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Exploring the clinical management of confabulation within neuropsychology services.

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Elinor Brooks.

Chapter 1: A systematic review of interventions for confabulation in adults with acquired brain injury or dementia.

Elinor Brooks[1]

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Abstract

Objective

This systematic review aimed to identify and synthesise studies describing psychosocial interventions used in the management of confabulation following brain injury and dementia. More specifically, intervention type and efficacy were explored.

Method

Five databases were searched for studies using a range of psychosocial interventions with adult participants experiencing confabulation in the context of ABI and dementia. The Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (Kmet et al., 2004) was used to assess methodological quality.

Results

Of the thirteen included studies, most had case study designs though three group studies were also identified. In total, 132 participants were included, the majority male in the working-age category. Interventions incorporated a range of cognitive, emotion-focussed, and behavioural components and targeted processes including raising insight, ‘reality testing’ and self-monitoring. Most studies had poor-moderate methodological quality and there was inconsistency in the level of detail with which intervention and measurement procedures were reported.

Conclusions

Despite limitations of the evidence, general trends observed included similarities in treatment targets, despite variation in strategies used and involvement of family members in neurorehabilitation. Future research could build upon current literature by conducting robust investigations using single case experimental designs. In addition, due to reporting inconsistencies there is a need for future work to follow established reporting standards.

Introduction

Confabulation can be described as the unintentional production of false or erroneous memories (Bajo et al., 2017). They are often autobiographical, and recollection may be entirely or partially erroneous (Burgess, 1996; Kopelman, 2010). For example, memory content may be inaccurate or misplaced in time and place context. Individuals may act upon confabulations, resulting in the production of statements and actions incongruent with current reality (Dalla Barba et al., 2020; Schnider, 2001). This neuropsychological phenomenon can occur in people with psychosis and acquired brain injury (ABI) and is often associated with difficulties in executive functions, insight and mood (Bajo et al., 2017). The few longitudinal studies that exist have shown confabulation can improve or even resolve over time (Bajo et al., 2017). However, it has been argued that its presence can interfere with neurorehabilitation and adjustment to disability; therefore confabulation is an important treatment target (Fotopoulou, 2008).

Confabulation has been classified as ‘provoked’ or ‘spontaneous’ (Kopelman, 2010). Provoked confabulations may occur in response to questioning, whereas spontaneous confabulations occur freely. Another approach to classifying confabulations identifies four subtypes: provoked, momentary, behaviourally-spontaneous and fantastic (Nahum et al., 2012). Although there are currently no agreed diagnostic criteria, these categories are based on empirical evidence and may serve as an appropriate classification method (Bajo et al., 2017). Other reported confabulation types include momentary and delusional (Dayus & Van Den Broek, 2000; Trivino et al., 2017). Theories propose various underlying mechanisms including errors in executive aspects of memory processing, distinguishing source and context of memories and discrimination between imagined versus experienced events (Gilboa & Verfaellie, 2010; Nahum et al, 2012; Schnider, 2008).

A small number of studies have examined the use of interventions to manage confabulation. Strategies include behaviour management, psychoeducation, collaborative formulation, provision of systematic feedback, and use of diaries and checklists (Fish & Forrester, 2018; Fotopoulou, 2008; Schnider, 2008; Trivino et al., 2017). These aimed to address a variety of cognitive, emotional, behavioural and systemic treatment target mechanisms and intended outcomes. One published systematic review provided a summary of existing pharmacological, surgical and non-pharmacological interventions for confabulation and their effectiveness, which also appears to include psychosocial interventions (Francis et al., 2021[2]). However, the definition of ‘psychosocial’ is unclear and there is limited information pertaining to the inclusion criteria and keyword definitions for types of psychosocial interventions included, however the search strategy included the terms “intervention”, “treatment” and “therapy”. This provides a rationale for the current systematic review to systematically explore psychosocial interventions with a more rigorous methodology and with the sole focus on psychosocial interventions. The present study included review questions related to assessment and measurement of confabulation as well as treatment. Additionally, specific methodological refinements included the use of more sensitive search terms, searching the ‘grey’ literature (i.e., beyond peer-reviewed scientific journals), use of a transparent, pre-registered methodology, and incorporation of co-rating at both screening and quality appraisal stages.

Aims of the Present Review

This review aimed to identify and synthesise studies reporting the use of psychosocial interventions in the management of confabulation in the context of ABI or dementia. Specifically, this pertained to the direct management of confabulation as opposed to the management of wider difficulties in someone presenting with confabulation. Psychosocial interventions included psychological, educational, environmental and social approaches. See Appendix 1.1 (pp.82) for more details.

Review Questions

Primary question: interventions

What psychosocial interventions have been reported in the treatment and/or management of confabulation in people with ABI or dementia?

Secondary questions: study characteristics

- In what settings did these interventions take place?
- Who delivered the intervention?
- How were confabulations assessed and characterised?
- Were co-morbid disorders described?
- What treatment targets were reported?
- How were outcomes measured?

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[2] Note the Francis et al., (2021) review was published after the original proposal for the current review was developed, but in time for our proposal to be refined in response to it.

- What were the effects of the interventions?
- Were individuals followed up post-intervention?
- Did intervention type relate to the type of confabulation identified?

Method

Eligibility criteria

Due to the low number of studies identified in scoping searches, the frequent use of case studies and low n participant groups, a systematic review with a narrative synthesis was conducted. The SPICE (Setting, Perspective, Intervention, Comparison, Evaluation; Booth, 2006) framework was used to operationalise the scope of the review. Table 1 describes the SPICE framework and eligibility criteria used.

Table 1: The SPICE framework operationalising the scope of the search.

SPICE	Search limits
Setting	Any setting accepted
Perspective	Adults (18+ years)
	Experiencing confabulation
	Following brain injury or in context of dementia
Intervention	Range of psychosocial interventions (any non-pharmacological, non-surgical and non-medical intervention was accepted; *Appendix 1.1, pp.82, for definitions*).
Comparison	Studies with and without comparison groups and/or conditions were considered.
Evaluation	Outcomes of interventions or studies which assess or comment on possible effects of intervention.

Search Strategy

Five databases were searched from inception to 08.05.2022: Cumulative Index to Nursing and Allied Health Literature (CINAHL; Ebscohost), Medline (Ovid), Embase (Ovid), Cochrane (Central) and psycINFO (Ebscohost) via the University of Glasgow library online services (https://www.gla.ac.uk/myglasgow/library/specificsearch/databasesbysubject/). A Boolean search technique combined terms for ‘confabulation’, with those for ‘brain injury, or ‘dementia’. Other potentially limiting terms related to settings, interventions, or outcomes were intentionally omitted to maximise sensitivity (Appendix 1.2, pp.83, for full details). For the search of Embase and Medline, key terms were mapped to medical subject headings (MESH headings). Additional search limits restricted the search to English language and human participants. Literature published outside of peer-reviewed scientific frameworks was included (i.e. 'grey literature'), such as dissertations and book chapters. The search strategy was reviewed by a librarian and a PRISMA flow diagram details the full search strategies (Figure 1).

Screening

References were exported to the citation manager EndNote (http://endnote.com/), organised electronically and duplicates removed. Titles and abstracts of articles were screened against eligibility criteria, and any clearly ineligible papers excluded. The remaining papers underwent full text screening against inclusion and exclusion criteria (Appendix 1.3, pp.84), with reasons for exclusion documented (Figure 1). At each screening and data extraction stage, 25% of the papers (or a minimum of 10 papers, whichever was the greater) were independently screened by a second reviewer (RS) to ensure accurate application of criteria. Initial screening agreement was 89% (n=198/223) and full text-screening co-rating agreement was 85% (n=40/47). Screening stage discrepancies largely related to articles with limited data presented in the abstract, following discussion these were carried forward through to full text review. At the full-text screening stage discrepancies related to what constituted a psychological intervention and identification of confabulation, particularly when it was poorly defined. Disagreement was resolved through discussion and provision of information about confabulation, as the co-rater was less familiar with this phenomenon than the primary rater.

Data Extraction

A standardised data extraction form was developed using Microsoft Excel. This included instructions at each step to improve consistency, reliability and validity during the process. When determining confabulation type a standardised description of four main types was presented (Nahum et al., 2012). A pilot data extraction exercise was run on an initial sample of papers (n=3, approximately 25%), to confirm the reliability of the extraction template. The form was adjusted to include 'recruitment procedure' and 'description of confabulation' as confabulation type was not always explicitly reported.

Quality assessment

The Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (QualSyst; Kmet et al., 2004; Appendix 1.4, pp.85) was used to assess the methodological quality of the studies. This tool has good reliability and is well suited to bodies of literature using a variety of methodologies. It consists of 14 items of quality assessment, with each assigned one of four scores (Yes = 2, Partial = 1, No = 0, Not applicable=N/A), using the provided criteria[3]. Rated scores are summed, with proration for items rated N/A. The second rater rated 50% of papers to establish inter-rater reliability. A two-way mixed intraclass correlation coefficient (ICC = .907, 95% CI [0.689, 0.972]) indicated good reliability. Differences in opinion were resolved through discussion. It was agreed that the ratings of the primary researcher were accurate and reliable and therefore the primary researcher conducted the quality assessment of the remaining papers.

Registration

The review protocol was registered on PROSPERO (https://www.crd.york.ac.uk/prospero/) under '*A systematic review of interventions for confabulation in adults with acquired brain injury'* (registration number: CRD42022322630). An amendment was made to the protocol following registration, which included updating eligibility criteria to exclude medical interventions and published abstracts and posters.

Results

Study Selection

Figure 1 shows the flowchart displaying details of the search process and results. Thirteen articles were included in the review synthesis. No articles were found relating to interventions for confabulation in the context of dementia.

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[3] Note that 'not applicable' ratings are not permitted for items 1, 2 and 4.

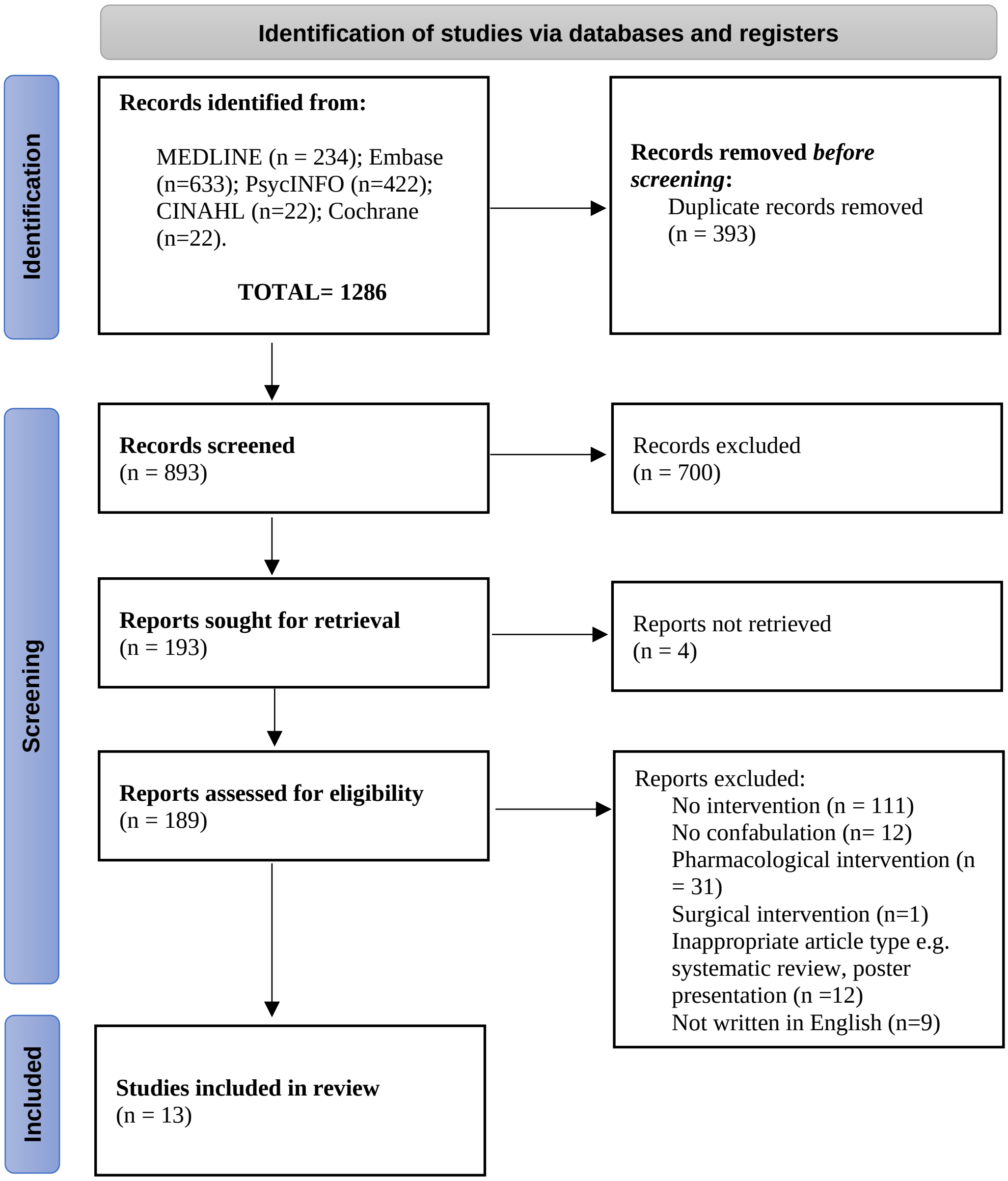

Figure 1: Flowchart of the study selection process and results for inclusion in the systematic review.

Participant characteristics

Participant characteristics across all studies are summarised in Table 2, see Appendix 1.5 (pp.86-89) for summary of study characteristics. Most participants were male (M:F = 89:43) spanning working adult age range, but predominantly within 40-60 years. All studies were conducted in western cultural contexts. The aetiology of participants' brain injuries varied, including traumatic brain injury (n=7; 6, 7, 8, 13), herpes simplex virus encephalitis (n=1; 3) and middle cerebral artery stroke (n=10; 13). The largest aetiological group was Wernicke's and/or Korsakoff's syndromes (n=52) reported in two cohort studies (10,11). However, most articles (1,2,4,5,11,12,13) reported on cases presenting with anterior communicating artery aneurysms (ACoAA; n=24). Time since injury ranged from 15 days-3.5 years. Most studies reported the type of confabulation presented or a brief description. Where discussed, types of confabulation reported included behaviourally spontaneous (n=26), fantastic (n=23), momentary (n=20), provoked (n=2) and delusional (n=1). One study (11) reported group data only, therefore it was not possible to ascertain how many participants presented with each type. Limited data was provided on previous mental health and physical health histories and previous treatment. It is unclear if this is because studies did not assess for wider difficulties or assessed without reporting.

Table 2: Participant characteristics.

Author (year)	**Age (years)**	**Sex (M/F)**	**N**	**Aetiology**	**Time since injury**	**Type of confabulation**	**Comorbid difficulties (Y/N)**	**Other treatment**
1. Burgess & McNeil (1999)	51	M	1	Clipped Anterior Communicating Artery Aneurysm (ACoAA).	7 weeks	Behaviourally-spontaneous (not explicitly stated). “Specific and stable”.	Not stated.	Not stated.
2. Dayus & van den Broek (2000)	42	M	1	Ruptured ACoAA (subarachnoid haemorrhage) with secondary bleed.	6 years	Delusional and provoked.	Wider cognitive impairment: executive functioning, memory.	Pharmacological Social supports.
3. Del Grosso Desteri et al. (2002)	53	F	1	Herpes Simplex Virus Encephalitis (HSVE; damage to bifrontal and temporal lobes).	4 months	Severe spontaneous and provoked.	Secondary narcolepsy. Cognitive impairment (dysexecutive syndrome, sustained attention, temporal disorientation, memory, apathy, vigilance).	Physical rehabilitation

Author (year)	**Age (years)**	**Sex (M/F)**	**N**	**Aetiology**	**Time since injury**	**Type of confabulation**	**Comorbid difficulties (Y/N)**	**Other treatment**
4. DeLuca (1992)	(1) 45 (2) 47	M M	2	ACoAA ACoAA	1 month 3 months	'severe' Spontaneous.	(1) amnesic disorder, apathy, (2) Amnesic syndrome, executive dysfunction, personality change.	(1) not stated. (2) not stated.
5. DeLuca & Locker (1996)	47	M	1	ACoAA, with signs of rupture. Shunt required for 1 week for encephalitis post craniotomy	3 months	Spontaneous with occasional fantastic element and/or behavioural responses.	Amnesic syndrome, personality change, cognitive impairments (memory, orientation, attention and, executive function). 'Emotional and behavioural problems' during treatment, for example anxiety and self-esteem as awareness recovered.	Inter-disciplinarity approach, details of other therapist not stated.
6. Fish & Forrester (2018)	24	M	1	TBI	3.5 years	Behaviourally spontaneous	Cognitive difficulties (information processing, memory, executive function, orientation to time). Distress relating to confabulation.	Not stated.

