientiousness have more robust positive relationships with memory, and negative relationships with suggestibility (e.g., Jackson & Balota, 2012; Liebman et al., 2002). Overall, these mixed findings may in part be attributed to methodology, the different measures used, and the overlooked interpersonal nature of interviews.

In his review of the literature, Gudjonsson (2003) discovered that suggestibility relates more to state anxiety induced by interrogative pressure than to a stable tendency to experience anxiety (trait anxiety). The existing literature on the influence of anxiety on memory and suggestibility is mixed (e.g., Bruck & Melnyk, 2011; Klemfuss & Olaguez, 2020). Previous studies have reported negative associations between both trait and state anxiety with attention (e.g., Bartlett, 2001) and positive associations with suggestibility (e.g., Drake et al., 2015; McGroarty & Thomson, 2013). In the context of investigative interviewing, Almerigogna et al. (2007) found a more pronounced impact of anxiety on suggestibility when interviewers acted in a non-supportive manner compared to a supportive one; participants who scored highly on both trait and post-interview state anxiety responded incorrectly to misleading questions more frequently. Thus, additional work on the role of individual differences in different interviewing contexts is needed before we can draw conclusions about the underlying mechanisms of suggestibility and false memory formation.

One key variable that has received minimal attention in the investigative interviewing literature is parenting style. This is despite reviews (e.g., Bruck & Melnyk, 2011; Klemfuss & Olaguez, 2020) showing that maternal attachment and parent–child relationship quality serve as significant predictors of memory and suggestibility. Parenting style plays a significant role in one's development, which inevitably influences character and behaviour (Power, 2013). According to Maccoby and Martin (1983), parenting styles can be classified into a two-dimensional model: parental demandingness, which refers to how parents control their child's behaviour, and responsiveness, which refers to how accepting and responsive parents are to their children's special and emotional needs.

Baumrind (1991) used the abovementioned dimensions to derive four primary parenting styles: authoritative parenting is characterised by high demandingness and high responsiveness, authoritarian parenting is characterised by high demandingness and low responsiveness, permissive parenting is characterised by low demandingness and high responsiveness, and neglectful parenting is characterised by low demandingness and low responsiveness. Yet, it remains unclear how parenting styles with distinctive parental demandingness and

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responsiveness may be related to interviewee's behaviour in an investigative interview context. For example, those who were raised by authoritarian parents are more likely to exhibit low self-confidence and behave in more compliant and obedient ways (Baumrind, 1991). A study by Jalal and Sari (2023) on adolescents' self-concept with authoritarian parenting demonstrated a lack of critical thinking and a tendency to comply with orders unquestioningly. With such self-concept, they are arguably more likely to be susceptible to suggestions during questioning. Furthermore, Deshmukh (2019) also found that individuals who were raised by authoritative parents tended to have better social competence and were less suggestible than those raised in authoritarian and permissive parenting styles. These everyday parenting style experiences not only influence behaviours when facing different interview conditions but also affect potential responses towards interrogative and suggestive situations.

1.2 | The current study

In existing studies, the effects of interviewer behaviour have often been measured with little consideration of the reciprocal interviewee's behaviour or personality. This approach may overlook the fact that each individual brings a different perception and experience to their interaction with interviewers (Johnston et al., 2019). Given the documented associations between supportive contexts and an interviewee's honest responses or cooperation (e.g., Lewy et al., 2015; Zajac et al., 2012), the inclusion of an honesty-humility measure may advance our understanding. In the current study therefore, we included the HEXACO personality inventory which includes an honesty-humility dimension, characterised by sincerity, fairness, greed avoidance, and modesty.

Additionally, due to the Covid-19 pandemic, many of our daily activities, including court procedures, moved online. Some studies have emerged from countries such as New Zealand, United States, and Austria examining videoconferencing investigative interviews during the pandemic and supported it as an effective and legally defensible alternative to face-to-face interviewing, particularly when appropriate guidelines are followed (e.g., Brown et al., 2021; Dale & Smith, 2021; Dickinson et al., 2021; Vieth et al., 2020). Online interviews offer many benefits such as broadened access to appropriately trained and experienced interviewers and minimised delays between disclosure and interview, which is likely to reduce potential sources of contamination on memory (e.g., Brown et al., 2012; Nelson et al., 2017). To date, it remains unclear whether the impact of interviewing conditions (e.g., interviewer behaviour) on memory and suggestibility persists when interviews are conducted virtually. The positive encouraging and calming effects in the supportive interviewing condition might be neutralised due to difficulty in building rapport with the interviewee; while the adverse anxiety-provoking effects in the non-supportive condition may reduce in the remote context (Saywitz et al., 2019). Conducting the present study online allowed us to examine whether an interviewing model with an online modality exhibits the same general properties as its in-person counterpart.

