Confabulation and False Memory in Young First-Episode Psychosis Patients and Normal Controls

2016

MSc in Clinical Psychology

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Forewords and Acknowledgements

Submitted in partial fulfillment of the requirements of the MSc Psychology degree, Reykjavík University, this thesis is presented in the style of an article for submission to a peer-reviewed journal. Supervisors are Kamilla Rún Jóhannsdóttir and Jón Friðrik Sigurðsson. When the thesis is submitted, the authors of the submitted paper will be Andri Hrafn Sigurðsson, Arnar Ingi Friðriksson, Kamilla Rún Jóhannsdóttir and Jón Friðrik Sigurðsson.

This thesis was initiated in semester 2 and authors conducted a literature review. The research was authorized by the Ethical Committee of Administrative Research at Landspítali-The National University Hospital of Iceland and the director of medicine at Landspítali. In semester 3, authors collected data and completed the write-up in semester 4. This study was conducted at Reykjavík University and at Landspítali.

First and foremost, we would like to thank everybody who was involved in this research project, especially our supervisors Kamilla Rún Jóhannsdóttir and Jón Friðrik Sigurðsson, for all their guidance and advise. We would also like to thank Ólína Guðbjörg Viðarsdóttir for data collection, data sharing and excellent cooperation. Finally, we want to give thanks to all the participants who participated in this research.

Abstract

Studies have demonstrated that forced confabulation can increase susceptibility to false memories in normal controls whereas patients with psychotic disorder generate more confabulation, but it is unclear whether their confabulation leads to increased false memory recall. Furthermore, it is unclear to what extent false memory recall and confabulation in early psychosis patients is based on their impaired cognitive functions. The aim of the present study was to investigate confabulation and the creation of false memories in young first-episode psychosis patients and normal controls after controlling for cognitive functions. Participants in the clinical group (N = 28) and control group (N=32) carried out eight neuropsychological tests, watched a video excerpt and answered a questionnaire with eight correct and four false questions about events that never happened in the video. Participants were encouraged to guess answers if they did not remember the event (to confabulate). Participants were examined one week later to see if they had created a false memory for their confabulated answers. It was hypothesized that patients would generate more confabulations and recall fewer of their confabulated answers as a false memory one week later compared to healthy controls. It was also hypothesized that confabulation and false memory were not dependent on cognitive function. The results demonstrated a non-significant main effect of time of interview on the false memory formation. Main effect of group on the false memory formation was not significant. Interaction between time of interview and group on the false memory formation was significant. One of eight neuropsychological tests (Digit Span) significantly affected participants' confabulation and false memory. Investigating these phenomena adequately, researchers, psychologists and other health workers can determine its occurrence in different situations, as in psychological treatment, and in criminal investigations.

Keywords: confabulation, false memory, cognitive function, young first-episode psychotic patients

Confabulation and False Memory in Young First-Episode Psychosis Patients and Normal Controls

Considerable amount of studies have demonstrated that patients with psychotic disorders such as schizophrenia are susceptible to false memory formation (Bhatt, Laws, & McKenna, 2010; Lee, Iao, & Lin, 2007; Moritz, Woodward, Cuttler, Whitman, & Watson, 2004) and are more likely to confabulate about false events (Kalathil, 2014; Lorente-Rovira, Santos-Gómez, Moro, Villagrán, & Mckenna, 2010; Nathaniel-James & Frith, 1996). Confabulation leads to false memory, but the link is not thoroughly studied in relation to psychosis with one study showing no link between these two phenomena (Kalathil, 2014). A better understanding of confabulation and false memory formation in psychosis patients is important, in particular whether confabulation is linked with false memory and whether both are caused by impaired cognition. Most studies examining the false memory phenomena in schizophrenia have used the Deese-Roediger-McDermott word list (Bhatt et al., 2010; Lee et al., 2007; Moritz et al., 2004). The aim of the current research is to study confabulation and false memory creation in young first-episode psychosis patients after controlling for cognitive functions and when faced with more realistic events.