Author (year)	Age (years)	Sex (M/F)	N	Aetiology	Time since injury	Type of confabulation	Comorbid difficulties (Y/N)	Other treatment
7. Fotopoulou (2008)	19	M	1	TBI and insertion of extra-ventricular drain. Bifrontal damage.	6 months	Spontaneous, occasional behavioural response.	Amnesia, anosognosia, personality changes and executive function difficulties.	Not stated.
8. Mattioli et al. (1999)	51	M	1	TBI (bilateral frontal and right temporal lesions).	1 year	Fantastic and spontaneous.	Amnesic syndrome and delusional misidentification.	Pharmacological intervention (neuroleptic).
9. Mills et al. (2006)	Range: 39–75	M F	9* 10* (n=15)	Ruptured ACoAA	Range: 15–504* days	Not stated.	Not stated.	Not stated.
10. Monteiro et al. (2011) 11.	42	F	1	Wernicke-Korsakoff syndrome, admitted following loss of consciousness due to 'alcoholic coma'. Medial bilateral and posterior-medial changes of the thalamus.	10 months	Not stated	Alcohol dependency, 'learning difficulties'.	Pharmacological treatment (Thiamine, anxiolytics and antidepressants).

Author (year)	**Age (years)**	**Sex (M/F)**	**N**	**Aetiology**	**Time since injury**	**Type of confabulation**	**Comorbid difficulties (Y/N)**	**Other treatment**
12. Rensen et al. (2019)	*Treatment* M = 59.9 *Control:* M=62.2	*Treatment* M/F *Control* M/F	M/F: 39/13 (M/F): 22/9	*Treatment and control:* Korsakoff Syndrome (KS; Criterion: DSM-5 alcohol-induced major neurocognitive disorder, amnesic confabulatory type; Alcoholic KS including presence of amnestic syndrome and history of thiamine deficiency and alcoholism).	Only time (years) in nursing home reported: *Treatment* M=6.8, *Control* M = 7.9	Provoked and spontaneous.	Not stated, however controlled for dementia.	Not stated.
13. Tiberg (2014)	42	F	1	Subarachnoid haemorrhage secondary to AcoAA (right orbitofrontal and ventromedial prefrontal damage).	2.5 months	Not explicitly stated.	Amnesia.	Not stated.
14. Trivino et al. (2017)	*Treatment* range: 35-86, M=63 *Control* range: 48-81, M=68	*Treatment* M/F *Control* M/F	(M/F): 7/3 (M/F): 5/5	TBI (n=4), AcoAA (n=3), Middle Cerebral Artery (MCA) stroke (n=10), vascular mild cognitive impairment (n=1), hydrocephalus (n=1) and CO2 intoxication (n=1).	Treatment range (months): 3–60, M=10.7 Control range (months): 3 – 42, M=9.5	All had momentary and behaviourally-spontaneous confabulations, some (n=12) with additional fantastic confabulations.	Fregoli syndrome (all participants), pseudo-hallucinations (n=17) and reduplicative amnesia (n=15).	No other treatment.

Quality of evidence

Table 3 displays the methodological quality ratings. No study fulfilled all quality criteria. Four studies (1,4,9,12) fulfilled 25-50% of the criteria, seven studies (2,3,5,7,8,10,13) fulfilled 50-75% and two (6,11) fulfilled >75%. Of those with an experimental design only one (13) reported blinding and random (sequential) allocation of participants. However, this method of allocation was later stopped, with participants assigned to groups depending on geographical location. The chance of allocation bias is increased where allocation is either not reported or random allocation has not occurred. Regarding missing data, one study (9) did not specify participant data for the final treatment group, and one (13) only partially reported effect sizes for some analyses. Finally, only one study (11) provided an estimation of variance, however this is representative of the limited number of experimental studies. By contrast, the most common criteria fulfilled were provision of sufficiently described objectives (85%) and appropriate sample size for study design (85%).

Table 3: methodological quality scores using the QualSyst including the summary score (summary score: total sum/total possible sum).

Author (year)	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Summary Score
1. Burgess & McNeil (1999)	Y	Y	P	N	N/A	N/A	N/A	P	Y	N	N	N	P	P	0.46
2. Dayus & van den Broek (2000)	Y	Y	P	Y	N/A	N/A	N/A	Y	Y	Y	N	N	Y	P	0.73
3. Del Grosso Desteri et al (2002)	P	Y	P	P	N/A	N/A	N/A	P	Y	P	N	P	P	Y	0.55
4. DeLuca (1992)	Y	P	N	P	N/A	N/A	N/A	N	Y	N	N	N	N	P	0.32
5. DeLuca & Locker (1996)	Y	Y	P	Y	N/A	N/A	N/A	P	Y	Y	N	N	P	Y	0.64
6. Fish & Forrester (2018)	Y	Y	Y	Y	N/A	N/A	N/A	P	Y	Y	N	P	Y	Y	0.82
7. Fotopoulou (2008)	Y	Y	P	P	N/A	N/A	N/A	P	Y	P	N	N	P	P	0.55
8. Mattioli et al. (1999)	Y	Y	N	Y	N/A	N/A	N/A	Y	Y	Y	N	P	Y	P	0.73
9. Mills et al. (2006)	Y	P	P	N	N/A	N/A	N/A	P	P	P	P	P	N	P	0.46
10. Monteiro et al. (2011)	Y	Y	P	P	N/A	N/A	N/A	P	Y	Y	N	N	Y	P	0.64
11. Rensen et al (2019)	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	0.77
12. Tiberg (2014)	P	P	Y	P	N/A	N/A	N/A	N	Y	N	N	N	P	N	0.36
13. Trivino et al. (2017)	Y	Y	Y	Y	P	N	Y	Y	P	Y	N	P	Y	Y	0.71

†*Scoring: Yes (Y) = 2, Partial (P) = 1, No (N) = 0; Not Applicable (N/A).*

Primary review question

The primary aim was to explore what psychological interventions have been reported in the management of confabulation in people with brain injury or dementia. Based on the data extracted from studies, intervention characteristics were established and are summarised in Table 4.

Table 4: Intervention characteristics.

Author (date)	**Setting**	**Treatment strategies**	**Treatment targets**	**Treatment paradigm**	**Results: (Quantitative, qualitative)**
1. Burgess & McNeil (1999)	Inpatient	Diary (logical reasoning/reality testing), prompts (to use strategies), cues (from family).	Independently use cognitive strategies to support identification of confabulation and reduce conflict.	Rehabilitation: 5 weeks, no further information provided.	1) Could 'fact check' confabulation using evidence. 2) No longer acted on confabulations. 3) Conflict with wife stopped.
2. Dayus & van den Broek (2000)	Inpatient to outpatient	Self Monitoring Training (SMT) including: interview of familiar topics, handheld 'clicker' to indicate recognition of errors, direct feedback on errors.	*Primary target*: rehabilitation of dysexecutive syndrome to support disinhibition, improving self-monitoring and awareness (e.g. of confabulatory swearing). Reduce behaviour associated with confabulation.	SMT programme consists of 4 phases: 1)'S*elf-monitoring baseline' (*daily interviews for 5 days on 8 chosen topics), therapist and client record number of errors made; 2) 'S*elf-monitoring training, 25%':* interviews continued, praise given if clients score was +/- 25% of therapists; 3) '*Self-monitoring training, 10%':* Procedure repeated but for score within +/-25%; 4) '*12 week Follow up':* repeated initial baseline assessment. Phases 1-3 inpatient (18 sessions), phase 4 outpatient (28 sessions).	1) Frequency of swearing declined from M = 323.8 (baseline) to M= 70.2. (2) SMT resulted in improved accuracy of monitoring swearing (associated with confabulations) which were maintained. (3) delusional outburst (relating to confabulation) reduced from M=5.65 per day (baseline) to M=0.15.

Author (date)	**Setting**	**Treatment strategies**	**Treatment targets**	**Treatment paradigm**	**Results: (Quantitative, qualitative)**
3. Del Grosso Desteri et al (2002)	Inpatient to outpatient	‘Rigid’ routine, memory book/diary, prompts (to use strategies), learning and recall trials, orientation (using diary), calendar and timer, constructing routes on maps, associative learning, counselling, family training.	Independence. Improving cognitive functions (*sustained attention, temporal and spatial framing*, *visuo-spatial*, *planning*) to support the rehabilitation of confabulation.	Inpatient: 2 sessions per day for 1 month. Outpatient: 2 days per week for 1 month.	1) Reduced confabulations. 2) Significant improvement in activities of daily living (ADLs) and executive function, diminished topographic disorientation and improved temporal orientation. Increased insight. 3) Could use calendar and timer with minimal cues. 4) Narcolepsy persisted.
4. DeLuca (1992)	(1) inpatient to outpatient (2) Outpatient	Detailed description not provided however: (1) included confrontation, environmental cues and direct feedback, (2) therapy.	(1 & 2) Increasing intellectual, emergent, and anticipatory awareness into confabulatory errors.	(1) Inpatient: 3 weeks, outpatient: 1 month. (2) Outpatient: 5 months.	(1) Confabulations “disappeared”. Patient able to check for and use environmental cues. Related cognitive difficulties persisted. (2) Frequency of confabulation ‘diminished’, nature changed from ‘gross elaborations’ to ‘short’ and ‘plausible’. Insight increased.

Author (date)	Setting	Treatment strategies	Treatment targets	Treatment paradigm	Results: (Quantitative, qualitative)
5. DeLuca & Locker (1996)	Inpatient to outpatient	Prompts (to use strategies), memory book (daily events, date, names & photographs of therapists and maps), memory aids (repetition and rehearsal, use of music), various affect, cognition and vocation-based groups (e.g., executive function, memory, stress), counselling, cognitive therapy (discuss strategies), cues (environment), work simulation, executive planner.	a) Consistently use cognitive strategies, b) increase insight into confabulations, c) return to high level of employment (premorbid).	1:1 and group format., 5 days per week reducing as setting changed to outpatient, including weekly therapy and counselling. Therapy goals and strategies developed by the inter-disciplinary team.	1) Improvements in executive functioning, memory and insight. 2) Improvements in ability to utilise intervention strategies. 3) At 6 months confabulations ceased. 4) Successful return to work.
6. Fish & Forrester (2018)	Outpatient	Psychology sessions used for psychoeducation and to develop a collaborative formulation with patient and family, then “Sherlock Holmes” style procedure to distinguish between actual and confabulated events using checklist. MDT sessions supported cognition via frequent reminders of session goals, compensatory strategy use (e.g., calendar for logging events), asking permission to postpone discussions of confabulation until allocated psychology time.	a) Shared understanding, b) consistent use of strategies, c) reduce emotional impact and time spent confabulating, d) support reconceptualization of experiences.	18 weeks, 1:1 format, weekly psychology sessions, as part of comprehensive day-patient rehabilitation programme.	1) Theory-driven intervention successfully reduced confusion and emotional distress associated with confabulation. 2) Client’s awareness and understanding of confabulation was increased. 3) Patient and family reported that frequency of confabulation reduced.

Author (date)	**Setting**	**Treatment strategies**	**Treatment targets**	**Treatment paradigm**	**Results: (Quantitative, qualitative)**
7. Fotopoulou (2008)	Inpatient	Motivational conceptualisation of confabulations shared with staff and family, caution around confrontation and contradiction, using a non-threatening or curious approach. Individual sessions with neuropsychologist. Third person discussion. Provide correct information. Pace conversations. Explore emotional component of confabulations. Family education. direct feedback, shared formulation and prompting (to refrain from discussing violent confabulations).	a) Increase understanding of emotional and motivational aspects of confabulation. b) Develop shared understanding. c) Build rapport with individual and family. d) Better manage confabulations and associated behaviour. e) Address cognitive difficulties and functional/vocational goals.	1:1 and group sessions, MDT approach. Timeframe not specified.	1) Reduction in distress and agitation. 2) Functional goals achieved. 3) Learned to self-monitor and reduced narration of violent confabulations, reducing aggressive behaviour. 4) Developed understanding of subjective meaning of confabulations and relation to the individuals' premorbid, idealised and 'wishful' self.
8. Mattioli et al. (1999)	Not explicitly stated: evidence of work at home.	Direct feedback, providing evidence (e.g., photos, letters), logical reasoning and reality testing, recording and reviewing conversations.	Increase insight and awareness into disorder and confabulations (errors).	1 session per week for 2 years. *First part of session*: recorded interview in which events of individual's life were reviewed using evidence. *Second part of session*: replayed recording and individuals' statements 'critically analysed', testing reality and encourage recognition of errors.	1) Recovered awareness of memory deficit and confabulations. 2) Confabulations in verbal memory reduced and became plausible. 3) Confabulations on semantic word retrieval tasks ceased. 4) Reduction in personal semantic memory confabulations and spontaneous confabulations, however no change in personal episodic memory.

Author (date)	**Setting**	**Treatment strategies**	**Treatment targets**	**Treatment paradigm**	**Results: (Quantitative, qualitative)**
9. Mills et al. (2006)	Outpatient	Task repetition, compensatory strategies (time planner), cues for functional activities (e.g., cooking).	Functional goals aimed at increasing independence in ADLs and/or reducing need for 1:1 support. Task repetition to support procedural memory and use of compensatory strategies to explore rehabilitation effect on cognitive and behavioural deficits of ACoA (including confabulation).	1 session (2-5 hours) per day. 3-5 days per week. Treatment duration (days): M = 55 for Occupational Therapy (OT) and M = 57 for speech-language (SL) pathology. 'Some treatment' delivered in 'structured environment' other strategies provided in community setting.	**Confabulation outcome:** 1) A repeated-measure ANOVA identified a main effect of change in confabulation and scores on the Supervision Rating Scale (SRS; $F_{1,12}$ = 8.92, p=0.004). 2) A significant interaction between SRS score and cessation of confabulation was also identified ($F_{1,12}$ = 9.08, p=0.004), patients who stopped confabulating improved on SRS score. 3) Significant correlation identified between change in SRS score and confabulation (r=0.78, p=0.0003), with large effect. **Qualitative report** 1) Participants cognitive impairment was sustained over time despite functional improvements: 9/13 with memory, 10/15 with executive function and 8/13 'continued to confabulate'.

Author (date)	Setting	Treatment strategies	Treatment targets	Treatment paradigm	Results: (Quantitative, qualitative)
10. Monteiro et al. (2011)	Not explicitly stated: evidence of support from staff	Communication with family and MDT, psychoeducation/training for carers, routine, repetition of daily activities, compensatory strategies (inc. notes, schedule, weekly events, pictures, calendar), 'training' for ecological scenarios (e.g., paying bills.), reviewing interactions: photos and names of people.	a) Improving adjustment and function. b) Improve temporal orientation. c) Raise awareness of memory difficulties, including confabulation. d) Use compensatory strategies. e) Improvement in initiation and decision-making. f) Provide emotional support. g) Widen social network.	25-week intervention, 1 session per week (neuropsychologist). Family received 'orientation' on goals and progress every 2 months. Constant sharing of information between healthcare professionals. Caregivers recorded observation and 'reported' to therapist every month.	1) Daily routine and engagement in activities further increased motivation to engage in rehabilitation. 2) Repetition and routine allowed for spontaneity in activities and stabilisation of clinical difficulties. 3) Developed understanding of memory difficulties and awareness of the consequences. 4) Compensatory strategies improved temporal orientation and recall of autobiographical information. 5) Record of daily events improved monitoring of activity. 6) Abstinence from alcohol. 7) After 6 weeks confabulations disappeared. 8) Improved independence, reduction in perseveration and widening of social support network.