To clarify the factors and conditions under which adults are likely to retain accurate information and be vulnerable (or resistant) to suggestions during online interviews, this study systematically explored the relative contributions across two levels: interviewing condition (i.e., interviewer behaviour and exposure to post-event misinformation), and individual differences (i.e., perceived parenting styles, HEXACO personality traits, social trait and state anxiety).

We hypothesised that:

H1. Supportive interviewer behaviour will be positively related to recall and negatively related to suggestibility.

H2. Exposure to misinformation will be negatively related to recall and positively related to suggestibility.

H3. Honesty-humility, extraversion, conscientiousness, and openness to experience traits will be positively related to recall and negatively related to suggestibility; while emotionality will be negatively related to recall and positively related to suggestibility. Agreeableness will be positively related to recall and suggestibility.

H4. Trait and state anxiety will be negatively related to recall and positively related to suggestibility.

H5. Authoritarian and permissive parenting will be negatively related to recall and positively related to suggestibility; while authoritative parenting will be positively related to recall and negatively related to suggestibility.

2 | METHOD

2.1 | Participants

A total of 159 English-speaking Malaysian adults (43 men, 116 women) aged between 18 to 55 years old ($M = 24.70$; $SD = 5.48$) participated in this online study through recruitment via social media. The majority of the participants were of Chinese ethnicity (79.9%), followed by Malay (11.3%), Indian (7.5%), and other ethnic groups (1.3%).

2.2 | Materials

2.2.1 | Memory recall and suggestibility

A modified Gudjonsson Suggestibility Scale 1 (GSS1; Gudjonsson, 1984) was administered to measure memory recall and interrogative suggestibility. A standard GSS1 protocol typically involves presenting a short story to the participant as a memory test, followed by an immediate free recall session. After a 50-min delay, the

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participant is again asked to recall what they can recall about the story. A series of 20 questions is administered: 15 leading questions that consist of suggestive information that was not part of the original narrative, and five about true events mentioned in the narrative (control questions). The researcher then provides negative feedback, in which the participants are told that they have made some errors in the first round, and thus a re-administer of the questions is needed. The same 20 questions are then re-administered.

Instead of administering immediate and delayed recall measures, in the modified approach of the present study, a single free recall test was conducted after the presentation of misinformation and prior to the first administration of the 20 questions. This adjustment was aimed at preventing multiple recall instances, allowing for a focussed examination of the impact of misinformation on participant's recall and suggestibility.[1] This study also implemented a 30-min intervening period after the story was told in order to mimic real-world forensic contexts, where witnesses are often questioned after a delay rather than immediately. During this short intervening period, a filler task was administered to maintain participant engagement throughout the online session.

Scoring of free recall was as follows:

1. *Recall accuracy*: one point was given for each number of facts accurately remembered by the participant, with a maximum score of 40.

2. Confabulation score (or recall inaccuracy): following Smith and Gudjonsson (1986), one point was given each time there was a memory distortion (i.e., the reported events/ details which were different from what being told in the narrative) or fabrication (i.e., the reported events/ details which were not included in the narrative). For example, if participants mentioned 'holiday in Australia', instead of 'holiday in Malaysia' which was in the original narrative, the falsely remembered detail was coded as a distortion; If participants mentioned details like 'visiting an embassy' which was not part of the original narrative, it was coded as a fabrication.

The GSS1 assessed four different components of suggestibility. Scoring of each component was as follows:

1. *Yield 1*: the extent to which the participant yielded to the 15 leading questions from the interviewer. The maximum score is 15.

2. *Yield 2*: the extent to which the participant yielded to the 15 leading questions after negative feedback, that is, after being told that have made errors and needed to be re-questioned. The maximum score is also 15.