False memories refer to recollection of events that never took place or remembering an event differently from the way it happened (Brainerd & Reyna, 2005). Confabulations of events have, among other things, been shown to affect the creation of false memories (Ackil & Zaragoza, 1998; Kalathil, 2014; Lorente-Rovira et al., 2010; Zaragoza, Payment, Ackil, Drivdahl, & Beck, 2001). Confabulation creates a memory distortion where gaps in recollection are filled in by fabricated responses (Fotopoulou, Conway, & Solms, 2007). Confabulation can be elicited in various ways such as giving misleading information, asking about events that never took place, requiring people to recall narratives or forcing people to

answer even though they do not remember the event (Ackil & Zaragoza, 1998; Forgas, Laham, & Vargas, 2005; Nathaniel-James & Frith, 1996).

Studies have demonstrated that requiring people to recall narratives can produce confabulation (Lorente-Rovira, Pomarol-Clotet, McCarthy, Berrios, & McKenna, 2007; Lorente-Rovira et al., 2010; Nathaniel-James & Frith, 1996). Nathaniel-James and Frith (1996) examined confabulation in 12 patients with schizophrenia and 12 healthy controls. The participants listened to six short stories and had to recall as much as they could immediately after the reading in order to elicit confabulation. The results showed that schizophrenic patients generated more confabulations and recalled significantly less information from the stories than controls.

Ackil and Zaragoza (1998) examined the consequences of forced confabulation in healthy participants. Participants first viewed an eight-minute video excerpt and were then required to answer both true and false questions concerning the video. In order to answer the false questions, that is, questions about events that never occurred, they were encouraged to answer all the questions (to confabulate). Participants were tested one week later to examine whether they had created a false memory of the events they had earlier confabulated about. The results demonstrated that forced confabulation can affect the creation of false memories as participants were prone to develop false memory for their confabulation (Ackil & Zaragoza, 1998).

Kalathil (2014) examined confabulation and false memory in schizophrenic patients over eight weeks using the paradigm of Chrobak and Zaragoza (2008). Confabulation was elicited by asking 67 schizophrenic patients and 23 healthy controls to make up answers to suggestive questions from a 20-minute video clip and recall as much as they could about the video eight weeks later. The results demonstrated that the schizophrenic patients confabulated at a significantly higher rate than the control group when asked to describe scenes from the

excerpt. However, they did not hold on to their confabulation after eight weeks compared to healthy controls, suggesting that schizophrenic patients are prone to confabulate but not necessarily to create false memories based on their confabulation.

Studies have demonstrated that confabulation can lead to false memory among healthy individuals and that psychosis patients are susceptible to false memory (Ackil & Zaragoza, 1998; Bhatt et al., 2010; Moritz et al., 2004; Zaragoza et al., 2001). It is therefore important to further investigate these phenomena and examine it over a shorter term such as one-week period. Furthermore it is important to examine confabulation and false memory after controlling for cognitive function where studies have linked confabulation with decreased cognitive function (Lorente-Rovira et al., 2007, 2010; Nathaniel-James & Frith, 1996). However, these studies have not provided clear association between confabulation and cognitive function. Nathaniel-James & Frith (1996) examined confabulation by asking participants to recall narratives and administered memory-, executive and IQ tests to examine the relationship between cognitive functions and confabulation. They investigated executive functioning, intellectual impairment and recognition- and recall memory. There was only a significant difference between high and low confabulators on one test measuring executive function. Lorente-Rovira et al. (2007) examined confabulation and cognitive function using seven neuropsychological tests. WAIS-R IQ, executive- and memory tests measuring episodic and semantic memory were carried out to investigate the role of cognitive function in confabulation in schizophrenic- and healthy participants. Compared to the healthy participants, patients generated significantly more confabulation. According to the results, they found a significant difference between confabulators and non-confabulators on two neuropsychological tests examining semantic memory and one test examining executive function. Results from study conducted by Lorente-Rovira et al. (2010) were in agreement with previous studies showing that schizophrenic patients confabulated at higher rate than

control participants (Lorente-Rovira et al., 2007; Nathaniel-James and Frith, 1996). Pearson correlation indicated that confabulation was significantly related to semantic memory impairment but not clearly related to executive function, as there was only one of eight tests significantly related with confabulation. Confabulation was unrelated to episodic memory impairment. According to the results from the aforementioned studies, there seems to be a possible link between confabulation and cognitive function. However, these studies used multiple neuropsychological tests to examine this relation but only few of them where significant indicating an unclear relationship.