Author (date)	Setting	Treatment strategies	Treatment targets	Treatment paradigm	Results: (Quantitative, qualitative)
11. Rensen et al. (2019)	Inpatient (care facility)	Errorless learning training (Rensen et al, 2017) inc.: avoiding confrontation and questions, if direct feedback necessary opt for curious approach, providing correct information	Improve psychotic and behavioural symptoms of KS (inc. confabulation).	Training in two functional tasks using errorless learning approach. Training complete when no further gain made after 3 sessions. Caregivers rated performance on tasks (pre/post).	1) A significant reduction in provoked confabulations found for the treatment group only (Z=-3.97, p=<0.001, r=-0.51). 2) No change in spontaneous confabulations observed in either group. 3) Control group: symptoms stable for all variables. 4) No change in apathy for either group.
12. Tiberg (2014)	Inpatient	Tailored neuro-psychodynamic psychotherapy: including 'going-along' with confabulations and exploring personal meanings.	Understand content of confabulations and subjective meaning to assess transference.	14 sessions over 2 months, x2 per week.	1) The client's 'connection with reality' increased throughout sessions and worsened following cessation of therapy.
13. Trivino et al. (2017)	Inpatient	Learning and recall, direct feedback (on errors), logical reasoning (with evidence).	To assess confabulation-specific treatment paradigm by monitoring improvements in: a) selective attention during learning, b) monitoring processes during retrieval, c) confabulation frequency, d) memory control processes following retrieval.	Initial assessment session, without feedback, to gather baseline (repeated post intervention). 3 sessions per week, 3 weeks: learning, recall and feedback phases. Learning phase included 12 stimuli differing in type, modality and nature of source. This was followed by an immediate and delayed recall and then direct	1) Groups did not differ significantly across all measures prior to intervention. 2) Following treatment the experimental condition showed a significant reduction in the number of confabulations ($F(_{1,18})$ = 82.43; p<0.0001), a significant increase in correct responses ($F(_{1,8})$ = 45.87, p<0.001), a significant increase in correct source attribution ($F(_{1,18})$ = 10.88; p=0.004) and a significant decrease in

Author (date)	**Setting**	**Treatment strategies**	**Treatment targets**	**Treatment paradigm**	**Results: (Quantitative, qualitative)**
13. Trivino et al. (2017) continued				feedback on errors. Control group remained on waiting list for 3 weeks, then received treatment.	errors of source attribution ($F(_{1,18}) = 23.60$; p=0.0001). 3) experimental condition a large effect size was found for the reduction of confabulations (d=2.85) and the increase in correct responses (d=1.25). 4) No significant changes were found in non-responses, showing treatment did not improve non-responding strategies.

Thirty-two intervention strategies were identified across all studies (Table 4) adopting a range of approaches). All studies utilised techniques working directly with the individual, including direct feedback (1,2,3,4,6,7,8,11,13), confrontation (4), logical reasoning using evidence (1,3,4,5,6,8,13) and cues (1,4,5,9). However, two studies (7,11) actively discouraged confrontation and challenging, unless absolutely necessary and five studies included indirect approaches such as providing training (3,7,10) or psychoeducation (6,7) to families and carers. Eight studies (1,3,5,6,7,9,10,11) also involved others, such as staff or family, to prompt and support continued use of techniques, particularly during initial phases of treatment.

Seven studies (1,3,5,6,7,9,10) incorporated cognitive strategies such as memory books, calendars, timers and planners, which were also used to support reality testing and logical reasoning. Two studies approached management using functional strategies such as ‘training’ in ecological activities (9,10). Meanwhile, seven studies focused on the emotional impact of confabulation, with strategies such as therapy or counselling (3,4,5,12) and 1:1 sessions with a trained professional to discuss confabulations in a safe space (5,6,7). Only one study (10) explicitly described using strategies to support social and interpersonal functioning, by reviewing recent interactions, thus widening support networks. Some studies commented on the importance of gaining a shared understanding, using techniques such as collaborative formulation (6) and continued communication or sharing of information (7,10).

Information on intervention length, frequency, or intensity was limited. Of those providing this information, three studies (2,3,9) reported daily sessions and five (6,8,10,12,13) reported weekly sessions with a neuropsychologist or other therapist. On average, programmes lasted M = 20.7 weeks (range=3-104 weeks). Most studies reported reinforcement and continued use of strategies beyond clinical sessions, whether in inpatient or outpatient settings.

Seven (4,5,7,8,9,10,12) studies provided limited information regarding treatment strategies, restricting reliable replication of studies and/or treatment programmes and interventions. Exhaustive lists of techniques used were not reported, techniques if listed were not reported in detail and/or their use not operationalised. For example, in study 5 the use of groups supporting executive function and memory have been reported without any further description, likewise for specific strategies used in study 4. As a result, the methodological quality and reliability of conclusions is reduced in most studies. This also limits the ability to ascertain efficacy of interventions in the management of confabulation following ABI. Furthermore, variance in the duration and frequency of treatment and intervention type, makes it difficult to draw comparisons across the data. Finally, 10 (1,2,3,4,5,6,7,8,10,12) out of 13 studies used a case study design and three (3,8,9) did not provide a robust rationale for the use of selected strategies (Appendix 1.5, pp.86-89). This means any theoretical implications based on these findings should be considered speculative until further empirical support is obtained. Generalisability of results is also reduced.

Secondary review questions

Setting and provision of interventions

Study characteristics, including settings, are reported in Appendix 1.5 (pp.86-89). Eleven studies reported clinical settings for treatment; five studies (1,7,11,12,13) conducted in inpatient settings, two (6,9) in outpatient and four (2,3,4,5) transitioning from inpatient to outpatient. Some studies supporting transition to outpatient settings showed good ecological validity as strategies were adjusted for use in the community and adapted as the individual progressed through rehabilitation. Regarding intervention provision, table 5 reports characteristics of the others involved. As discussed, carers and families are reported to play a role in providing and supporting the use of interventions. It is therefore possible that the rehabilitation environment, such as setting and availability of wider support, may influence the type of intervention used and its efficacy. However, the data does not allow for further investigation of this hypothesis at present.

Table 5: others involved in interventions.

	Family	**Carer**	**Staff (inpatient)**	**Therapist or neuropsychologist**	**Wider MDT (OT, SL)**
Studies	n=9 (1,2,3,4,5,6,7,8,13)	n=2 (10,11)	n=3 (1,3,7)	n=13 (1,2,3,4,5,6,7,8,9,10,11,12,13)	n=5 (4,5,7,9,13)

Assessment and identification of confabulation

Table 6 shows that nine (1,2,3,5,6,7,8,10,13) out of thirteen studies completed an initial neuropsychological assessment meanwhile three (4,11,12) did not provide any information relating to assessment. Other non-standardised assessment approaches were used including observations (2,3,6,7,8,10,11,13), informant report (1,2,3,7,8,9,10,11,13), interviews (2,8,10) and reviewing clinical records (13). Quantitative assessment measures were reported less frequently and included an ad-hoc memory questionnaire in two studies (6, 13), and a standardised confabulation-specific measure in three studies, two (8, 13) using the Confabulation Battery (Dalla Barba et al., 2018) and one (11) using the Nijmegen–Venray Confabulation List (NVCL-20; Rensen et al, 2015). QualSyst ratings for many studies were rather low, as the limited detail meant items 3 and 4 often received ratings of ‘partial’ at best.

Furthermore, none of the studies reported selecting or tailoring interventions based on the categorisation of confabulation. Only one study (11) found a reduction in provoked (but not spontaneous) confabulations, retrospectively considering it a possible effect of the errorless learning paradigm on one type of confabulation and not the other. Consequently, it is not possible to deduce whether interventions were tailored according to brain injury severity and/or type of confabulation, or to ascertain the neuropsychological processes affected by particular interventions.

Comorbid difficulties

Comorbid difficulties were reported in ten (2,3,4,5,6,7,8,10,12,13) studies, mostly pertaining to cognitive sequelae from ABI including executive dysfunction, amnesia or more discrete cognitive impairments (table 2). However, no study reported assessment of wider psychological and mental health difficulties. Additionally, only one (11) reported assessing for dementia as a differential diagnosis, with none considering a differential diagnosis of psychosis. As a result, ratings for QualSyst items 4 and 12, describing subject characteristics and controlling for confounding variables, were reduced for several studies (see table 3).

Treatment targets

A variety of treatment targets were identified (table 4), including managing behavioural aspects of confabulation (1,2,7,11), activities of daily living and functional goals (3,5,7,9,10) and emotional (1,3,4,5,6,7,10,12) and cognitive (3,4,5,7,8,9,10,13) sequalae associated with confabulation. Seven studies (2,4,5,6,8,10,13) also provided interventions aiming to increase awareness of deficits including confabulation. Such interventions included self-monitoring training, direct feedback and logical reasoning and supported reality testing such as the ‘Sherlock Holmes’ style procedure. At least eight studies (1,2,4,5,6,7,9,10) did not report an overall aim of reducing confabulations. Out of these, three studies (6,7,9) aimed to reduce overall impact of confabulation including emotional and behavioural difficulties. Meanwhile the others aimed to support and/or improve functional and/or cognitive capacities of individuals experiencing confabulation.

Outcome measurement

Table 6 shows outcome measures reported in the studies and whether investigations included a follow-up. Four studies used standardised tools such as neuropsychological assessment (3,5,8,13), Confabulation Battery (8, 13; Dalla Barba et al., 2018), the Supervisor Rating Scale (9; Boake, 1996), the Everyday Memory Questionnaire (9; Royle & Lincoln, 2008), the Dutch Behavioural Rating Scale for Psychogeriatric Inpatients (11; de Jonghe, Ooms & Ribbe, 1997), The Health of Nations Outcome Scale for ABI (11; Fleminger, 1999), and the NVCL-20 (11; Rensen et al, 2015). Two studies developed specific assessment tools (6, 8). All studies used a more bespoke approach to measuring outcome which included observations (1, 2, 5, 6, 7, 10, 12, 13), client self-report and interviews (1, 4, 5, 6), informant reports and interview (1, 2, 6, 9, 10), goal attainment (1, 2, 5, 6, 7, 9, 10), monitoring frequency of associated behaviours (2), monitoring activities in daily living (3, 10), monitoring the frequency of confabulations (1, 2, 4, 8, 11, 13). Again, QualSyst ratings were relatively low, as the definition and monitoring of outcomes as scored in item 8, was often weak, with only three studies using confabulation-specific measures to monitor outcomes.

Effect of interventions

As the majority of studies used a descriptive case study design, there is little quantitative data (Appendix 1.5, pp.86-89). However, three studies used retrospective (9), quasi-experimental (11) and clinical trial (13) designs and reported quantitative analyses. In all three, significant reductions were found following intervention, with moderate-large effects. However, methodological limitations and reduced quality appraisal on specific items limits interpretation and application of results. For example, study 9 classified participants into confabulation ‘present’ or ‘absent’ categories based on clinician review of prior assessments, and this approach has not been validated. This approach to assessment and monitoring of confabulations is also poorly reported and means more subtle changes in confabulation frequency, intensity and so on cannot be detected. In the two other studies (11,13) that used standardised measures, overall quality score was comparable however ratings in specific quality domains were variable. For example, study 13 included a small sample size, did not fully adhere to random-group allocation and effect sizes were not reported for all analyses. Meanwhile, study 11 fulfilled most of the quality criteria apart from items 5-7 pertaining to the blinding of conditions and randomised participant allocation (table 3). Only two studies

(6,11) achieved a high-quality rating however treatment strategies and paradigms differed significantly.

Most of the remaining ten studies reported narrative and qualitative data. Overall, improvements were shown in confabulation frequency in addition to wider factors such as cognitive function and activities of daily living. Seven (3,4,5,6,7,8,10) of these reported a reduction or complete cessation of confabulations following treatment and a variety of intervention strategies were used (for approaches see primary research question and method of outcome measurement discussed above). However, as confabulations were not always specifically targeted during intervention, and limited information was provided relating to approach and strategies used, it is difficult to draw clear associations between the type of intervention and changes in confabulation frequency.

Follow-up

Five studies reported completing follow up assessments (table 6). This was a combination of repeating neuropsychological assessment (3,5,8), outcome measures and/or confabulation specific measures (8,) and qualitative review (5,6,7). Time of follow-up assessment varied from 3 months to 2 years after completion of treatment. Study 13 also conducted a follow up assessment but only for five participants (50% of experimental condition, 0% of control) and data reporting is not clear.

Table 6: assessment and outcome measures.

Author	Assessment	Outcome measure(s) and/or variable(s)	Pre and post measure	Follow up
1. Burgess & McNeil (1999)	Cognitive testing, informant report, self-report.	Self-report, informant report: confabulation frequency, interpersonal 'friction', goal attainment.	Pre and post	No
2. Dayus & van den Broek (2000)	Cognitive testing, observations, self-report, interviews (informant).	**a)** Swearing frequency. **b)** 'Difference score': no. of swear words recorded by client vs therapist. **c)** Frequency of delusional (confabulatory) outbursts. **d)** Informant recorded no. of confabulatory outbursts **e)** Goal attainment (recognition of behaviour).	Baseline and 12 weeks post training (i.e., phase 4).	No
3. Del Grosso Desteri et al. (2002)	Cognitive testing, observations, autobiographical memory assessment (confabulations).	Cognitive testing, informant report: ADLs, orientation, confabulation frequency, cognitive function.	Pre and post.	3 & 8 months
4. DeLuca (1992)	(1) Unknown. (2) Unknown.	(1 & 2) Judgement on confabulation frequency (unclear how information was gathered).	Unclear.	No
5. DeLuca & Locker (1996)	Cognitive testing.	Cognitive testing, observations, self-report: autonomy using strategies, awareness level, re-engagement in employment (goal attainment).	Pre and post.	3 months
6. Fish & Forrester (2018)	Cognitive testing (6 months prior), ad-hoc memory recognition tests (including confidence rating).	Observations, informant report, self-report, goal attainment: strategy use, confabulation awareness, confusion, distress.	Pre and post.	6 & 12 months
7. Fotopoulou (2008)	Cognitive testing, self-report, informant report, observation.	Goal attainment, self-report: independence in ADLs.	Pre and post.	9 months

Author	Assessment	Outcome measure(s) and/or variable(s)	Pre and post measure	Follow up
8. Mattioli et al. (1999)	Cognitive testing, observation, informant report, self-report, interview, Confabulation Battery (Dalla Barba et al., 2018), story recall, memory questionnaire, cued-word retrieval task.	Assessment measures repeated: confabulation frequency and type, orientation, cognitive function, behaviour.	Pre and post (inc. during treatment).	At 1 & 2 years
9. Mills et al. (2006)	"Initial assessment" (by Speech and Language pathologist, Occupational Therapist, Neuropsychologist), informant report, "supervisor" rated presence/absence of confabulation and cognitive impairment.	Goal attainment, Supervision Rating Scale, "supervisor" rating: presence of confabulation or cognitive impairment, required supervision level (ADLs).	Pre and post.	No
10. Monteiro et al. (2011)	Cognitive testing, Everyday Memory Questionnaire (EMQ), observations, interview (client and informant).	Informant observation, goal attainment, EMQ: behaviour during ADLs in relation to goals.	Pre and post.	No
11. Rensen et al. (2019)	Not stated.	Informant report using: Dutch Behavioural Rating Scale for Psychogeriatric Inpatients, Health of Nations outcome scale-ABI, Nijmegen-Venray Confabulation List: confabulation type and frequency and changes in "psychotic symptoms", affect, apathy, agitation.	Pre and post.	No
12. Tiberg (2014)	Not stated	Observations (therapist): confabulation content.	Not reported.	No
13. Trivino et al. (2017)	Cognitive testing, informant "monitoring" of confabulations (3 months prior to treatment), clinical records, questionnaire (confabulations and memory), Confabulation Battery.	Cognitive testing and baseline session capturing: a) frequency of confabulations, b) no. of correct responses, c) no. of nonresponses, d) correct source attribution.	Pre and post.	3, 9 & 18 months (n=5 only)

Discussion

The aims of this systematic review were to identify and describe current psychosocial interventions for confabulation secondary to ABI and dementia, and to discuss intervention characteristics and efficacy. Thirteen articles contributed to the findings, all of which focussed on ABI. This contrasts with the previous systematic review by Francis et al. (2021) who found eleven articles, of which nine were relating to psychosocial interventions. The current review included all nine of those papers (1,2,3,4,5,6,7,12,13), along with a further four (8,9,10,11). Key findings are discussed in context with current literature and methodological issues.