3. *Shift*: the extent to which the participants changed or shifted their original answers in response to the negative feedback. The maximum score is 20.

4. *Total suggestibility*: the sum of Yield 1 and Shift scores, with a maximum score of 35.

2.2.2 | Personality traits

The 60-item version of the HEXACO Personality Inventory (HEXACO–60; Ashton & Lee, 2009) was administered to assess the six domains of the HEXACO model of personality structure, with 10 items for each domain: Honesty-Humility (H) reflects one's tendency to be fair and genuine in dealing with others (e.g., 'I wouldn't pretend to like someone just to get that person to do favours for me'); Emotionality assesses a tendency to experience fear and anxiety, and one's need for emotional support and sentimental attachments with others (e.g., 'I sometimes can't help worrying about little things'); Extraversion (X) refers to a tendency to become engaged in social endeavours, such as socialising and leading (e.g., 'In social situations, I'm usually the one who makes the first move'); Agreeableness (A) reflects one's tendency to be tolerant and cooperative with others (e.g., 'I am usually quite flexible in my opinions when people disagree with me'); Conscientiousness (C) refers to one's tendency to become engaged in task-related endeavours, such as planning and organising (e.g., 'I always try to be accurate in my work, even at the expense of time'); and Openness to Experience (O) refers to a tendency to become engaged in idea-related endeavours, such as thinking and creativity (e.g., 'I like people who have unconventional views'). Participants indicated how strongly they agreed or disagreed with each statement about themselves on a five-point Likert Scale.

2.2.3 | Parenting styles

The present study focussed on examining three major parenting styles using the Parental Authority Questionnaire (PAQ; Buri, 1991): Permissive, which is characterised by high affection but low behavioural control (e.g., 'As I was growing up my parent did not direct the behaviours, activities, and desires of the children in the family'); Authoritarian parenting, which is characterised by a harsh and punitive control and low affection (e.g., 'My parent felt that wise parents should teach their children early just who is boss in the family'); and Authoritative, which is characterised by a high level of both parental affection and behavioural control (e.g., 'As I was growing up my parent directed the activities and decisions of the children in the family through reasoning and discipline'). PAQ was administered to measure parental authority or disciplinary practices from the point of view of the child. Participants indicated how strongly they agreed or disagreed with each statement on a five-point Likert Scale about their parents' parenting style. The scale comprises a total of 30 items, divided into three subscales with 10 items for each parenting style. The items on each subscale were summed (total scores range from 10 to 50), with higher scores indicating a greater appraised level of the parental authority prototype.

2.2.4 | Social trait anxiety

The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) assessed the way that social anxiety impacts participants' daily life across various situations. The LSAS consists of 24 items measured in two dimensions: Fear/Anxiety was rated on a four-point Likert scale (0 = none, 1 = mild, 2 = moderate, 3 = severe) to indicate how anxious or fearful they feel in each situation; and Avoidance was rated on a four-point Likert scale (0 = never, 1 = occasionally, 2 = often, 3 = usually) to indicate how often they avoid a situation. Total scores range from 0 to 144. The higher the score, the greater the level of social anxiety.

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2.2.5 | State anxiety

The 6-item version of Spielberger's (Spielberger, 1983) State-Trait Anxiety Inventory (STAI-6; Marteau & Bekker, 1992) assessed participant's state anxiety. Participants were asked at the end of the study to indicate how they felt at that moment on a four-point Likert scale. Total scores range from 0 to 18 with higher scores indicating greater state anxiety.

2.2.6 | Intelligence quotient (IQ)

Past studies consistently reported that IQ is positively related to memory, and negatively related to suggestibility (Polczyk, 2005; Ridley et al., 2013), thus we administered the Raven's Standard Progressive Matrices (SPM; Raven et al., 1989) to test participants' nonverbal IQ and to screen those who had below average scores. The Raven's SPM comprises a total of 60 multiple-choice questions. Participants were asked to identify the missing part in each test item from multiple puzzle pieces to complete the geometric pattern. A total score was calculated, and a standardised percentile rank was determined. Those who scored at or below the 25th percentile were interpreted as below average in intellectual capacity and were removed from the analyses. We excluded only one participant and proceeded with the analyses using 159 participants. In the present study, the Raven's SPM was administered as a filler task during the intervening period between the original narrative and free recall test. Participants' IQ were positively correlated with memory recall accuracy r (158) $= .23$, $p < .001$, and negatively correlated with total suggestibility r (158) $= -.18$, $p = .021$.