The aim of the present study is to examine confabulation and false memories using a paradigm designed by Ackil and Zaragoza, (1998). Only one study, to the knowledge of the authors, has examined confabulation and false memory in patients with schizophrenic disorder (Kalathil, 2014) but few studies have examined these phenomena in young first-episode psychosis patients. In view of the previously mentioned studies, which have shown an unclear relation between confabulation and cognitive function, the objective of the present study is to further investigate confabulation and false memories in young first-episode psychosis patients and normal controls after controlling for cognitive function.

Recent studies suggest that different types of emotions (positive or negative), have various effects on memory (Porter, Bellhouse, McDougall, ten Brinke, & Wilson, 2010) with negatively valenced events being related to increased false memory formation than positive and neutral events (Porter, Spencer, & Birt, 2003). Therefore, confabulation and false memory was examined using a negatively valenced video-clip.

We hypothesize that 1) the patients will generate more confabulation than healthy controls 2) patients will recall fewer of their confabulated answers as a false memory one week later compared to healthy controls 3) confabulation and false memory are not dependent

on cognitive function 4) patients will answer correct questions at higher rate in the first interview compared to the second interview one week later due to their cognitive impairment.

Method

Participants

The participants in this study were 28 patients at Landspítali-The National University Hospital of Iceland in the early stages of psychotic disorder and 32 controls at Reykjavík University. Patients were 26 males (92.9%) and 2 females (7.1%), with the mean age of 22.9 (*SD* = 2.9), ranging between 18 and 30 years. Patients were recruited from mental health ward at Landspítali. All patients were on medication during the research period. Participants in the clinical group were a subset of a larger study investigating cognitive function in patients in the early stages of psychotic disorder. They were introduced to the study at the mental health ward and given the opportunity to participate. Experienced psychologist examined the participants in the clinical group.

Participants in the control group were recruited at Reykjavík University and introduced to the study through an e-mail advertisement. The participants were 16 males (50%) and 16 females (50%). Their mean age was 24 (*SD* = 2.6) and ranged between 18 and 30 years. Participants were excluded if they had diagnosis of depression or anxiety or history of head injury. Small amount of payment were given for participation (1500ISK).

Stimuli and materials

The video clip. All participants in this study watched a negatively valenced scene where criminal murder an innocent woman (Sons of Anarchy, season one/episode twelve). The video begins at minute 31:01 and end at minute 42:02.

The confabulation paradigm. Two interview sessions were implemented and the participants had to answer 12 questions in each session. Two questionnaires with different sets of false-event questions were administered alternately to participants. Participants answered the first questionnaire after watching the video clip and it included eight true

questions and four false questions, which were used to elicit confabulation. The following is an example of a true question: “What did the brunette woman do immediately after slapping the blond haired man at the party?”. Example of a false question is: ”After the brunette woman slapped the blond haired man, where was he bleeding from?” This question refers to an event that is likely to have occurred given the storyline of the video excerpt. However, the person was not bleeding at all. Before participants answered the questionnaire, they were encouraged to guess if they did not know the answers in order to elicit confabulation (Ackil & Zaragoza, 1998).

The second questionnaire was administered one week later. This questionnaire included true or false questions instead of open-ended questions and was used to examine if participants had created false memories. The false questions were dependent on participants’ confabulated answers from the first questionnaire, administered a week earlier. For example, if the participants would give the answer “from the cheek” to the question “After the brunette woman slapped the blond haired man, where was he bleeding from?” during the first interview, then he or she would receive the following question one week later, “The blond haired man was bleeding from the cheek after the brunette woman slapped him– true or false?”. If participants did not give answers to the false event question in the first interview, they were asked the same question as those who confabulated except it contained a word that was believed to be a likely answer given the story line. For example; “The blond-haired man was bleeding from his lips – true or false?”.