Most reported strategies concern cognitive, emotional or behavioural constructs. Despite the use of varied intervention strategies, common treatment targets were identified, for example raising insight. Several strategies were used to achieve this including direct feedback, self-monitoring training and logical reasoning. This suggests that different tools can target similar constructs and achieve similar outcomes and also reflects the variability in approach to managing this condition. This may represent a more general approach to managing neuropsychological conditions which often incorporates a variety of approaches and strategies. For example, the well documented neuropsychological rehabilitation of memory includes internal and external strategies which can take a direct or indirect approach, allowing for individualised treatment (Velikonja et al., 2014). However, it is also possible that variability in the management of confabulation may be associated with the absence of established management guidelines.

Furthermore, all studies used a combination of strategies, often incorporating compensatory cognitive strategies which support memory functions such as external memory aids. The use of cognitive interventions in the management of confabulation may be supported by wider theoretical literature which conceptualise confabulation as the result of errors in memory processing (Gilboa & Verfaellie, 2010). A few studies provided empirically grounded treatment rationales and drew theoretical implications from their findings, however the ability to draw robust theoretical conclusions is limited due to study design and methodological issues.

This review has highlighted the importance of the systems around the patient when managing confabulation. Many treatment paradigms and intervention strategies were aimed at carers and families or involved them in the process. One study (11) reported that a lower success rate for participants may have been due to absence of social support. Although there is limited empirical data regarding the role of families and carers in the rehabilitation of confabulation specifically, their importance is well recognised more generally. Wider literature provides a robust rationale for intervention to both include and support family members, as functional outcome of individuals with ABI have been associated with the psychological well-being of their carers (Bivona et al., 2020).

Most articles reported the type of confabulation, but few used established, confabulation-specific tools (in assessment and/or outcome measurement) and none reported using potential classifications from current literature. Furthermore, no article explicitly demonstrated that the identified confabulation type influenced strategy selection or management. Lack of focus on the type of confabulation may be due to theoretical issues discussed, as there is no general consensus regarding classification, although some papers have provided a basis for classification (DeLuca, 2000; Nahum et al, 2012). This area would benefit from further research, focusing on neuropsychological and behavioural profiles of types of confabulation and how this may impact management. In the absence of an established classification system future management could adopt an approach, similar to that of Moscovitch (1989), placing importance on understanding the central features of confabulation (such as memories which are likely to contain inaccuracies and be incongruent with time and place context) rather than the identification of specific types. A classification system and/or guidance around identification of core features would increase the possibility that specific treatments can be developed, and management tailored.

Overall, study characteristics varied, with most investigations providing a narrative report of the management of confabulation at a single case-level. The few studies providing quantitative analyses did report reductions in confabulation post-treatment and improved possible mechanisms associated such as accuracy of source attribution. However, interpretation of these results must be cautious due to methodological issues. These include reduced quality, particularly when controlling for confounding variables, and limited description of methodology such as providing a) descriptions of strategies used, b) strategy selection and operationalisation, and c) direct association between strategy used and outcome. Furthermore, most studies did not assess, and thus did not control for, wider mental health difficulties despite known impacts on cognitive abilities and functioning. This, in addition to the reasonably low quality of empirical studies, means it is difficult to reliably ascertain the effect of specific interventions and their contribution to outcomes reported.

Generally, evaluation of the evidence from these articles is restricted by poorly defined treatment variables and outcome measures and variation in treatment paradigms and methods. Furthermore, generalisability of results is also limited due to study design and participant characteristics such as gender, age, aetiology and culture. Some similarities across studies can be found, for example in settings and treatment targets and promising findings were reported. Therefore, the current data provides a good basis upon which to build future research. As suggested by several authors, replication of these studies using single case study designs or larger sample sizes and better control conditions would be valuable. Similarly, the wider exploration of such treatment programmes in progressive conditions such as dementia and closer adherence to reporting standards guidance is recommended (Trivino et al. 2017).

Overall completeness and applicability of the evidence

This review did not restrict papers by country, study design or setting. The search strategy was restricted by age (adults) and presentation (excluding confabulation secondary to psychosis) to enable closer comparison of study findings. This review did not find high quality evidence; thus, low-quality evidence limits the conclusions that can be drawn and the ability to comprehensively answer this review’s questions.

Potential biases in this review

The AMSTAR tool (Shea et al., 2007) was used to review this systematic review. There was also limited discussion around the heterogeneity of results from empirical studies, however this is limited due to nature and design of most studies included. In addition, the QualSyst tool used has limitations. It has not been validated against other established, ‘gold standard’ scales therefore internal validity may be reduced. However, this tool provided the flexibility to assess the quality of a variety of study designs which was important for a systematic review in this area of literature. Additionally, studies were not penalised for lacking methodological features not applicable to their chosen design. Finally, there was a risk of researcher bias in this synthesis due to its subjective nature. However, the use of a second reviewer helped reduce this bias in screening quality appraisal stages, as did supervision throughout the process.

Conclusions

This review has identified trends across studies in the management of confabulation following ABI. These include the use of compensatory cognitive strategies, consideration of the emotional impact of confabulation and the inclusion of families and wider health professionals. However, conclusions are limited due to the low methodological quality of studies and the heterogeneity of strategies used. In addition, poor reporting of intervention strategies, treatment paradigms and outcome measures also limited this narrative synthesis of results. Further research using single case study designs or randomised control trials is required to examine and validate current intervention approaches. This will enable robust conclusions to be drawn pertaining to the efficacy and operationalisation of strategies in confabulation management. Additionally, further research examining interactions between type of confabulation and intervention strategy will be beneficial.

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Chapter 2: Exploring the clinical management of confabulation within neuropsychology services.

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Plain language summary

Title

Exploring the clinical management of confabulation within neuropsychology services.

Background

Confabulation is a type of memory difficulty in which a person recalls false or factually incorrect memories unintentionally and believes them to be true. Although confabulation can resolve naturally, it does not always, and it can significantly impact a person's well-being, relationships and daily living. There are no clinical guidelines on how to assess and treat confabulation, even though it occurs quite commonly in the early stages after acquired brain injury. It is therefore important to understand how clinicians are currently supporting people with confabulation, as well as their wider systems.

Aims and questions

This study aimed to document experiences and opinions of clinicians who have worked with people with confabulation, in particular exploring how this difficulty has been assessed and managed, alongside clinician ratings of confidence and experience. The main questions were, out of those with experience working with confabulation:

1. What proportion of clinicians provide assessment, formulation and intervention for confabulation?
2. What approaches to management (including assessment, formulation, intervention, and outcome measurement) are applied in current practice?
3. What treatment targets are commonly identified when managing confabulation?
4. What difficulties exist when assessing, formulating and intervening with confabulation?
5. How confident are clinicians in managing confabulation?
6. Is there a significant relationship between clinician confidence and experience with managing confabulation?

Methods

Clinical psychologists and neuropsychologists with experience in working with confabulation were recruited to a two-part study via adverts on social media and notices distributed to members of professional organisations. In part 1, 44 participants completed an online survey containing questions about their experience and their approach to the management of confabulation. In part 2, from this sample 8 participants went on to complete individual interviews exploring these areas in more depth. Consent was gained via electronic consent forms. Ethical approval was gained from the relevant University of Glasgow Committee (ref: 200210045).

Quantitative survey data was analysed using descriptive statistics, and a correlational analysis explored the relationship between clinician confidence and experience. Qualitative survey and interview data was transcribed and meaningful patterns and themes identified.

Main Findings and Conclusions

The survey found that most clinicians: a) provide assessment, formulation, intervention and outcome measurement for confabulation and b) use a variety of methods across these areas of management, including both direct (e.g. cognitive strategies) and indirect (e.g. environmental or systemic) approaches. Common treatment targets included increasing the individual's awareness of confabulations and managing the emotional impact of confabulation for individuals and families. Half of the sample reported feeling confident managing this condition and a moderate positive relationship was found between level of experience and confidence. Finally, thematic analyses found that, overall, participants thought confabulation can be effectively manged in practice, despite outlining several issues and areas for improvement. This study is the first to capture the current clinical management of confabulation in neuropsychology services. It provides an important grounding for future research to further explore the development and evaluation of interventions, supporting those experiencing confabulation.

Abstract

Objective

Confabulation, the production of erroneous or unintentionally fabricated memories, is a poorly understood consequence of acquired brain injury. As confabulation is linked with risk and limits engagement in rehabilitation, its clinical management is a pressing concern. This mixed-methods study examined current practice and opinions in managing confabulation.

Method

Clinical Psychologists and Neuropsychologists (n=44) completed a survey exploring their experience, opinion and confidence in managing confabulation. Eight participants completed a semi-structured interview further exploring these areas. Descriptive statistics and correlations identified patterns in quantitative data, and qualitative data was analysed using reflexive thematic analysis.

Results

Out of those with relevant experience, most clinicians reported providing assessment, formulation, intervention and outcome measurement using various approaches. However, more clinicians provide formulation than intervention. Common aims of treatment include increasing the individual's awareness and managing the emotional impact of confabulation. Half reported feeling confident managing this condition and a moderate positive correlation was identified between level of experience and confidence. Participants thought that confabulation could be effectively manged, despite several challenges including the absence of guidelines, limited experience and phenomenon-specific factors such as limited insight, distress and confusion. Four themes were identified: 'an individualised approach which acknowledges the holistic context of confabulation', 'integration is key', 'specific challenges related to the management of confabulation' and 'the way forward'.

Conclusions

There is some variance in how clinicians approach confabulation. However, most clinicians adopt an individualised approach involving wider systems. These findings provide a basis for future research to develop clinical practice in this area.

Introduction

Confabulation is the unintentional production of statements, actions or memories which are incongruent with an individual’s past, present or future (Dalla Barba et al., 2020). They are often autobiographical and can be entirely or partially erroneous (Kopelman, 2010). Confabulation may occur in the context of psychosis, dementia and acquired brain injury (ABI), and often presents alongside difficulties with executive functions, insight and mood (Glowinski et al., 2008; Bajo et al., 2017). In some cases, confabulation has been shown to spontaneously improve within 9 months, but in others it persists over time (Bajo et al., 2017).

Confabulation is a heterogenous phenomenon that has been the focus of research from anatomical and cognitive perspectives. Typical lesion locations include frontal brain regions such as the orbital and ventromedial prefrontal cortices (Schnider, 2008). Turner et al. (2008) found higher rates of confabulation in patients with focal frontal relative to posterior lesions, and within the frontal lesion group those with orbital and/or medial damage confabulated the most. It is also known that a variety of brain regions are associated with confabulation, such as hippocampal and para-hippocampal areas, suggesting that confabulation is not the result of one specific brain lesion or aetiology (Dalla Barba & La Corte, 2013). Many authors have classified confabulation as ‘provoked’ versus ‘spontaneous’ (Kopelman, 2010). Provoked confabulations occur in response to a question, whereas spontaneous confabulations occur freely without provocation. Several theories propose a variety of underlying mechanisms including errors in executive aspects of memory processing (recall and monitoring), ‘filling in gaps’ to compensate for amnesia, difficulties distinguishing source and context of memories and difficulties discriminating between memories of imagined versus experienced events (Gilboa & Verfaellie, 2010; Schnider, 2008; Nahum et al., 2012; Pick, 1905).

Despite being the focus of considerable research, there has been little research exploring confabulation from an applied clinical perspective. As this phenomenon impedes the efficacy of neurorehabilitation and limits recovery, it is crucial to identify effective approaches to the assessment and management of confabulation (Schnider, 2008). The literature has documented a small number of assessment strategies including standardised measures, questionnaires and observation methods (Nahum et al., 2012). Dalla Barba and colleagues (2018) developed the Confabulation Battery, and a shorter ‘screening’ tool, designed to elicit confabulations across several cognitive domains including personal and historical semantic memory, episodic memory and orientation to time and place contexts. Such developments are promising, however further clinical validation and independent replication are required. Furthermore, Brown et al. (2017) stated that confabulation is often missed or misidentified due to its heterogeneity and association with wider disorders. They also discussed the importance of corroborating client reports with family members, particularly for those with reduced insight. Fish and Forrester (2018) reported a case study in which collaborative formulation was used to help the patient develop insight into his confabulation and provide the basis for the use of compensatory strategies to enable identification and verification of confabulated memories. Formulation is defined as a “tool used by clinicians to relate theory to practice.… to guide their thinking about the problems and difficulties presented by the [client]” (Butler, 1998, pp. 2-3). Overall, the comprehensive assessment of confabulation and use of formulation may play a key role in effectively managing this condition. However, the evidence is limited. It is therefore important to understand how confabulation is currently assessed and formulated in clinical practice.

A small number of studies and review articles has examined relevant interventions, or suggested approaches to treatment and/or management (e.g. Fotopoulou, 2008). These include psychoeducation, use of diaries, errorless learning, counselling, refraining from direct challenging, providing systematic feedback, and use of strategies to verify recollections (Fish & Forrester, 2018; Schnider, 2008; Trivino et al., 2017). Additionally, some studies have suggested that intervention for comorbid cognitive, emotional and behavioural difficulties may indirectly improve confabulation (Bajo et al., 2017; Dayus & Van den Broek, 2000). These approaches to intervention have good face validity and are worthy of further investigation. However, they are few in number, preliminary in nature, and concern a clinical problem that is seemingly highly variable as well as being challenging to assess and measure. Hence, they are not sufficient to guide practice.

Clinical practice can be shaped by a ‘top-down’ approach, where randomised control trials and evidence inform clinical guidelines which are used by practitioners to guide practice (Mukamel et al., 2014). Where there is an absence of robust evidence it may be reasonable to adopt a ‘bottom-up’ approach where review of current practice can inform the evidence base (Vansteenkiste et al., 2012). To our knowledge no study has attempted to establish current clinical practice in relation to confabulation. Using a systematic approach, this study attempted to identify approaches to assessment, formulation and intervention with confabulation following ABI, within the linked professions of clinical psychology and clinical neuropsychology.

Aims

The primary aim was to characterise current clinical psychology and neuropsychology practice in relation to confabulation in adults following ABI, including specifically:

a) To identify key themes in clinician approach to assessing, formulating and intervening with confabulation in neuropsychology settings.

b) To determine current methods of evaluating outcomes.

c) To explore clinician experience and confidence in working with confabulation, and the relationship between the two.

Research questions

Within the professions of clinical psychology and neuropsychology and out of a population with some experience working with confabulation:

1. What proportion of clinicians provide assessment, formulation and intervention for confabulation?
2. What approaches to management (including assessment, formulation, intervention, and outcome measurement) are applied in current practice?
3. What treatment targets are commonly identified when managing confabulation?
4. What difficulties exist when assessing, formulating and intervening with confabulation?
5. How confident are clinicians in managing confabulation?
6. Is there a significant relationship between clinician confidence and experience with managing confabulation?

The first aim is addressed in research questions 1 – 3, the second aim is explored in research questions 2 -3 and the third aim is addressed in research questions 4 – 6.

Method

Design

The study used a two-part exploratory mixed-methods design, including an initial survey and subsequent interview. Part 1 gathered quantitative and qualitative survey data exploring participant demographics, experiences of managing confabulation, opinions and confidence.

Part 2 used semi-structured interviews to further explore these topics, gathering more detailed qualitative data. As a token of our appreciation, participants in either part of the study were invited to enter a prize draw to win 1 of 5 £20 Amazon vouchers, contingent on participants entering their email addresses in an online form.

Participants

A quota sampling method was adopted to recruit an internationally diverse sample of Clinical Psychologists and Clinical Neuropsychologists who met the following criteria.

Inclusion criteria:

- qualified to practice clinical psychology or neuropsychology in the country in which they work
- minimum of 6 months full time equivalent clinical experience working in ABI
- encountered at least one case of confabulation associated with ABI (including Korsakoff's Syndrome and Alcohol Related Brain Damage).

Exclusion criteria:

- experience managing confabulation solely associated with dementia and/or psychosis
- no clinical experience of confabulation.

We recruited both nationally and internationally because international clinicians were considered to have valuable knowledge and experience that it was important to capture in this exploratory study. In addition, key papers on the topic originate outside the UK hence it was reasonable to expect that international clinicians may have highly relevant expertise. Therefore, though we did not aim to identify an internationally *representative* sample, we did aim to be *inclusive* of knowledge both within and outside the UK. The limitations of this approach are considered in the discussion.

Sample Size

It was impossible to ascertain the number of eligible clinicians worldwide, particularly in view of the need for participants to have some experience working with confabulation. Hence the sample size calculation was based on UK data only, and in particular a 2017 report noting that the UK Division of Neuropsychology had 649 full members (Yates, 2017[5]). Studies of a similar design and population focus reported response rates of 9.7%-12% (Hirst et al., 2017;

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[5] Not all of these members would have been eligible for this study, but there would also have been non-members who were eligible, so it is recognised that this figure is very much an approximation, used because no more suitable figures were available.