2.2.7 | Interviewer behaviour manipulation check

An interviewer behaviour rating form was administered to assess the participants' rating of interviewer behaviour between supportive and non-supportive interviewing conditions (Bain & Baxter, 2000). Participants were asked to indicate how strongly they agree or disagree with each item about their impression of the interviewer on a five-point Likert Scale. This manipulation check comprises 18 items, which was evaluated on 14 aspects of interviewer's manner: nervous, serious, friendly, understanding, confident, professional, firm, respectful, positive, formal, warm and sincere, strict, negative, and pushy.

2.3 | Procedure

This study was conducted remotely, and all tasks were completed online. There were two parts to the study: in the first part, participants completed a demographic information form, HEXACO–60, PAQ, and LSAS. Participants were then invited to participate in the second part of the study, which was an online interview session on Microsoft Teams.

The interview session involved experimental manipulations of interviewer behaviour (i.e., supportive versus non-supportive interviewing style) and exposure to post-event misinformation (i.e., exposed versus non-exposed). Participants were pseudo-randomly assigned to one of four conditions with 40 participants in each interviewing condition: (1) supportive and non-exposed, (2) supportive and exposed, (3) non-supportive and non-exposed, and (4) non-supportive and exposed condition. In the supportive condition, the interviewer acted in a friendly manner, dressed in casual clothes, maintained eye contact and smiles, and spoke with a warm voice. In the non-supportive interviewer condition, the interviewer made no attempt to build rapport and gave minimal responses to any attempts at conversation, portrayed a formal and stern attitude, dressed in dark formal clothes, had minimal eye contact, did not smile, and spoke with a monotonic voice during interview. The supportive and non-supportive manner were in line with procedures successfully used in previous studies (e.g., Hershkowitz et al., 2017; Peter-Hagene et al., 2019).

The modified GSS1 procedure was administered individually during the interview session. Participants were instructed to listen carefully to the robbery story read by the interviewer, followed by a 30-min filler task using the Raven's SPM. Participants in the exposed condition were then presented with post-event misinformation about the story via a 1-min audio recording, whereas participants in the non-exposed condition were not. The audio recording in the exposed condition was a misinformation script recorded by a trained female research assistant, but each participant was informed that it was narrated by another participant (i.e., 'A participant heard the same story you heard earlier. I will now play you the audio recording to show you what she remembers from the story'). The misinformation script contained 15 false pieces of information, including 6 distorted and 9 fabricated details that were not part of the original narrative.

Participants then performed a free recall test, where they were asked to tell the interviewer what they remembered about the original narrative. After the free recall, they were asked 20 questions, 15 of which suggested information that was not part of the original story. Participants were then provided with negative feedback (i.e., 'You made a few mistakes. Let's go through them again and see if you can do better this time'), and the same 20 questions were then re-administered.

At the end of the study, participants completed the interviewer behaviour rating form and the STAI-6. All participants were debriefed upon completion of the study. The online interview took approximately 45 min. Participants' oral responses were audio-recorded for transcription and coding later.

3 | RESULTS

3.1 | Preliminary analyses

Using the interviewer behaviour rating form, participants' ratings of their impressions toward the interviewer (first author) revealed that the manipulation was successful. An independent samples t-test on

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TABLE 1 Reliability statistics of scales.

Scale	No. of items	Cronbach's alpha (α)
HEXACO–60		
Honesty-Humility	10	.67
Emotionality	10	.72
Extraversion	10	.77
Agreeableness	10	.70
Conscientiousness	10	.69
Openness	10	.72
PAQ		
Permissive	10	.79
Authoritarian	10	.87
Authoritative	10	.86
LSAS	24	.95
STAI-6	6	.80
Interviewer behaviour rating	18	.77

Abbreviations: LSAS, Liebowitz Social Anxiety Scale; PAQ, Parental Authority Questionnaire; STAI, State-Trait Anxiety Inventory.

participants' ratings of interviewer behaviour revealed a significant difference between supportive ($n = 80$) and non-supportive ($n = 79$) conditions, t (157) $= -5.12$, $p < .001$. Participants were more likely to rate the supportive interviewer as friendly and positive, and to rate the non-supportive interviewer as stern and negative.