Experienced emotion scale. This scale was designed for the present study and measures participant’s feelings at a given moment in time and consists of five words, describing different emotions (relaxed, anxious, insecure, happy, worried). The words *Happy* and *Relaxed* imply positive emotion, while *Anxious, Insecure* and *Worried* imply negative emotions.

Neuropsychological measures

The following neuropsychological tests measuring different cognitive functions were administered in this study: **The Digit Symbol-Coding Test** from the Wechsler Adult Intelligence Scale (WAIS-IV) measure processing speed, motor persistence, sustained attention and visuomotor coordination (Lezak, 2004; Wechsler, 2008). **The Digit Span** measure immediate verbal recall and working memory and is a subscale of WAIS-IV (Lezak, 2004; Wechsler, 2008). **The Hinting Task** measures mental state reasoning and examines the capacity to make social judgments (Corcoran, Mercer, & Frith, 1995). **The Logical Memory Test** measure verbal memory and is a subscale of Wechsler Memory Scale (WMS-IV) (Lezak, 2004; Wechsler, 2009). **The Stroop Color-Word Task** measure executive function (e.g. selective attention and processing speed) (Lezak, 2004; Stroop, 1935). **The Matrix Reasoning** is a subscale of WAIS-IV and measures nonverbal abstract reasoning and nonverbal fluency (Lezak, 2004; Wechsler, 2008). **The Facial Emotion Identification Test** measure facial emotion perception (happiness, sadness, anger, surprise, fear, shame) (Erol, Putgul, Kosger, & Ersoy, 2013; Kerr & Neale, 1993).**The Trail Making Test** measures the speed of cognitive processing and executive function. It also measures visual scanning, visuomotor tracking, processing speed and cognitive flexibility (Lezak, 2004).

Symptom ratings

Structured Clinical Interview for Positive and Negative Syndrome Scale (SCI-PANSS). Measure symptom severity in patients with psychotic disorder (positive symptoms, negative symptoms and general psychopathology) (Kay, Flszbein, & Opfer, 1987).

Design and Procedure

The Ethical Committee of Administrative Research at Landspítali-The National University Hospital of Iceland authorized this study. Participants in the control group were examined at Reykjavík University whereas patients in the clinical group were examined in a mental health ward at Landspítali. Participants in both groups were tested individually for approximately 80 minutes. Participants were informed that the study was about cognitive functions and memory.

Positive and negative symptoms in the clinical group were measured at psychiatric department in Landspítali using the PANSS.

Participants in both groups started by reading and signing informed consent and then carried out the cognitive tests in the following order: the Digit Symbol-Coding test, the Digit Span, the Hinting Task, the Logical Memory Test (immediate memory), the Stroop Color-Word Task, the D-KEFS Tower Test (data from this test was not used in the study), the Matrix Reasoning, the Facial Emotion Identification Test, the Logical Memory Test (delayed- and recognition memory) and the Trail Making Test. The D-KEFS Tower Test was not administered to participants in the control group and therefore the Logical Memory Test (delayed- and recognition memory) and the Trail Making Test were reversed in order to make the time between the immediate memory and delayed and recognition memory to be approximately thirty minutes as the test indicates. After completing the cognitive tests the confabulation paradigm was utilized (see description above).

To ensure confidentiality, all data were kept in locked filing cabinet located at the mental health ward and at Reykjavík University.

Results

Table 1 show the mean frequency of confabulation to false-event questions, false memory recall and correct recall for both clinical and control groups in interview 1 and interview 2.