Baber, 2020), and a recommended sample size of 50-100 has been suggested for surveys using thematic analysis (Braun & Clarke, 2019). Therefore, a sample size estimate of n=65 was calculated for the survey. For a moderate-large sample size for thematic analyses of interview data a range of 10-20 participants is suggested (Braun & Clarke, 2013). In addition, an upper and lower boundary is recommended (Sim et al., 2018). Therefore, the intended sample size for interview was 8-12.

Materials

Part 1

An initial survey was designed by the research team and peer reviewed as part of a Doctorate in Clinical Psychology (DClinPsy) project proposal process. It was developed further through a piloting process advertised to university staff known to meet the inclusion criteria. Two staff members consented to complete the pilot survey and gave anonymous feedback, including a suggestion that one component, which presented a clinical vignette and asked open questions related to it, duplicated the content of some of the earlier survey items. This vignette component was hence removed (note that as all other survey items remained unchanged, the pilot data was carried forward into the analysis). See appendix 2.1 (pp.90) for more details.

The survey was hosted using web-based survey software (Online Surveys, Jisc, 2022). The initial pages contained preliminary information regarding the study aims, confidentiality limits and data governance, followed by a consent form (Appendices 2.2 and 2.3a, pp.91-92), before presenting the survey itself. The survey gathered quantitative data using dichotomous responses and Likert scales. Qualitative data was collected using open questions and free text boxes. Demographic data for all participants was also collected, including date of qualification, country of occupation, and service types previously worked in. At the end of the survey, two links were presented for participants to provide email addresses as a means of opting in to part 2 and/or the prize draw.

Part 2

Interview questions were developed, informally reviewed by a clinical neuropsychologist external to the research team and pilot tested with a trainee clinical psychologist with experience in neuropsychology (note this data was not carried forward into the analysis).

Questions were then streamlined to ensure the interview remained within the proposed time frame (Appendix 2.4, pp.93). The participant information sheet and consent forms were emailed to participants (see Appendices 2.2 and 2.3b, pp.91-92) along with the topic guide to facilitate reflection prior to interview. The videoconferencing platform Zoom (Zoom Video Communications, 2022) was used. Interview audio and video recordings were temporarily stored on the University of Glasgow Zoom cloud. The interviews were then transcribed by the primary researcher using Microsoft Word and Windows Media Player.

Procedure

Part 1

A study advert and link (Appendix 2.5, pp.94) to the survey were shared via email with professional organisations including the British Psychological Society Division of Neuropsychology (DoN), the International Neuropsychological Society, the World Federation of NeuroRehabilitation Neuropsychological Rehabilitation Special Interest Group and regional special interest groups within the UK, alongside social media feeds (e.g., Twitter, Facebook), including requests to circulate to relevant contacts. The advert included summary information about the study including confirmation of ethical review and data governance arrangements, and contact emails. The survey was live for 17 weeks from 4th February – 2nd June 2022. Follow-up invitations were circulated on social networking platforms approximately every 3 weeks after the initial advertisement.

Part 2

Following completion of the survey, participants were invited to provide their contact details indicating their interest to participate in part 2 (interview). They were then contacted by the principal investigator, who also conducted the 1:1 interviews. At the end of interview participants were thanked for their time, invited to contact the team with queries and reminded about data withdrawal procedures. The interview audio and video data were downloaded and transcribed by the first author. Transcripts were checked by the first author but were not checked by participants, due to time constraints. Data wase collected remotely, and most participants were situated in work environments.

Ethics, Governance and Data Protection

The study gained ethical approval from University of Glasgow College of Medical, Veterinary and Life Sciences ethics committee (project no.: 200210045; Appendix 2.6, pp.95). All participants gave informed consent to participate including consent to the anonymous publication of direct quotations. Participants were approached with sensitivity when discussing confidence and opinions regarding a relatively poorly-defined area of practice, and were asked not to disclose patient-identifiable information in their responses. No such disclosures were made. Participant data remained anonymous, with the exception that optional email addresses which were temporarily linked to the survey data for purposes of the prize draw and interview opt-in procedure, with the participant's consent.

Analysis

Quantitative and qualitative survey data were examined using descriptive statistics reporting frequencies, and correlational analysis exploring the relationship between clinician confidence and experience. Spearman's Rho was selected as there were two variables and data were ordinal. Qualitative interview data was processed and analysed using verbatim transcription and qualitative analysis. Based on the exploratory nature of this study and its aim to gather rich data to characterise practice alongside clinician knowledge, experience and opinion, qualitative analysis for interview data was selected. Due to the lack of current literature, associated limitations for hypothesis-testing, and exploratory design reflexive thematic analysis was selected (Braun and Clarke, 2019). Reflexive thematic analysis allowed for the exploration of subjective clinician experiences and opinion and also facilitated the identification of codes without the use of an established evidence base, using the data-driven inductive approach. During thematic analysis one coder (the primary researcher) spent time becoming familiar with the data and manually developing initial codes using an inductive approach using Microsoft Word. Codes were then grouped together to create categories. These categories formed a coding tree and contributed to the process of identifying themes. Extracts relating to these codes and categories were then extracted from the dataset using Microsoft Excel. A flexible approach was adopted, using post-it notes to further review and group codes, extracts and categories, mapping different possible themes. This process was repeated until several themes were generated, which meaningfully represented the data. Adaptations were also made to the themes and sub-themes in consultation with the research team.

Research team characteristics and reflexivity

The research team (female: n=2; male: n=1) consisted of a primary researcher, a trainee clinical psychologist with an MSc in Applied Neuropsychology, and two supervisors, who are both clinical-academic clinical psychologists and neuropsychologists. All members of the research team have clinical experience in working with confabulation, predominantly within adult acquired brain injury rehabilitation settings. This experience naturally led to our interest in the project and influenced all stages of its conduct. The interviews and thematic analysis were conducted primarily by the first author, who considered carefully how her prior experience and opinions could influence theme development and understanding of the data but remained as open-minded as possible throughout this process and was guided by participant report. None of the participants were previously known to the primary researcher conducting the analyses. Participants were aware that this study contributed to the primary researcher's DClinPsy at the University of Glasgow.

Results

Demographics

The survey took 30-35 minutes to complete. A total of 47 survey responses were received (including pilot participants, n=2). However, three registered responses were blank and thus discarded. Therefore, responses from 44 valid participants were included (clinical psychologists n=27; clinical neuropsychologists n=17). Most participants qualified between 2010 – 2019 (n=23, figure 2) and currently practiced in the United Kingdom (n=31). Other countries include United States of America (n=6), Cyprus (n=1), Australia (n=1), Nigeria (n=1), Germany (n=1), and Ireland (n=1). Two participants did not disclose their location. Time spent working in neuropsychological settings varied across participants, ranging from 7 months to 40 years (M=10 years 6 months). Fifteen survey participants opted in to part 2, and 8 (Male: 3; Female: 5) completed the semi-structured interview (clinical psychologists n=4; clinical neuropsychologists n=4). Reasons for drop-out were: no response (n=3), illness (n=1), limited availability (n=3). All 8 participants were practicing in neuropsychological services at the time of study. Countries of practice included the United Kingdom (n=6), Germany (n=1) and Australia (n=1).

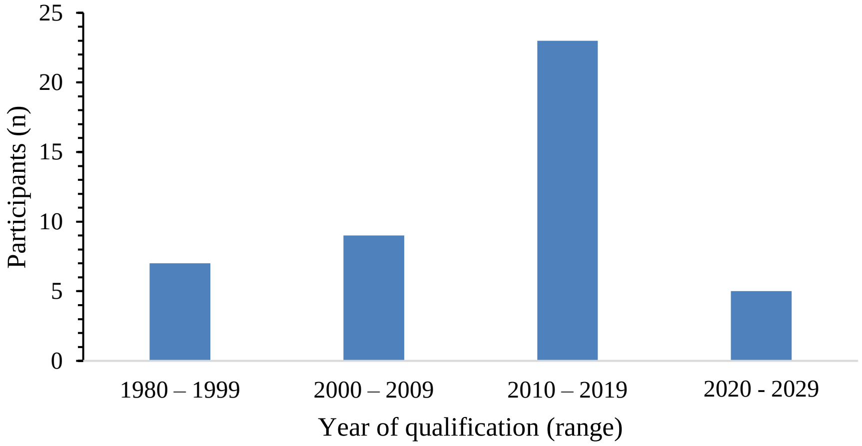

Figure 2: Frequency chart showing the number of participants by year of qualification.

Quantitative analysis: Survey

Descriptive statistics

1. Provision of assessment, formulation, intervention and measurement of outcome and wider difficulties.

In line with research question 1 categorical response options ‘Yes’, ‘No’, and ‘Sometimes’ were used to assess whether clinicians would provide assessment, formulation, intervention, outcome measurement and assess for and/or intervene with risk and wider psychological comorbidities for individuals with confabulation following ABI. Table 7 shows that if participants were to encounter confabulation the majority would provide assessment (77.3%), formulation (86.4%) and outcome measurement (81.8%). The majority of clinicians would also provide intervention (63.6%) but this is a smaller proportion compared to other domains of work. Furthermore, most clinicians would assess for risk (81.8%) and wider psychological difficulties (88.6%) and provide intervention for comorbidities (72.7%).

Table 7: The number of participants indicating how often they undertake specific activities relevant to working with confabulation.

	Assess confabulation	Develop formulation	Provide intervention	Measure outcome	Assess for risk	Assess comorbid psychological difficulties	Treat comorbid psychological difficulties
Yes	***34***	***38***	***28***	***36***	***36***	***39***	***32***
No	*3*	*3*	*4*	*3*	*3*	*2*	*3*
Sometimes	*6*	*3*	*12*	*4*	*5*	*2*	*8*
No response	*2*	*n/a*	*n/a*	*1*	*n/a*	*1*	*1*

†*mode in bold*

1b. Clinical experience

Also in line with research question 1, binary response options gathered data on clinician experience of providing assessment, formulation, intervention and outcome measurement for confabulation. Table 8 shows that approximately half of participants (54.5%) had experience completing an assessment of confabulation and approximately half (43.2%) did not. Meanwhile, most clinicians (72.7%) reported having experience developing formulations. A smaller proportion reported having experience providing interventions (65.9%).

Table 8: The number of clinicians who have experience providing assessment, formulation and intervention of confabulation following ABI.

	Experience completing assessment	Experience developing formulation	Experience providing intervention
Yes	***24***	***32***	***29***
No	*19*	*10*	*14*
No response	*1*	*2*	*1*

†*mode in bold*

2. Strategies

In line with research questions number 2 and 3, participants reported having knowledge of and/or experience using a range of strategies in the management of confabulation using free text survey questions. Note that these numbers represent a smaller proportion of the sample. Overall, clinicians had knowledge of and experience using a variety of management strategies, however it is unclear if multiple strategies were used concurrently, for example the use of multiple assessment tools. (Out of those with experience assessing confabulation (n=25), reported methods included informant report (n=11), clinical interview (n=10), neuropsychological assessments for memory (n=13), attention (n=3) and executive function (n=5), observations (n=5). Out of those with experience developing a formulation of confabulation (n=32) biopsychosocial approaches were mostly described (n=13), including the Evans model (2006 cited in Wilson et al., 2009), in addition to behavioural frameworks (n=4). Out of those with experience providing intervention (n=29) clinicians discussed psychoeducation (n=12), training and support to families and staff (n=11), memory aids (n=9), reorientation (n=5), distress management (n=5) and self-monitoring techniques (n=4). Treatment targets which participants would consider included insight (n=14), distress (n=13), increased understanding (patient, family and staff; n=9) and support for wider systems (n=9).

In addition, memory aids were often used to support memory recall and provide information to inform logical reasoning. Finally, in those who would measure outcomes in this population (n=37) outcome measurement strategies discussed included behaviour monitoring charts (n=10), measures of affect (n=8), rating scales (n=8) and goal attainment (n=5). See appendices 2.7 – 2.11 (pp.96-100).

Of those who would assess for risk (n=41) risk factors identified included harm to others (e.g. aggression; n=14), harm from others (e.g. exploitation; n=14), harm to self (e.g. self-neglect; n=13) and distress (n=6). Out of those who would manage comorbid psychological difficulties (n=41) approaches reported included psychotherapeutic interventions (n=18), behavioural management approaches (n=10) and cognitive rehabilitation strategies (n=8). See appendices 2.12 and 2.13 (pp.101-102).

3. Clinician opinion

In line with research question 4, data was collected relating to clinician opinion in the areas of: how robust current management methods are, the variety of current methods, further research, self-reported level of experience and confidence in relation to managing confabulation.

Robustness of current methods

Half of participants were unsure if current assessment (45.5%), intervention (50%) and outcome measurement (54.5%) tools were robust (table 9). Approximately a third either disagreed or somewhat disagreed that assessment (36.4%), formulation (29.5%), intervention (29.5%) and outcome measurement (34.1%) tools were robust.

Table 9: Frequency (n) of clinician opinions relating to the reliability of current management approaches.

	Assessment tools available are robust	Formulation frameworks available are robust	Intervention strategies available are robust	Outcome measures available are robust
Disagree	*7*	*3*	*3*	*4*
Somewhat disagree	*9*	*10*	*10*	*11*
Unsure	***20***	***16***	***22***	***24***
Somewhat agree	*8*	*15*	*9*	*4*
Agree	*0*	*0*	*0*	*1*

†mode in bold

Variety of current methods

Most clinicians were unsure if a good variety of current management methods exists. Meanwhile a large proportion of participants either disagreed or somewhat disagreed that there is a good variety of assessment (47.7%), formulation (47.7%) and/or outcome measurement (43.2%) tools available (table 10).

Table 10: Frequency (n) of clinician opinions relating to the variety of current management tools.

	There's a good variety of assessment tools	There's a good variety of formulation frameworks	There's a good variety of intervention strategies	There's a good variety of outcome measures
Disagree	*11*	*8*	*5*	*8*
Somewhat disagree	*10*	*13*	*6*	*11*
Unsure	***14***	***15***	***18***	***19***
Somewhat agree	*8*	*6*	*12*	*4*
Agree	*1*	*2*	*3*	*2*

†mode in bold

Further research

Table 11 shows that most clinicians either agreed or somewhat agreed that further research into the management of confabulation would be useful for their practice, including research into assessment (81.8%), formulation (86.4%), intervention (90.9%) and outcome measurement (86.4%).

Table 11: Number of clinicians who report that further research into the management of confabulation will be useful for their clinical practice.

	Further research into assessment will be useful	Further research into formulation will be useful	Further research into intervention will be useful	Further research into outcome measurement will be useful
Disagree	*0*	*0*	*0*	*0*
Somewhat disagree	*2*	*1*	*1*	*1*
Unsure	*6*	*5*	*3*	*5*
Somewhat agree	*13*	*16*	*15*	*18*
Agree	***23***	***22***	***25***	***20***

†mode in bold

Self-reported view of experience

Approximately half of the sample somewhat agreed that they have a good level of experience in assessment (40.9%), formulation (43.2%) and intervention (40.9%) in relation to confabulation (Table 12). Meanwhile, approximately a third disagreed that they had a good level of experience monitoring outcomes (27.3%).

Table 12: Number of clinicians who felt they had a good level of experience managing confabulation.

	I have a good level of experience assessing confabulation	I have a good level of experience developing formulation	I have a good level of experience providing intervention	I have a good level of experience monitoring outcomes
Disagree	*5*	*5*	*6*	*9*
Somewhat disagree	*5*	*8*	*9*	***12***
Unsure	*12*	*8*	*6*	*9*
Somewhat agree	***18***	***19***	***18***	*9*
Agree	*4*	*4*	*5*	*5*

†mode in bold

Clinician confidence

In line with research question number 5, table 13 shows that confidence varied amongst the sample. Approximately a third somewhat agreed they felt confident completing an assessment (34.1%), providing intervention (38.6%) and measuring outcomes (29.5%) in the context of confabulation. However, another third was unsure if they felt confident providing assessment (34.1%), intervention (36.4%) and measuring outcome (29.5%).

Table 13: Number of clinicians who felt confident managing confabulation.