A summary of the reliability statistics for each measure and subscale is presented in Table 1. The Cronbach's alpha coefficients of all measurements used fell within the desirable range with satisfactory reliability, ranged between .67 and .95.

Descriptive statistics and correlations for individual difference variables and GSS1 indices are presented in Table 2. A Pearson's correlation test showed that recall accuracy had no correlation with confabulation ($r = -.04$, $p = .591$), but was negatively correlated with all suggestibility measures: Yield 1 ($r = -.46$, $p < .001$), Yield 2 ($r = -.40$, $p < .001$), Shift ($r = -.18$, $p = .029$), and total suggestibility ($r = -.42$, $p < .001$). Confabulation was positively correlated with Yield 2 ($r = .16$, $p = .042$), and total suggestibility ($r = .16$, $p = .045$). Most of the HEXACO personality traits demonstrated weak correlations ($r < .25$) with recall and suggestibility measures. Overall, recall accuracy was positively correlated with extraversion, and negatively correlated with state anxiety and permissive parenting; Yield 2 was positively correlated with social anxiety and permissive parenting; Shift and total suggestibility were negatively correlated with openness to experience.

3.2 | Predictors of memory recall and suggestibility

Hierarchical regression analyses were performed to assess the relative contributions of interviewing conditions and individual differences on adults' memory recall accuracy, confabulation, Yield 1, Yield 2, Shift, and total suggestibility. For each of the GSS1 indices, the dummy-coded variables of interviewer behaviour and exposure to misinformation were entered in the first block (Model 1) and the individual differences variables (i.e., HEXACO personality traits, perceived parenting styles, social trait anxiety, and state anxiety) were entered in the second block (Model 2). The standardised regression coefficients for each predictor in the first and second models of hierarchical regression analyses predicting GSS1 indices are reported in Table 3.

3.2.1 | Predictors of memory recall

The significant final models explained 21% of the variance in recall accuracy, $R^2 = .210$, F (13,145) $= 2.97$, $p = .001$, and 14.6% of the variance in confabulation, $R^2 = .146$, F (13,145) $= 1.90$, $p = .034$. Adjusted R^2 went up from 5% in the first model to 14% in the final model of recall accuracy showing that the added individual differences variables improved model power and explainability. In the prediction of confabulation, a lower adjusted R^2 of 7% (from 10% in the first model) was reported when individual differences variables were included in the model. This suggests that Model 1 with only the interviewing condition variables may carry greater explanatory power. Results demonstrated that supportive interviewer behaviour ($\beta = .25$, $p = .001$), higher emotionality ($\beta = .12$, $p = .019$), and extraversion ($\beta = .19$, $p = .040$), lower state anxiety ($\beta = -.19$, $p = .022$), and those who grew up with less permissive parenting ($\beta = -.23$, $p < .001$) significantly predicted better memory recall accuracy. However, only exposure to post-event misinformation significantly predicted higher confabulation ($\beta = .31$, $p < .001$) during free recall.

3.2.2 | Predictors of suggestibility

The final model accounted for a similar amount of variances in each suggestibility measure: 12.5% of the variance in Yield 1, $R^2 = .125$, F (13,145) $= 1.59$, $p = .095$; 12.7% of the variance in Yield 2, $R^2 = .127$, F (13,145) $= 1.63$, $p = .084$; 11.3% of the variance in Shift, $R^2 = .113$, F (13,145) $= 1.42$, $p = .157$; and 12% of the variance in total suggestibility, $R^2 = .120$, F (13,145) $= 1.53$, $p = .114$. While none of the final models of suggestibility were statistically significant, the small increasing trend of adjusted R^2 in the final model suggests that individual differences may serve as a greater predictor to suggestibility, as compared to the interviewing conditions. Results revealed that none of the interviewing condition variables uniquely predicted suggestibility. In terms of individual differences, those with higher openness to experience reported lower Shift ($\beta = -.19$, $p = .025$) and total suggestibility ($\beta = -.18$, $p = .029$). Individuals who reported being raised by parents who adopted a permissive or authoritarian parenting style demonstrated higher Yield 1 ($\beta = .30$, $p = .003$, and $\beta = .25$, $p = .016$, respectively), as well as higher total suggestibility ($\beta = .22$, $p = .027$, and $\beta = .23$, $p = .027$, respectively). Those reported being raised by permissive parenting also demonstrated a higher Yield 2 score after receiving negative feedback ($\beta = .29$, $p = .006$).