Table 1

Descriptive statistics for confabulation, false recall and correct recall for clinical group and control group for interview 1 and 2

		Group	N	Mean (%)	SD (%)
False recall					
	Interview 1				
		Clinical	24	80.2	24.4
		Control	32	64.8	23.6
	Interview 2				
		Clinical	24	58.3	31.8
		Control	32	67.2	25.7
Correct recall					
	Interview 1				
		Clinical	27	83.3	14.3
		Control	32	92.6	9.4
	Interview 2				
		Clinical	27	90.7	8.9
		Control	32	96.5	7.9

A 2 time of interview (first vs. second interview) x 2 group (clinical vs. control group) mixed ANCOVA was used to analyze the data for false answers with the neuropsychological tests included as covariates. The results for false recall revealed a non-significant main effect of time of interview, F (1, 44) = 3.125, p = .084. The main effect of group on false recall was not significant F (1, 44) = .166, p = .685. The interaction between time of interview and group was however significant, F (1, 44) = 5.293, p = .026. As Figure 1 shows, patients in the clinical group confabulated at a higher rate in the first interview (80.2%) compared to

remembering their confabulated answers as a false memory one week later (58.3%). Conversely, the control group confabulated to the false-event questions at a similar rate as later recalled (64.8% vs. 67.2%).

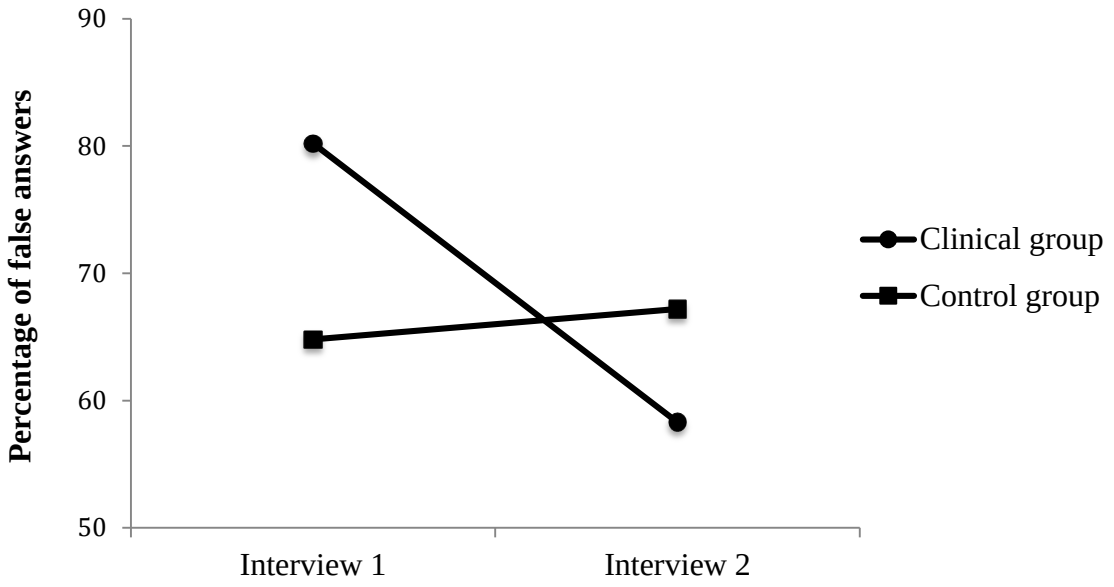

Figure 1. Percentage of false answers for the clinical group and the controls for interview 1 and 2.

ANCOVA revealed significant interaction between time of interview and Digit Span, F (1, 44) = 9.332, p = .004 and therefore the neuropsychological measure Digit Span was related to participants confabulation and false memory. No other covariates were showed significant relationship, $p > .05$.