	I feel confident assessing confabulation	I feel confident formulating confabulation	I feel confident providing intervention for confabulation	I feel confident monitoring outcomes pertaining to confabulation
Disagree	*3*	*1*	*1*	*3*
Somewhat disagree	*9*	*9*	*7*	*12*
Unsure	***15***	*8*	*16*	***13***
Somewhat agree	***15***	***23***	***17***	***13***
Agree	*2*	*3*	*3*	*3*

†mode in bold

Working with confabulation overall

In line with research question number 6, approximately half of participants either agreed or somewhat agreed that managing confabulation in clinical practice can be difficult (59.1%), that they had a good overall level of experience working with confabulation (54.5%) and that they had a good overall level of confidence (40.9%; Table 14).

Table 14: Frequency (n) of clinicians' overall opinion.

	Overall managing confabulation is difficult	Good level of experience overall	Good level of confidence overall
Disagree	*1*	*4*	*1*
Somewhat disagree	*7*	*7*	*9*
Unsure	*10*	*9*	*16*
Somewhat agree	***22***	***19***	***17***
Agree	*4*	*5*	*1*

†mode in bold

4. Perceived confidence and experience: correlational analysis

In line with research question number 6, Spearman's correlation coefficients were computed to assess the relationship between perceived confidence and perceived experience in the different aspects of working with confabulation following ABI. Seven extreme values (i.e. scores of 1 or 5) were identified, however cases were not considered outliers or removed as they were considered to represent natural variation on a clearly defined 1-5 point scale, within a relatively modest sample (Appendix 2.14, pp. 103-107**).** There was a significant, correlation between overall experience and overall level of confidence when managing confabulation with a medium effect size, $r_{44} = .57$, $p < .001$. Furthermore, positive correlations with a medium effect size were also found between self-reported experience and confidence in the assessment of confabulation ($r_{44} = .63$, $p < .001$), development of formulation ($r_{44} = .54$, $p < .001$), when providing intervention ($r_{44} = .55$, $p < .001$) and when measuring outcome ($r_{44} = .66$, $p < .001$).

Thematic analysis: interview

During thematic analysis of interview data, transcripts were read multiple times allowing the primary researcher to become immersed in the data (see Appendix 2.15, pp.108-112 for more details). Codes were then identified and grouped to create categories including type of approach used in management (e.g. informal and formal); important factors considered during management (including understanding context, team working, treatment targets); impact of confabulation on the individual, families and staff; skills and other theories utilised by the clinician; barriers and limitations in the management of confabulation; explanations for reduced clinician confidence and clinician suggestions for future research. The thematic analysis identified several themes, shown in diagrammatic form in figure 3.

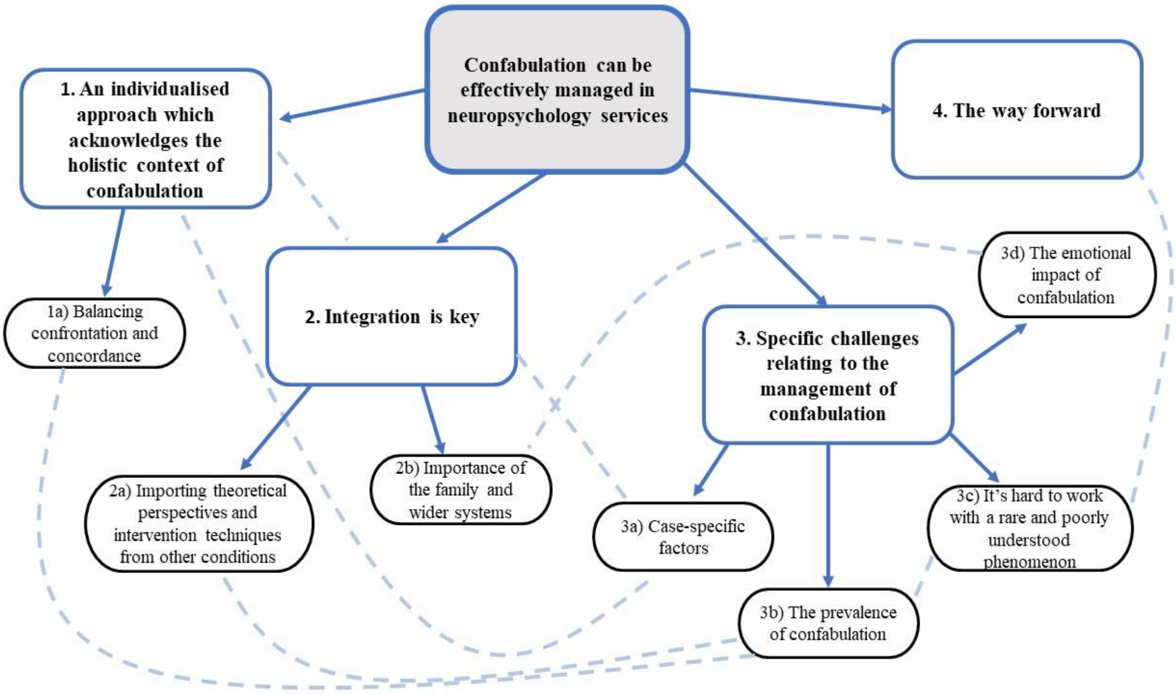

Figure 3: Representation of overarching (in grey), superordinate (1-4) and sub-themes from the thematic analysis of interview data. Inter-connectivity between themes and sub-themes also illustrated.

Overarching theme: confabulation can be effectively managed in neuropsychology services

Overall, clinicians felt confabulation can be effectively managed in neuropsychology settings. However, most also identified specific issues in the areas of assessment, formulation, intervention and outcome measurement, suggesting areas for improvement. The approach to management and related issues are captured in the following four themes.

1. An individualised approach which acknowledges the holistic context of confabulation

Most clinicians adopted an individualised approach to management using a combination of informal and formal methods for assessment, formulation, intervention and outcome measurement. This not only enabled accurate identification of confabulations themselves, but led to personalised, holistic care.

> 01: "My approach would be to understand the person first of all… if you know the person well you can be confident recognising confabulations…it can be subtle and you may be unsure if you don't know someone's story… The family give context to make sense of underlying themes…meaning management is slightly different."

With regards to assessment, clinicians described the importance of firstly understanding the person, their values, personality and social systems both pre and post injury. Gathering collateral information, involving family members and 'fact-checking' were crucial in gaining understanding. This provided 'context' for confabulations, aiding recognition of when they occur, why, in what form, and potential impact. Some participants also assessed the content of confabulations, identifying underlying themes which informs formulation and guides intervention.

With regards to formulation, most participants combined detailed information (quantitative and qualitative) about the person and their confabulations whilst also considering the individuals functional and cognitive abilities, insight, injury/aetiology, behaviour and risk. This was described as a biopsychosocial framework, and some clinicians used the established neuropsychological formulation framework proposed by Evans (2006; in Wilson et al., 2009).

With regard to intervention, clinicians described selecting a variety of methods and tools. These included psychoeducation (client, family, staff), orientation scripts, diaries/logbooks, direct feedback, scaffolding (supporting logic reasoning) and errorless learning of specific information contrary to confabulation content. Clinicians discussed how this allows for responses to confabulation to be individually tailored. All clinicians also reported using a personalised approach to measuring outcome by developing "bespoke" goals. Outcomes relating to management of associated distress, memory difficulties and behaviour were also deemed as important to monitor, if not more, than reduction in confabulation frequency.

> 07: "The first step of good treatment is someone understanding what confabulation is and why it's happening and their families understanding that too…it's about finding out what's causing someone problems and addressing that in quite a personalised way."

However, some clinicians also used formal, standardised approaches in conjunction with bespoke approaches, particularly during assessment and outcome measurement. This included neuropsychological assessments and validated outcome measures to monitor associated factors such as amnesia or insight. These tools were not employed by all clinicians and were primarily used to support the main conclusions drawn from informal approaches. For example, standardised assessment tools were not used in isolation and often used to gather further qualitative data, such as observations during cognitive testing.

1a) Balancing confrontation and concordance

Clinicians discussed several treatment targets. One key aim was supporting family members and care teams in particular providing psychoeducation and training, facilitating the ability to find a balance between ‘confrontation’ and ‘concordance’. Challenging confabulations may lead to distress and reinforcement of the confabulated memory, particularly if the individual has severe cognitive impairment, is acutely disoriented or severely lacking insight into disability. However, this is also described as a useful technique to raise insight, improve self-monitoring and change or reduce confabulations. On the other hand, responding in concordance with confabulations, or “going along with it”, appears to ensure an element of safety and reassurance that the individual’s reality is not ‘wrong’, reducing distress and the likelihood for interpersonal friction. This is aimed at supporting the client and their system to ‘live well’ with confabulations. However, it is possible that this approach is less effective in changing or reducing confabulatory beliefs. Clinicians discussed the importance of the timely use of each method, in conjunction with understanding the level of insight that person holds in that moment in time as this can fluctuate. Some participants recommended developing trust and safety before attempting to challenge confabulations, ultimately questioning the individual’s reality, meaning that approaches incorporating confrontation would often be used towards the middle-latter stages of rehabilitation.

> 01: “Sometimes it’s about going along with the confabulation, not challenging it…and just being alongside the person…because challenging it might lead to challenging behaviour or distress…it’s finding that balance.”

Other treatment aims included improving orientation to injury and insight into confabulations and brain injury consequences, in addition to reducing distress experienced by the patient (especially as distress can increase as awareness improves). Clinicians stated how distress may be caused by the confabulation itself and its content, the behavioural reaction to the confabulations or wider associated factors such as disorientation and memory impairment.

This treatment target was often incorporated within a wider aim of 'supporting the patient, families and carers in managing confabulation'.

Some clinicians also discussed considering the level of conviction with which the confabulations are held, aiming to reduce this. One clinician described how confabulations are "not necessarily all or nothing" and by identifying conviction levels you can understand how resistant certain beliefs may be to change, starting treatment with those held with least conviction. Other clinicians discussed implementing strategies which work to avoid further reinforcement or reduce the opportunity to confabulate. These included errorless learning and the provision of information to 'fill in gaps', redirection, and 'going along with it'.

2. Integration is key

This theme describes the coming together of theories, models and people to overcome challenges and provide an effective approach to managing confabulation in neuropsychology services.

2a) Importing theoretical perspectives and intervention techniques from other conditions

> 08: "I've borrowed approaches from other literatures …None are ideal but it's a case of trying to draw anything from those a) theoretically and b) techniques…I'm looking to see if the theoretical aspects of those conditions made sense in the context of my patients."

Most participants utilised theories and/or strategies established for use with other psychological/neuropsychological presentations. This included incorporating measures of mood, orientation and memory/amnesia during assessment to not only assess these constructs but also better understand aspects of confabulation. For example, some clinicians referenced cognitive-behavioural theories during formulation, adopting third-wave therapeutic or behavioural approaches during intervention, or described using established measures of other functions, such as the Galveston Orientation and Amnesia Test (Levin et al., 1979), when monitoring outcomes.

The type of theory or strategies adopted depended largely on individual presentation and the clinician's conceptualisation of confabulation. For example, confabulations were conceptualised in the context of memory, awareness/insight, cognitive belief and/or behavioural difficulties.

2b) Importance of the family and wider systems

> 05: "All interventions around how it's managed tend to be rooted through the family or teams."

Participants highlighted the importance of integrating patients, families and carers from assessment through to outcome measurement in order to successfully manage confabulation. For example, families and carers provided crucial information during assessment, worked with clinicians to develop a shared understanding, were trained to provide and prompt the use of intervention strategies and contributed to outcome measurement. Discussions relating to the management of confabulation often highlighted the need for all to work together to provide a consistent, collaborative and empathic response. Participants also discussed how communication within the team and with other health professionals was important for the patient to access the right care at the right time.

3. Specific challenges relating to the management of confabulation

This theme describes how features associated with confabulation can limit management or require adjustment of approach. It also explores issues surrounding the management of a condition that can be distressing for all involved.

3a) Case-specific factors

> 07: "one of the challenges in managing confabulation is that we rely on someone's insight and ability to introspect and recognise, which is in itself limited."

Severity of impairment and insight

Clinicians discussed how severity of injury and level of insight may affect the approach to management, particularly as reduced insight is commonly associated with confabulation. Specific assessments or intervention tools were reported to be ineffective in some cases as a result. For example, most clinicians explained that a level of insight was required to increase self-monitoring, identification of confabulations and facilitate appropriate patient response. A certain level of cognitive ability was also noted as important for patients to use logical reasoning and remember to use rehabilitation techniques such as orientation scripts. More specifically, some clinician input was required for effective use of some of these interventions.

Level of conviction

Furthermore, many clinicians commented on the conviction with which the patient held their confabulations being an important factor to consider during management. It was discussed that this could be a treatment target, but could also become a barrier to engagement in interventions, with one participant describing it as:

> (08): "an emotionally powerful kind of barrier to therapy."

If the client was considered less able to engage in assessment and interventions requiring more complex, metacognitive ability then clinicians reported adopting a more indirect approach, where assessment relied upon observations and informants, and intervention involved the system and environmental changes. Furthermore, outcomes for rehabilitation altered, becoming more focused on supporting the client and their system in managing confabulations, distress and risk rather than working to reduce confabulation severity or frequency. This theme is associated with theme 2, where there is a reliance on recruiting support from wider teams to provide tailored, indirect work in response to these presenting factors. This theme also links to theme 1 where a personalised approach is key in addition to gaining an understanding of the individual's presentation and how it may affect them, their system and therefore their treatment.

Time since injury

Additionally, some clinicians commented on the time since injury and the value of providing rehabilitation during an opportune 'rehabilitation window' where plasticity may be more likely and beliefs less entrenched.

3b) The prevalence of confabulation

Many clinicians felt that the perceived rarity of confabulation resulted in the lack of experience they had in managing it and may have also contributed to the lack of literature and guidance. This relates to theme 2a and links with reports of clinicians borrowing interventions from more established areas of clinical psychology. Consequently, many discussed how this lack of experience, training and guidelines could have resulted in reduced confidence managing this condition, in addition to the "cross-over" between confabulation and other presentations.

> 07: “There is a lack of confidence because it’s rare and we don’t get taught about it in our clinical psychology training, which is valid, but this is why people lack confidence and knowledge.”

Clinicians also stated that confabulation is not well represented in the field or during training. As a result, confabulation at times may not be the focus of assessment or intervention. One clinician described circumstances in their workplace where confabulation may be a:

> 02: “side-note to the main event of brain injury…in an acute general hospital it’s not taken that seriously, or as something to delve into the meaning of and formulate.”

They explained how this may be associated with a lack of awareness from other health professionals and how it also relates to the remit of the service and the context within which confabulation may present in acute settings. For example, when confabulation may be fleeting and/or an indicator for posttraumatic amnesia. This is associated with sub-theme 1a, further supporting the importance of acknowledging the context of confabulation and the concept that different approaches are required and provided at different points in time.

3c) It’s hard to work with a rare and poorly understood phenomenon

> 04: “We’re just doing our best, but we don’t know…I need to find more about it but there’s no ‘go-to’ literature that I know about.”

This sub-theme explores the implications of this phenomenon being poorly understood or addressed, relative to other neuropsychological conditions. These included challenges practicing without robust theoretical grounding, tools or guidelines and training, in addition to difficulties with staff understanding and engagement. One participant described their approach as ‘intuitive’ and variability in the approach to managing confabulation was noted as a result. This theme may be associated with theme 3b, discussing the emotional impact of working to support this condition particularly if there is limited guidance (e.g., anxiety and the need to tolerate uncertainty).

Many clinicians reported that their current knowledge and understanding of how to manage confabulation came from previous clinical experience. A few expressed gratitude for support and supervision earlier in their career. They discussed how it may be difficult for clinicians or trainees without this experience to know what to do, again resulting in reduced confidence and variation in practice.

> 03: “My [knowledge] has definitely come from my experience. I specifically had a supervisor who trained me in assessing it that way…I was lucky to experience it early on in my career.”

3d) The emotional impact of confabulation

The nature of confabulation was shown to cause confusion, distress and frustration for patients, families, staff and clinicians, making management challenging.

> 01: "If I find it exhausting and I'm not on the ward all the time. What's it like for nurses or family members if [the patient has] gone home and they're dealing with it every day? I think that's the biggest barrier, having that resilience to keep doing the same stuff repeatedly, that's exhausting."

Patients and families

All clinicians reported a likelihood of patient distress as a result of confabulation. This may arise from disorientation and confusion, moments when beliefs are challenged and/or the content of confabulation itself. In addition, participants reported how family members often became distressed watching their relatives react and respond to confabulations or when trying to challenge these beliefs themselves. As a result, distress was a key focus of management, including distress reduction for patient, families and carers and managing expectations.