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TABLE 2 Means (*M*), standard deviations (SD), and correlations for individual difference variables and GSS1 indices ($N = 159$).

	M	SD	H	E	X	A	C	O	P	AR	AT	SOA	STA	RA	CF	Y1	Y2	S	TS
H	32.97	5.93	-	.07	.02	.35***	.15	.21**	−.05	−.14	.09	−.11	−.10	.06	.03	−.05	−.01	−.00	−.03
E	34.86	5.78		-	−.22	−.26	−.07	.09	−.05	.14	−.06	.30***	.30***	.05	−.02	.01	.04	−.04	−.03
X	30.51	6.04			-	.09	.31***	.07	.14	−.18*	.22**	−.51***	−.11	.17*	−.09	−.07	−.10	−.01	−.05
A	32.87	5.45				-	.19*	.20*	−.09	−.18*	.13	−.14	−.13	.11	.00	−.02	.02	−.06	−.08
C	33.79	5.33					-	.08	−.08	−.10	.04	−.33***	−.05	.08	−.08	−.03	.02	.02	.00
O	34.09	5.88						-	.02	−.13	.04	−.10	−.12	.06	−.03	−.09	−.06	−.20*	−.22**
P	29.03	6.49							-	−.48***	.49***	−.00	.02	−.21**	.02	.13	.17*	.02	.12
AR	30.70	7.98								-	−.54***	.18*	−.02	−.01	−.01	.15	.05	.02	.10
AT	33.24	7.33									-	−.15	−.07	.03	.12	−.07	.01	.09	.02
SOA	46.99	23.27										-	.33***	−.13	−.06	.11	.18*	−.03	.05
STA	6.88	3.74											-	−.19*	−.03	.13	.14	.09	.14
RA	11.13	5.81												-	−.04	−.46***	−.40***	−.18*	−.42***
CF	3.08	2.00													-	.11	.16*	.13	.16*
Y1	6.57	3.30														-	.68***	.06	68***
Y2	8.04	3.38															-	.34***	.67***
S	5.14	3.82																-	.74***
TS	11.72	5.18																	-

Abbreviations: A, Agreeableness; AR, Authoritarian; AT, Authoritative; C, Conscientiousness; CF, Confabulation; E, Emotionality; H, Honesty-Humility; O, Openness; P, Permissive; RA, Recall Accuracy; S, Shift; SOA, Social Anxiety; STA, State Anxiety; TS, Total Suggestibility.X, Extraversion; Y1, yield 1; Y2, yield 2.

*$p < .05$; **$p < .01$; ***$p < .001$.

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TABLE 3 Standardised regression coefficients (β) for each predictor in Steps 1 and 2 of hierarchical regression models of the measures of memory and suggestibility ($N = 159$).

	Memory recall				Suggestibility							
	Recall accuracy		Confabulation		Yield 1		Yield 2		Shift		Total suggestibility	
Predictors	I	II	I	II	I	II	I	II	I	II	I	II
Step 1												
Supportiveness	0.23**	0.25***	−0.05	−0.06	0.02	−0.01	−0.02	−0.04	−0.08	−0.09	−0.05	−0.07
Misinformation	−0.07	−0.06	0.33***	0.31***	0.14	0.14	0.15	0.14	−0.14	−0.14	−0.02	−0.01
Step 2												
Honesty-humility trait		−0.05		0.04		0.01		0.01		0.09		0.07
Emotionality trait		0.21*		−0.05		−0.05		−0.04		−0.10		−0.10
Extraversion trait		0.19*		−0.11		−0.02		−0.05		−0.09		−0.08
Agreeableness trait		0.04		−0.00		0.08		0.10		−0.10		−0.02
Conscientiousness trait		−0.03		−0.08		0.04		0.12		0.05		0.06
Openness trait		0.02		−0.06		−0.07		−0.05		−0.19*		−0.18*
Permissive parenting		−0.23***		−0.02		0.30**		0.29**		0.04		0.22*
Authoritarian parenting		−0.11		0.04		0.25*		0.16		0.10		0.23*
Authoritative parenting		0.10		0.12		−0.09		−0.04		0.15		0.05
Social trait anxiety		0.02		−0.14		0.03		0.14		−0.09		−0.05
State anxiety		−0.19*		0.01		0.12		0.11		0.11		0.16
R^2	0.06	0.21	0.11	0.15	0.02	0.13	0.02	0.13	0.03	0.11	0.003	0.12
Adjusted R^2	0.05	0.14	0.10	0.07	0.01	0.05	0.01	0.05	0.02	0.03	−0.01	0.04
ΔR^2		0.15**		0.04		0.11		0.11		0.09		0.12
F	4.72*	2.97**	9.50***	1.90*	1.52	1.59	1.73	1.63	2.18	1.42	0.23	1.53