A 2 time of interview (first vs. second interview) x 2 group (clinical vs. control group) mixed ANOVA was used to analyze the data for correct answers. The results showed a non-significant main effect of time of interview on the rates of correct recall, F (1, 47) = .558, p = .459. The interaction between time of interview and group on the correct answers was non-significant, F (1, 47) = .395, p = .533. The main effect of group on the rates of correct recall appeared to be marginally significant F (1, 47) = 3.862, p = .055. As Figure 2 indicates there

was a difference between the groups with patients in the clinical group answering fewer questions correctly in the first and the second interview compared to the control group**.**

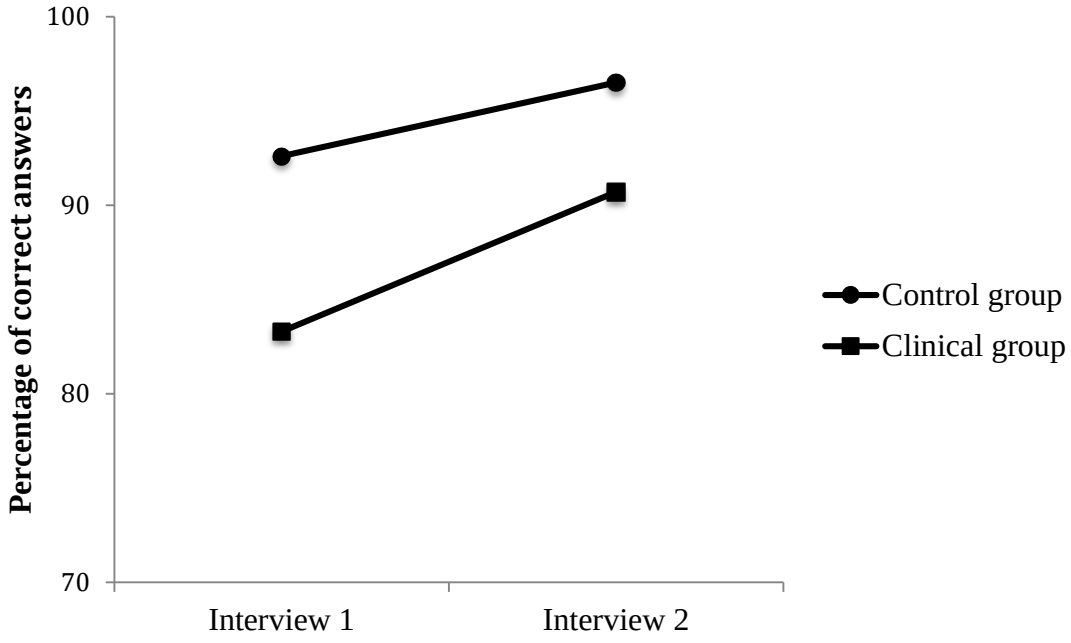

Figure 2. Percentage of correct answers for the clinical group and the controls for interview 1 and 2.

Regression analysis was used to estimate the amount of variance in confabulation and false memory explained by the total score of positive- and negative symptoms, and general psychopathology scales measured by PANSS. The results demonstrated that symptom severity did not significantly explain the variance in confabulation and false memory, individually nor together, $p > .05$.

Experienced emotion scale

The psychological measures were analyzed using mixed ANOVA. Two psychological measures were significant and one approached significance. On average, the participants were more relaxed prior to watching the video clip ($M = 3.77$, $SE = 1.02$) than after watching it ($M = 3.54$, $SE = 1.25$), F (1, 55) = 3.896, $p = .053$, and more happy prior to watching the video clip ($M = 3.53$, $SE = 1.10$) than after watching it ($M = 3.09$, $SE = 1.15$), F (1, 55) = 10.672, p

= .002. Additionally, participants were less worried prior to watching the video (M = 1.58, SE = .840) than after watching it (M = 1.86, SE = .915), F (1, 55) = 6.518, p = .013. Other psychological measures were not significant, $p > .05$. These results suggest that that the video excerpt affected participants' emotions.