Staff

Many clinicians shared insight into the emotional impact of managing confabulations on themselves and staff. Two participants described it as being 'heart-breaking' and draining, and three indicated that it was particularly difficult if challenging behaviour was present. Some explained that the sometimes 'relentless' nature of confabulations impacted the ability to respond in a compassionate manner at times and described using psychological strategies themselves to cope. This is in contrast to previously stated attitudes towards confabulation in theme 3b, where in some circumstances it may be viewed as a "side note".

This sub-theme is also associated with theme 2b, as having an understanding of the emotional impact on families appeared to be included in clinicians' formulations and intervention planning. In addition, when working with staff teams, knowledge of the emotional impact was reported to be the impetus for staff training and support as the team around the person is recognised as valuable in the management of confabulation.

4. The way forward.

> 05: “that’s where we need to focus, more literature, tools and something that’s more specific.”

Several suggestions were made to help advance practice. Recommendations included training, sharing knowledge, supporting those without experience and developing guidelines, tools and research (Appendix 2.16, pp.113). Most participants valued the development of informal tools such as a checklist or scale to support assessment and outcome measurement, and one discussed the possibility of running a Delphi study for the development of guidelines. Some discussed the benefit of this current study in facilitating relevant reflection and problem solving, suggesting that peer discussion may also develop this area further.

Discussion

Working with confabulation in clinical practice

The proportion of clinicians with relevant experience who provide assessment, formulation, and intervention for confabulation.

The results show that most clinicians with relevant experience would provide assessment, formulation, intervention and outcome measurement if they were to encounter confabulation following ABI in neuropsychology settings. This was also the case for the assessment and management of associated risk and psychological difficulties. However, fewer clinicians would provide intervention compared to assessment or formulation. This could possibly be due to an absence of experience or established guidelines pertaining to intervention. Or, as discussed by some participants, due to the lack of clinically validated strategies. To date there has only been one clinical trial attempting to validate a neuropsychological intervention paradigm specific to confabulation, therefore future research in this area is needed (Trivino et al., 2017).

Participant inclusion criteria for this study required some level of experience working with confabulation, therefore results reporting clinician experience may not accurately represent the overall clinical psychology and neuropsychology population. However, even within those with experience, fewer report experience providing assessment compared to formulation. This could be related to the clinician’s understanding of assessment, considering ‘assessment’ a more formal approach than collating information informally through discussions and observations. In addition, fewer clinicians were knowledgeable of standardised assessment and outcome measurement approaches compared to intervention. This may be related to the absence of well-established assessments and outcome measures. Findings from thematic analyses suggest this could be associated with the lack of theoretical understanding of confabulation itself. As a result, difficulties may exist measuring this phenomenon and thus developing robust, standardised tools. Schnider (2008) discusses similar issues stating that the theoretical underpinning of confabulation is poorly understood. Further theoretical investigation and classification of confabulation would likely improve this area of practice.

Furthermore, a relatively low number of clinicians reported having experience using some strategies, such as ‘avoiding confrontation’. This could be related to variance in clinician experience, knowledge, training and approach to management. However, these data only represented a proportion of the sample and low numbers could also be due to the use of open-response questions yielding limited information in online surveys (Reja et al., 2003). Nevertheless, open-response questions did allow for the collection of qualitative information and reduced data collection bias.

Approaches to management in current practice.

Overall, clinicians appeared to approach the management of confabulation similarly, by opting to use formal and informal measures, prioritising the importance of gaining a biopsychosocial understanding of the individual and their systems and allowing this understanding to inform bespoke intervention and outcome measurement. However, this study highlights that approaches to intervention are limited which, as discussed, may be due to few confabulation specific intervention methods being available with an established evidence base. Furthermore, participants had knowledge of and experience using a variety of management strategies throughout rehabilitation, however due to the remit of the study this has not been further explored and it is therefore unclear whether clinicians use a multimethod approach for example when or where they use multiple strategies. Based on preliminary data it is likely that many clinicians do adopt this approach however there is benefit to exploring this further in a more systematic way. In addition, all participants reported the importance of working with staff and families around the individual and recognising the impact confabulation can have on staff teams and themselves. However, some variability in clinician approach was also identified, pertaining to use of strategies and conceptualisation of confabulation. For example, some participants discussed using confrontation whereas others preferred not to use this approach, although most discussed using a combination of confrontation and concordance. Meanwhile, confabulation was found to be understood in the contexts of memory, awareness, belief constructs and/or behaviour. Such clinician conceptualisations are equally represented in current theoretical explanations which implicate memory and executive processes, levels of awareness and behaviour (DeLuca, 1992; Gilboa & Verfaellie, 2010; Nahum et al., 2012; Schnider, 2008). It is also possible that clinician conceptualisation of confabulation may contribute to variability in strategies used.

Treatment aims commonly identified when managing confabulation.

Interventions were found to target specific aspects relating to the management of confabulations, such as recognition, self-monitoring, and the skill of discerning between accurate and confabulated memories. Common treatment targets reported reflect some key theoretical explanations for confabulation, including self-monitoring theories and errorless learning paradigms (Nahum et al., 2012; Wilson et al., 1994). For example, direct feedback, orientation and diaries were used to raise awareness, aiming to improve self-monitoring of errors. Whereas errorless learning approaches were used to ‘fill in the gaps’ for the individual, preventing opportunities to confabulate, and aid learning of correct information, for example, about their brain injury. Interestingly, many participants highlighted the importance of supporting clients with wider factors associated with confabulation such as distress, behaviour and cognitive functions. This meant that clinicians often focused on wider treatment targets outside of aiming to reduce confabulation frequency and duration. Current literature similarly reports treatment paradigms which aim to reduce the impact of confabulations rather than frequency (Fish & Forrester, 2018). Literature, albeit limited, has shown that by supporting factors related to wider impacts, confabulation frequency and/or duration may also reduce. This was also discussed by a few participants in the present study, who suggested that distress and anxiety may trigger confabulations thus managing these aspects may indirectly reduce confabulation frequency. Finally, many clinicians reported providing interventions targeted at wider systems involved in the care of the individual, for example providing psychoeducation, psychological support and developing a shared understanding. This is consistent with the wider literature denoting the important role of families and systems in the rehabilitation of an individual with ABI, and the potential impact this can have on carers (McIntyre et al., 2020).

A finding of note is the recognition some clinicians gave to the development of trust and safety before implementation of more direct ‘confrontational’ techniques. This safe, therapeutic environment appears a clinically important aspect of managing confabulation and potentially key to treatment efficacy (DeLuca, 1992). However, it is not widely acknowledged in current literature exploring and validating intervention approaches. The value of therapeutic safety in the management of confabulation is an important area for future investigation.

Clinician confidence and experience in those with relevant experience

Survey responses show that only half of the sample felt confident managing confabulation following ABI which supports our initial impression that management can be difficult even within a sample that are relatively more experienced in this area. Qualitative analyses suggest this reduced level of confidence could result from an absence of literature and guidelines. Level of experience was also suggested to impede clinician confidence, something that may be affected by the rarity of this condition. In addition, a relationship between clinician confidence and experience was found, further strengthening this argument. However, it is important to recognise that this information was collected via self-report and therefore influenced by the clinicians' perception of their abilities. Wider literature exploring clinician confidence in therapy, suggests clinical psychologists may report reduced rates of confidence in their abilities particularly if they feel their training was not comprehensive (McMahon & Hevey, 2017). Participants in this study did indeed suggest that a lack of training in confabulation management may underpin reduced confidence. This also draws attention to potential limitations in assessing clinician confidence in relation to their clinical practice. Therefore, future research could replicate this study but also compare against self-reported confidence in managing conditions with established guidance. This will enable a more accurate assessment of whether reduced clinician confidence is specific to managing confabulation or clinical practice in general.

Current limitations in the management of confabulation

As discussed, current limitations in the management of confabulation relate to the absence of training and guidelines, limited evidence base and rarity of this condition. Most survey respondents indicated that further research would benefit clinical practice. Participants provided valuable suggestions including the development of checklists and scales to support assessment of confabulation following ABI and outcome measurement, and the completion of a Delphi study. In addition, participants valued this opportunity to reflect on the management of confabulation, suggesting that peer support groups may be beneficial to facilitate problem solving and sharing of ideas. Overall, there is a need for further development and evaluation of interventions.

Study limitations

Separate thematic analyses conducted on qualitative survey and interview data produced similar themes. However, questions across the survey and interview addressed the same topic, and samples partially overlapped, therefore identification of similar themes across both thematic analyses is not surprising. Nonetheless, this does give some preliminary indication of validity. With regard to participants, the sample and consequently the data were UK-centric, which means the scope for the findings to be generalised outside the UK context is limited. Additionally, it was not possible to factor in regional variation within the UK due to the small sample size. The representativeness of the sample is hence limited. Limitations around the phrasing and reliability of the survey questions also need to be considered. Specifically, several items used the phrasing "would you provide assessment/formulation/intervention/outcome measurement". This phrasing was chosen because we could not be sure that participants had experience in providing assessment, formulation, intervention and outcome measurement based on the inclusion criterion of having worked with at least one case, but we still wanted to know how they would respond if they were to encounter further cases. However, this phrasing allowed for the incorporation of hypothetical responses which (i) may have impacted negatively on the reliability of these survey items, and (ii) means the data may not accurately represent what clinicians actually do, possibly due to social desirability bias or because responses are based on a hypothetical scenario rather than direct experience. Further limitations concern the collection of survey data. Some respondents provided examples of strategies followed by 'etc.' meaning an exhaustive list was not collected. As discussed, this may also link to the low number of clinicians reporting experience using specific strategies. Therefore, this study has not resulted in a fully comprehensive list of strategies used in practice. Further study aiming to capture this would be beneficial. The intended sample size for the online survey was not met. This may be due to the limited experience clinicians have working with confabulation and thus individuals may not have met the inclusion criteria. Equally, this may reflect issues in recruitment methodology as this project was conducted within a limited time frame. Therefore, results should be interpreted with caution. Finally, as part 2 included interviews there is a potential risk of interviewer bias.

Conclusions

Overall, the study findings indicate practicing clinicians consider that confabulation can be effectively managed in clinical practice. However, there are several challenges which make management difficult. These include limited literature and validated interventions, limited training, and challenges specific to managing a rare and poorly understood phenomenon. Key findings were that clinicians emphasised the importance of providing holistic, personalised care which both encompasses and supports families and staff and is built upon a meaningful understanding of the client and their confabulations. Future research into the development and validation of management approaches is recommended.

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Appendices

Appendix 1: Systematic Review

Appendix 1.1: Definitions of key terms.

Intervention: "Any action intended to interfere with and stop or modify a process, as in treatment undertaken to halt, manage, or alter the course of the pathological process of a disease or disorder". *American Psychological Association Dictionary.*

Intervention may fall within phases of assessment, formulation and treatment. For the purpose of this systematic review, we will focus on any intervention falling within the 'treatment' phase.

Pharmacological: relating to interventions which rely on the use of pharmaceuticals.

Non-pharmacological: relating to interventions which do not rely on the use of pharmaceuticals.

Surgical procedure: a procedure where incisions are made to the body using instruments to repair injury or prevent disease.

Psychosocial: "the intersection and interaction of social, cultural, and environmental influences on the mind and behaviour." *American Psychological Association Dictionary.*

Appendix 1.2: Search strategy.

1. confabulation.mp.
2. confab*.mp.
3. 1 or 2
4. acquired brain injur*.mp.
5. Brain Injuries/ or brain injur*.mp.
6. brain damage.mp
7. (ABI or traumatic brain injur* or TBI or anterior communicating artery aneurysm or ACoAA or anoxic brain injury or anoxia or hypoxic brain injury or hypoxia or Wernicke* Korsakoff* or Wernicke* Korsakoff* syndrome or alcohol related brain injury or ARBI or alcohol related brain damage or ARBD or multiple sclerosis or MS or Parkinson* Disease or PD or stroke* or cerebrovascular accident or cerebrovascular disease or Huntington* disease or HD or motor neuron disease or MND or epilepsy or brain tumo*r or encephalitis or herpes simplex encephalitis or dementia or frontotemporal dementia or vascular dementia or FTD or VD or Alzheimer* disease or Alzheimer* or AD).mp.
8. 4 or 5 or 6 or 7
9. 3 and 8

Appendix 1.3: Inclusion and exclusion criteria.

Inclusion Criteria	**Exclusion Criteria**
Intervention study (non-pharmacological)	Confabulation in the context of psychosis
English language	Pharmacological and medical interventions/management approaches
Adult participants (18+ YOA)	Systematic reviews and abstract and poster publications
Unpublished literature	
Case studies	
Human participants	
Confabulation in the context of ABI and/or dementia	

Appendix 1.4: QualSyst scale.

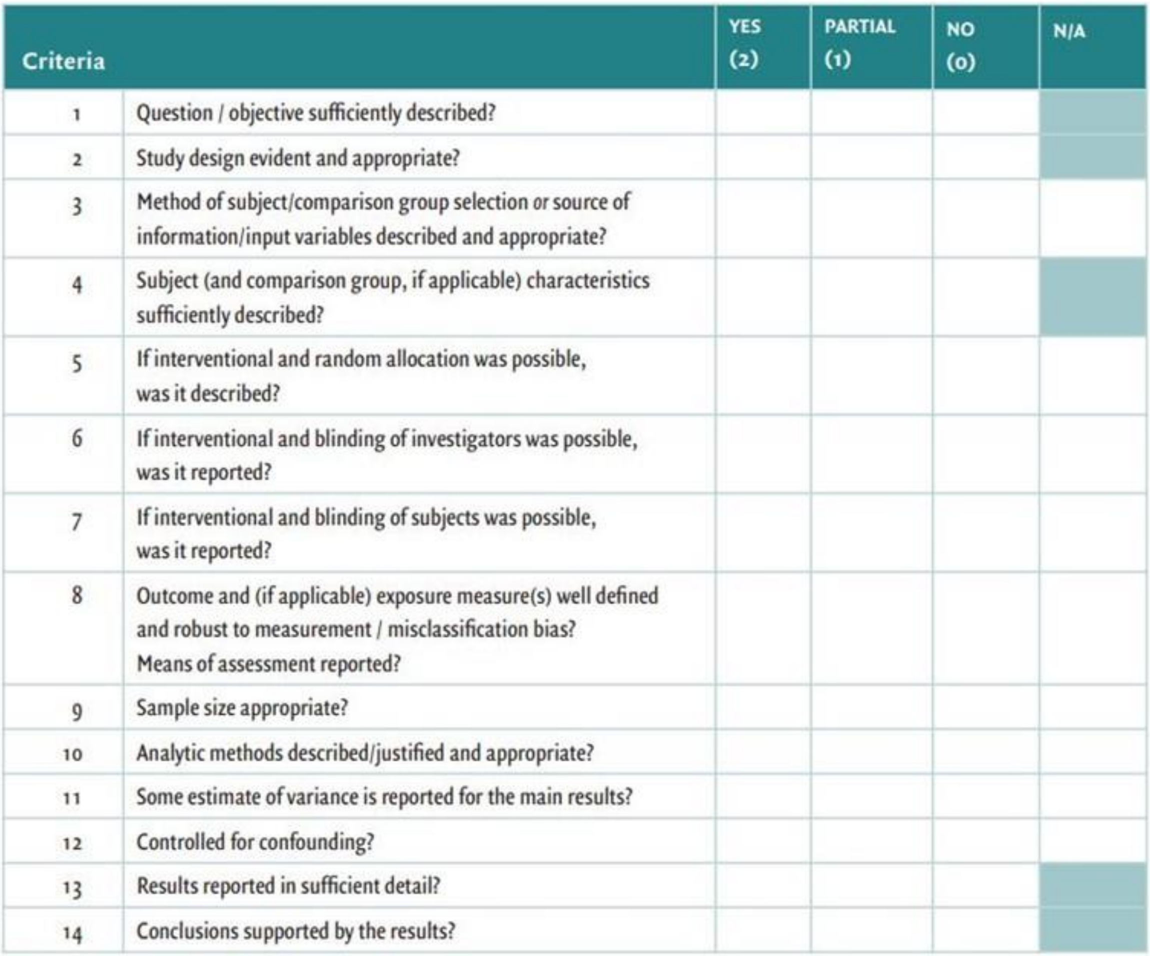


Table 1. Checklist for assessing the quality of quantitative studies

Criteria		YES (2)	PARTIAL (1)	NO (0)	N/A
1	Question / objective sufficiently described?				▨
2	Study design evident and appropriate?				▨
3	Method of subject/comparison group selection *or* source of information/input variables described and appropriate?				
4	Subject (and comparison group, if applicable) characteristics sufficiently described?				▨
5	If interventional and random allocation was possible, was it described?				
6	If interventional and blinding of investigators was possible, was it reported?				
7	If interventional and blinding of subjects was possible, was it reported?				
8	Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?				
9	Sample size appropriate?				
10	Analytic methods described/justified and appropriate?				
11	Some estimate of variance is reported for the main results?				
12	Controlled for confounding?				
13	Results reported in sufficient detail?				▨
14	Conclusions supported by the results?				▨

Appendix 1.5: Study characteristics.