Note: The categorical variables were transformed into dummy variables, where supportiveness = 1, and non-supportive = 0, for interviewer behaviour; and exposed = 1, and non-exposed = 0, for exposure to post-event misinformation.

*$p < .05$; **$p < .01$; ***$p < .001$.

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4 | DISCUSSION

The present study explored the predicting and combined effects of interviewing conditions (i.e., interviewer behaviour and exposure to post-event misinformation) and individual differences (i.e., HEXACO personality traits, perceived parenting styles, social trait and state anxiety) on recall and suggestibility.

In terms of interviewing conditions, H1 and H2 were partially supported. Supportive interviewer behaviour was positively related with recall accuracy. Even though exposure to misinformation did not predict recall accuracy, it was positively related with confabulation. This is consistent with earlier findings, where post-event inaccurate information may be incorporated into memory, resulting in the creation of false memories (e.g., Loftus, 2005; Zhu et al., 2010). According to Gudjonsson (2003), people tend to replace gaps in their memory with imaginary experiences that they believe to be true and develop fabricated or distorted recollections of an event. However, in contrast to previous findings (e.g., Baxter et al., 2006; Vallano & Compo, 2011), no relationship was found between any of the manipulated interviewing conditions and suggestibility. The null effect may be attributed to the marginal influence of specific elements within the interviewing contexts, including interviewer behaviour and exposure to post-event misinformation. This suggests that participants' responses to suggestions may be more strongly influenced by the other factors, such as individual differences.

In fact, regarding H3–H5, the overall regression models indicated that individual differences significantly improved the model power (except for confabulation), suggesting that they serve as stronger predictors of recall accuracy and suggestibility compared to the interviewing conditions. Extraversion positively predicted recall accuracy, while openness to experience negatively predicted suggestibility, which are consistent with past studies (e.g., Curley et al., 2017; Liebman et al., 2002). Individuals high in extraversion have higher social boldness (Ashton & Lee, 2009), which may make them feel more comfortable talking to the interviewer. It is therefore not surprising that they were more willing to share details during free recall (e.g., Liebman et al., 2002). Those high in openness tend to take an interest in unusual ideas and actively seek new solutions to problems, hence they may be less likely to fall prey to suggestive prompts (e.g., Madsen & Santtila, 2018). In contrast to past findings (e.g., Gudjonsson, 2003), the current study found a positive relationship between emotionality and recall accuracy. Considering that HEXACO's emotionality domain captures individuals' reactions to fear and anxiety, various responses to life stressors could arguably encourage engagement and drive optimal performance (El Zein et al., 2015). Individuals high in emotionality may also be easily worried and vigilant, making them strive to perform better (Ashton & Lee, 2009), and therefore, provide more accurate details during free recall (e.g., Doughty et al., 2017).

With regard to anxiety, findings were in line with Gudjonsson (2003), in which state anxiety plays a stronger role in predicting memory performance and suggestibility compared to trait anxiety. In the present study, trait anxiety was not related to any of the GSS1 indices, but those in a more anxious state did provide fewer accurate details during free recall.