Discussion

The present study examined confabulation and false memory in young first-episode psychosis patients and normal controls after controlling for cognitive functions. The findings from the present study demonstrated that the groups confabulated and created a false memory at different rates depending on interview sessions. The clinical group generated more confabulated answers in the first interview but recalled their confabulation as a false memory at lower rate one week later. Conversely, the control group confabulated at a similar rate as later recalled. These results are in line with earlier findings showing that patients with schizophrenia confabulate more than healthy participants (Lorente-Rovira et al., 2007, 2010). Results from the current study are also in accordance with previous study showing that schizophrenic patients confabulated at higher rate than healthy participants although they did not create false memories for events that they had earlier confabulated about (Kalathil, 2014). The result also confirm previous results demonstrating that forced confabulation can affect the creation of false memories in healthy controls as participants were prone to develop false memory for events they had earlier confabulated on (Ackil & Zaragoza, 1998; Zaragoza et al., 2001). The two hypotheses that patients would generate more confabulation than healthy controls and recall fewer of their confabulated answers as a false memory one week later were therefore supported.

It was also hypothesized that cognitive functions would not affect confabulation and false memory in both groups. The results of this study showed that one of eight

neuropsychological tests, Digit Span, measuring immediate verbal recall and working memory, significantly affected participant's confabulation and false memory. This is in accordance with previously mentioned studies which have demonstrated an unclear relationship between several neuropsychological tests and confabulation in schizophrenic patients (Lorente-Rovira et al., 2007, 2010). It is worth noting that the memory stimuli differed, were Lorente-Rovira et al. (2007, 2010) required participants to recall narratives in order to elicit confabulation but the present study required participants to answer both true and false questions after watching a video excerpt. Furthermore, Lorente-Rovira et al. (2007, 2010) used several different neuropsychological tests when examining cognitive functions compared to the present study.

The results from the present study showed that the clinical group and controls remembered correct answers at a similar rate in interview 1 and interview 2. This result is not consistent with previous studies which have demonstrated deficits in cognitive domains such as memory in patients with psychotic disorder (Lorente-Rovira et al., 2007, 2010; Nathaniel-James & Frith, 1996). Interestingly, it seems that the clinical group was quite clear about what happened in the video clip a week later because they answered the corrects answers at a high rate in both interview 1 and 2 and did not develop false memories for their confabulated answers. A possible explanation for this difference may be that the researchers contacted participants through telephone when measuring false memory. It is possible that participants in the clinical group were more confident to inform what they had seen in the video in the second interview when they were contacted through phone compared to the first interview when they talked to the researchers face to face. Overall, the clinical group answered the correct answers at a lower rate compared to the controls. Our hypothesis that patients would answer correct answers at higher rate in the first interview compared to the second interview one week later is therefore not supported.

Result from regression analysis revealed that symptom severity as measured by the PANSS did not significantly explain the variance in confabulation and false memory, neither individually nor together, which indicates that symptom severity in patients does not affect their tendency to confabulate and create a false memory.

The participants experienced greater emotions after seeing the video excerpt. They were more relaxed and happy and less worried before watching the video. This demonstrates that watching the negative emotional video affected the participant's psychological condition.

The results from the present study have scientific importance giving researchers more insight and understanding into confabulation and false memory formation and possible explanations for these phenomena. It can be concluded from this study that cognitive functions do not clearly affect confabulation and false memory, but more research is needed to examine other possible factors, such as individual differences and other cognitive factors. Investigating these phenomena adequately, researchers, psychologists and other health workers can determine its occurrence in different situations, as in psychological treatment when examining psychological condition, and in criminal investigations when interrogated and asked to remember or describe an event.

Several limitations of the study that could influence interpretation of the results are worth mentioning. It is difficult to generalize from this study due to relatively small sample size. Including more participants in both groups might have strengthened the statistical power of the results. Another limitation is that confabulation and false memories might be affected by pressure to make up socially acceptable answers. Ackil & Zaragoza, (1998) argued that participants might confabulate and generate their answers as false memories because it was socially desirable to behave in a certain way across experimental conditions. Therefore, it

could be useful for future studies to include measure of suggestibility and compliance in relation to confabulation and false memories.

The present study measured confabulation and false memories over a week period. It would be interesting for future studies to examine free recall several months later after participants have watched a video excerpt. By asking participants to describe a event from a video clip as accurately as possible, researchers can further assess confabulation and the false memory formation, that is, whether participants hold on to their confabulated answers over a longer period.

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