In terms of parenting styles, permissive parenting emerged as a significant negative predictor to recall accuracy, and a positive predictor to suggestibility. Permissive parents make very few demands of their children to adhere to rules or boundaries (Baumrind, 1991). Those raised by permissive parents may be exhibiting a weaker sense of self-discipline, making them more hesitant to conform to expectations for appropriate behaviour, such as sharing information when they are requested to do so in the free recall task. Additionally, individuals raised by permissive parents, who are non-judgmental and usually avoid confrontation, may have a stronger tendency to give in to suggestions during questioning (Deshmukh, 2019). Consistent with previous studies (e.g., Jalal & Sari, 2023), individuals with authoritarian parents reported higher Yield 1 and total suggestibility. Authoritarian parents expect their children to behave in compliant and obedient ways (Baumrind, 1991). Those raised by authoritarian parents may not be taught to voice their opinions, but instead comply with orders; this may explain why they are more susceptible to suggestions during questioning.

4.1 | Limitations

The exposed group in the current study was given misinformation, but the non-exposed group was not. Arguably, the exposed group experienced additional memory load which could have affected their performance on the free recall task. The non-exposed group could have been presented with a neutral story that is unrelated to the original narrative, to control the impacts of load differences on recall. As the impacts of increasing load on memory performance may be observed only when memory load was increased beyond interviewee's working memory span (e.g., Doherty & Logie, 2016; Farina & Greene, 2020), future studies may consider assessing participants' memory span (e.g., using working memory span tasks) to minimise the negative influence of extra loads on memory.

One could also argue that participants exposed to misinformation were given the additional opportunity to rehearse accurate information. Given that this design choice might have influenced recall accuracy scores and potentially masked the misinformation effect, further analyses using ANOVAs were conducted. There was no significant difference in recall accuracy between the exposed and non-exposed groups, suggesting that exposure to misinformation had a minimal impact on accurate recall. This implies that the observed misinformation effect remains robust, even when considering the potential confounding influence of rehearsal. Furthermore, the experimental setup perhaps reflects real-world scenarios where individuals often encounter and may inadvertently rehearse some correct information when exposed to misinformation from various sources. This design allowed us to assess the impact of exposure to misinformation on memory performance realistically, providing valuable insights into how individuals process misinformation in everyday situations.

The study was conducted in English, which may be cognitively taxing for participants whose first language is not English. Considering that the complexity of information to process can impact cognitive resources, potentially restricting the encoding or retrieval of

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information, this in turn may result in less accurate memory reports (Murphy & Greene, 2016). While English is widely used as a medium of communication in Malaysia, most Malaysians are bilingual or multilingual. A study by Alm et al. (2019) that compared native (Swedish) and non-native (English) speakers showed an increase in perceived cognitive effort and suggestibility in interviews that were conducted in a non-native language. Future studies should consider the participant's native language.

5 | CONCLUSION

Overall, findings indicate that interviews held in a supportive manner predict better recall. The findings also highlighted that exposure to misinformation may lead to the creation or elaboration of false information, whilst leaving accurate information intact. This study illuminates how recall accuracy and one's susceptibility to suggestions are influenced not only by the contextual details or the interaction with interviewers but also by their own internal structure (i.e., personality) and developmental environment (i.e., perceived parenting styles). Addressing the gaps in current knowledge about the role of parenting styles, these findings highlight the potential influences of permissive and authoritarian parenting on interviewee's behaviour and performance during interviews, especially stressful and suggestive ones. Finally, many courts in the world are moving their processes online, but there are still limited studies evaluating online interviewing as an effective alternate interviewing model in the criminal justice system. This study contributes to existing literature to support the proposition that online interviews may exhibit the same general properties as those in-person, specifically the positive impact of a supportive interviewing condition on recall accuracy.

AUTHOR CONTRIBUTIONS

Yi Shan Wong: Methodology; data curation; formal analysis; writing – original draft; writing – review and editing; project administration; conceptualization. **Rachel Pye:** Supervision; writing – review and editing. **Kai Li Chung:** Supervision; project administration; writing – review and editing; funding acquisition; conceptualization; methodology.

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CONFLICT OF INTEREST STATEMENT

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

Restrictions apply to the public availability of these data, which were used under license for this study. Data are available on request from the corresponding author with the permission of the Ministry of Higher Education Malaysia.

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ENDNOTE

[1] A study by Smeets et al. (2009) suggests that a shorter GSS procedure that is without the retention interval and recall tests does not affect total suggestibility scores.

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