Author (year); ***country***	**Design**	**Pop-ulation**	**Study aim**	**Con-fabulation described (Y/N)**	**Treatment rationale provided (Y/N)**	**Findings**
1. Burgess & McNeil (1999) *United Kingdom (UK)*	Case study	Adult, ABI	Theoretical implication: describe a case presentation of stable and content-specific confabulation.	Y	N	Reduction in behavioural response to confabulations and interpersonal disputes. Confabulations appeared specific and stable providing support for a more complex, integrative explanation of confabulation.
2. Dayus & van den Broek (2000) *Italy*	Case study	Adult, ABI	Explore use of self-monitoring training (SMT) in this population and its ability to attenuate delusions by rehabilitation of dysexecutive syndrome.	Y	Y	Findings indicate support for use of SMT in management of confabulations and associated behaviours. Wife reports some generalisation of treatment gains at home to everyday situations.
3. Del Grosso Desteri et al (2002) *UK*	Case study	Adult, ABI	To illustrate successful rehabilitation of cognitive sequalae of Herpes Simplex Virus Encephalitis (HSVE) with focus on independence in ADL's.	N	N	Concluded cognitive rehabilitation can support and improve cognitive sequalae of HSVE, despite severity of impairments.
4. DeLuca (1992) *United States of America (USA)*	Case study	Adult, ABI	To illustrate 'some intervention strategies' described in paper which relate to the model of 3 levels of awareness: intellectual, emergent and anticipatory.	N	Y	Intervention for unawareness of deficit related to confabulation is most effective following formal assessment of level of awareness, enabling interventions to be tailored to meet specific goals. Intervention may follow model discussed in paper, working to restore 3 separate levels of awareness.
5. DeLuca & Locker (1996) *USA*	Case study	Adult, ABI	To report the successful rehabilitation of cognitive difficulties following ACoAA, using theories of awareness.	Y	Y	Improvements in executive functioning and memory following cognitive rehabilitation, with successful return to premorbid employment. Therefore, this intervention was deemed successful.

Author (year); ***country***	**Design**	**Pop-ulation**	**Study aim**	**Con-fabulation described (Y/N)**	**Treatment rationale provided (Y/N)**	**Findings**
6. Fish & Forrester (2018) *UK*	Case study	Adult, TBI	Illustrate a formulation-based approach to managing confabulations, where intended outcome focuses on emotional impact of confabulation. Also, describe a first-person perspective of confabulation.	Y	Y	Collaborative approach enabled individual to manage and live well with confabulations through raising awareness and understanding.
7. Fotopoulou (2008) *UK*	Case study	Adult, TBI	Description of case study further illustrates aims of paper discussing importance of understanding meaning and content of confabulations from person-perspective. Overall gaining an understanding of motivation and aiding management.	Y	Y	Successful rehabilitation following intervention shows that by acknowledging the premorbid, idealised and wishful 'false selves' of the individual and subjective meaning of their confabulations, meaningful gains can be made and self-identity supported.
8. Mattioli et al. (1999) *Italy*	Case study	Adult, TBI	Explore neuropsychological presentations of confabulation and misidentification and provide justification for these to be treated as separate neuropsychological entities.	Y	N	During the 4-year observation a differential evolution of confabulation and misidentification was noted. The confabulatory syndrome 'shrank' with only minor intrusions recorded and confabulations becoming more plausible. Meanwhile, the individual continued to display the same misidentification. Therefore, it is argued that these constructs are separate entities and must be managed accordingly.

Author (year); ***country***	**Design**	**Pop-ulation**	**Study aim**	**Con-fabulation described (Y/N)**	**Treatment rationale provided (Y/N)**	**Findings**
9. Mills et al. (2006) *USA*	Retrospective descriptive	Adult, ABI	To report and review interventions used and functional outcome of individuals with ACoAA who engaged in an inter-disciplinary neuro-rehabilitation programme.	N presence or absence only	N	The level of supervision required by the sample reduced, however full independence was not achieved. Therefore, this approach to rehabilitation of cognitive difficulties may support functional capacity of individuals, reducing dependence on family members/carers.
10. Monteiro et al. (2011) *Brazil*	Case study	Adult, ABI	Illustrate the neuropsychological rehabilitation of neurological and psychiatric sequalae of Wernicke-Korsakoff's syndrome.	N Presence only	Y	Study illustrates that successful rehabilitation in this population requires a shared understanding and intervention which revolves around collaboration between MDT's, client and families, therefore using the IDT and holistic approach to work towards shared goals.
11. Rensen et al. (2019) *Netherlands*	Quasi-experimental	Adult, ABI	Explore the effects of errorless learning training on psychotic, affective and behavioural sequalae of Korsakoff's syndrome (KS).	Y	Y	Overall, errorless learning training in this population improved individual autonomy in long-term care settings and can result in a reduction of behavioural and psychiatric difficulties associated with KS.
12. Tiberg (2014) *Israel*	Case study	Adult, ABI	Illustrate transference during therapy may have been mediated by content of confabulations. This paper aims to discuss possible psychoanalytic and neuroscientific explanations.	Y	Y	Client's transference was found to include significant autobiographical events. It is suggested that as a result of poor episodic memory and reality testing and monitoring it is no surprise that strong emotions, provoked through transference, were presented in fantastic confabulations which matched their valence and intensity. Therefore, these emotions were still experienced 'to the full'. It is also suggested that the 'transferential confabulations' were produced in an attempt to justify these strong emotions towards the therapist. Finally, it is argued that psychotherapy should be considered for this population.

Author (year); *country*	**Design**	**Pop-ulation**	**Study aim**	**Con-fabulation described (Y/N)**	**Treatment rationale provided (Y/N)**	**Findings**
13. Trivino et al. (2017) *Spain*	Clinical trial	Adult, TBI and ABI	Design and test first known, empirical neuropsychological intervention for confabulation.	Y	Y	Treatment was shown to be effective in managing confabulations and has theoretical implications relating to mechanisms involved in the development and maintenance of confabulations. This provides robust hypotheses for future research to examine.

Appendix 2: Major Research Proposal

Appendix 2.1: Online survey.

Open Science Framework (OSF) link:
https://osf.io/cvb8f/?view_only=1da3689c246c4c4784b832d2085f4b8e

Appendix 2.2: Participant information sheet (part 1 and 2).

OSF link: https://osf.io/eqfhs/?view_only=0ccecba78ff243d0a20a63dcef8d59fe

Appendix 2.3: Consent forms.

2.3a) survey: https://osf.io/yhgp4/?view_only=6f93dc45cf564c7d813a66d90ecc8232

2.3b) interview: https://osf.io/6gwuc/?view_only=fe47d38605904e3685f535ba359c4de5

Appendix 2.4: Semi-structured interview questions.

OSF link**:** https://osf.io/upxc6/?view_only=580b99845a924436b457bbbafc396227

Appendix 2.5: Study advert.

2.5 a) Study advert (information):
https://osf.io/hk5ct/?view_only=b00c1d5b5aa3477ea367a06464746575

2.5b) Study advert (visual):
https://osf.io/rxt7m/?view_only=0453702df9c1455e98fdc829fafffead

Appendix 2.7: Assessment strategies and approaches clinicians have knowledge of and/or experience using (survey).

Strategy	Frequency	
	Knowledge	**Experience**
Neuropsychological assessment: - Memory - Executive function - Attention	 21 6 4	 13 5 3
Clinical interview	19	10
Informant report	15	11
Observations (inc. during cognitive testing and interview)	10	5
Assess quality of verbal report	6	2
Behaviour assessment and monitoring	4	2
Mood or distress scale	4	2
History taking	3	2
Case note review	3	1
Confabulation battery or screen (Dalla Barba et al., 2018)	3	1
Post-traumatic amnesia scales	3	2
Measures of insight	2	1
Ad-hoc assessment (e.g. assessing autobiographical recall against known information)	2	1
Orientation scales	1	0
Level of conviction (Rating scale)	1	1

Appendix 2.8: Formulation frameworks clinicians have knowledge or and/or experience using (survey).

Formulation approach/framework	**Frequency**	
	Knowledge	**Experience**
Biopsychosocial	13	13
5 P’s	4	0
Behavioural	4	4
Cognitive (e.g. cognitive-behavioural or delusions)	3	3

Appendix 2.9: Intervention strategies clinicians have knowledge of and/or experience using when managing confabulation (survey).

Strategy	**Frequency**	
	Knowledge	**Experience**
Psychoeducation (patient, families, staff)	15	12
Training/support to families and carers	11	11
Memory aids: e.g. diaries, note keeping, checking with others	9	9
(re)orientation	6	5
Self-monitoring	5	4
Distress management (patient, families, staff)	5	5
Direct feedback	4	2
Distraction/redirection	4	3
Reality testing or logical reasoning	4	4
Avoiding confrontation	4	4
Shared formulation	4	2
Scaffolding/Socratic questioning	3	1
Life story books or timelines	3	3
Behavioural approaches	3	2
“going along with it”, ”therapeutic lies”	3	1
Cognitive behaviour therapy techniques: e.g. thought challenging, behavioural experiments	4	4
Prompting	2	2
Errorless learning approaches	2	2
Confrontation	2	1
Motivational interviewing techniques	1	1
Validation	1	1
Family meetings	1	1
Written narratives	1	1

Appendix 2.10: Treatment targets identified by participants (survey).

Treatment target	Frequency
Insight	14
Manage associated distress	13
Support families and carers (e.g. training)	9
Understanding (patient, families, carers)	9
Memory function	9
Self-monitoring	5
Engagement in activities of daily living	5
Manage risk	5
Confabulation frequency	4
Interpersonal conflict	3
Reality testing	3
Interpersonal conflict	3
Orientation	2
Confidence managing confabulation	2
Acceptance	2
Independence using strategies	2
Time spent ruminating	1
Behaviour management	1
Self-identity	1

Appendix 2.11: Outcome measures clinicians are aware of for use in the context of confabulation following ABI (survey).

Outcome measure/approach	**Frequency**
Behaviour charts (e.g. to monitor frequency)	10
Distress measures (e.g. Public Health Questionnaire -9)	8
Rating scales (e.g. confidence, aggression, supervision rating scales)	8
Informant report	5
Goal attainment and engagement	5
Clinical observation	4
Patient report	3
Quality of life measures	2
Clinical judgement	1

Appendix 2.12: Factors relating to risk assessment in individuals with confabulation following ABI (survey).

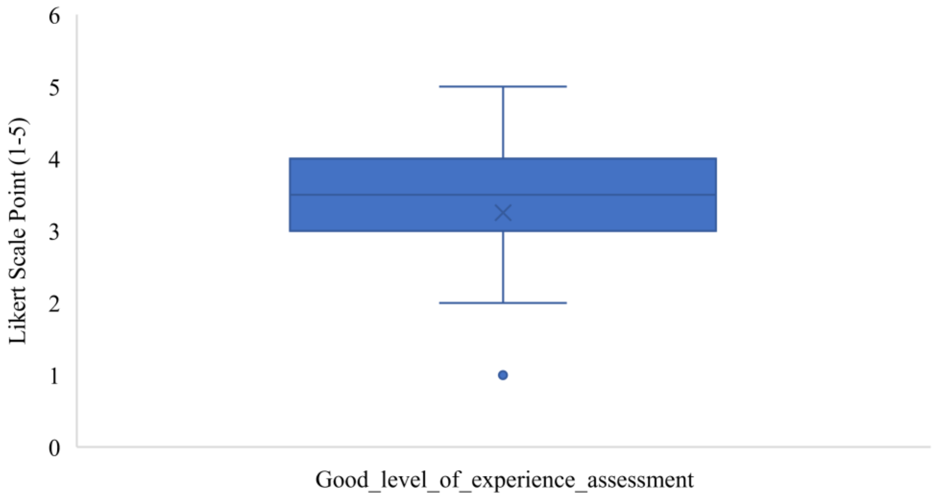
Risk factors	Frequency
Harm to others (e.g. aggression)	14
Harm from others (e.g. vulnerability due to confabulation and exploitation)	14
Harm to self (e.g. self-neglect or accidental)	13
activities of daily living (e.g. returning to work and independence)	7
Distress and suicidal ideation	6
Risky behaviour	5
Acting on confabulations	4
Capacity	4
Impulsivity or disinhibition	3
Absconding	3
Relationship breakdown	2

Appendix 2.13: Interventions for comorbid psychological difficulties which participants discussed when managing confabulation following ABI (survey).

Strategies	**Frequency**
Psychotherapeutic principles: - Acceptance and commitment therapy - Cognitive behaviour therapy - Compassion focused therapy	18
Behaviour management approaches	10
Cognitive rehabilitation	8
Psychoeducation	3
Social integration	1
Psychiatry liaison	1

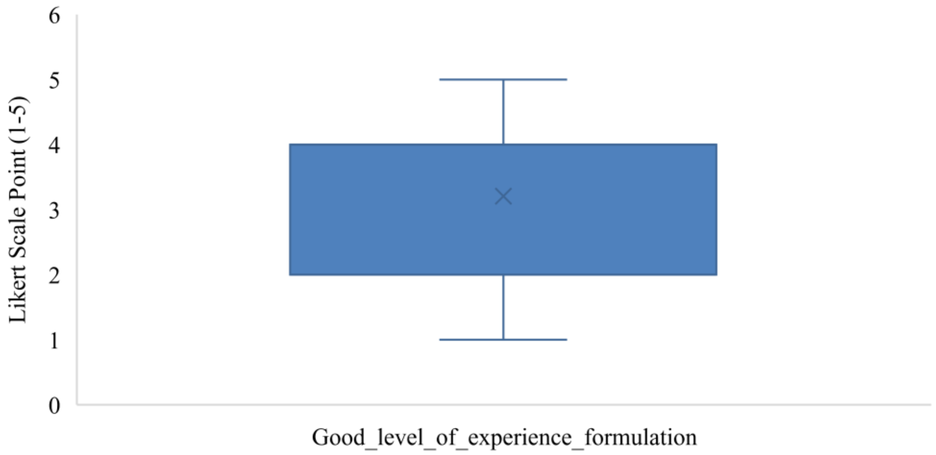
Appendix 2.14 Boxplots illustrating score distribution and outliers for data included in the correlation analysis.

a) A graph to show participant score distribution in response to the statement “I have a good level of experience in the assessment of confabulation”.

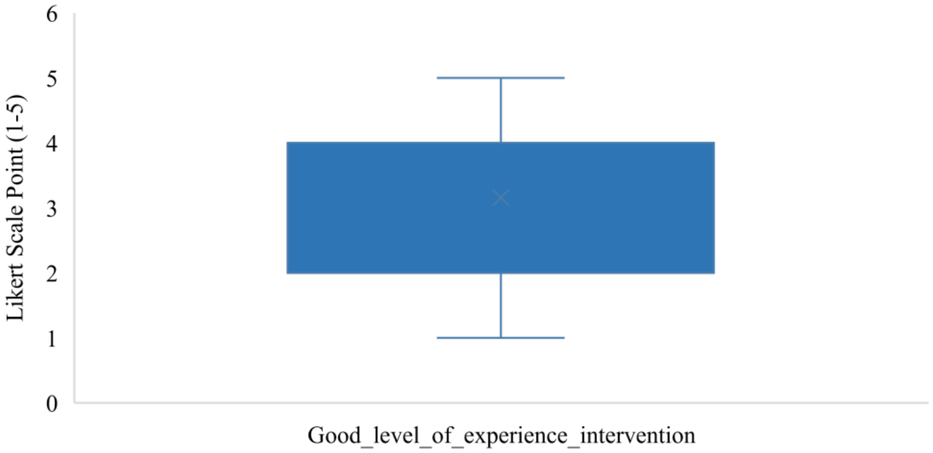


*outlier case number scoring 1 (n=4; 9, 14, 28, 37)

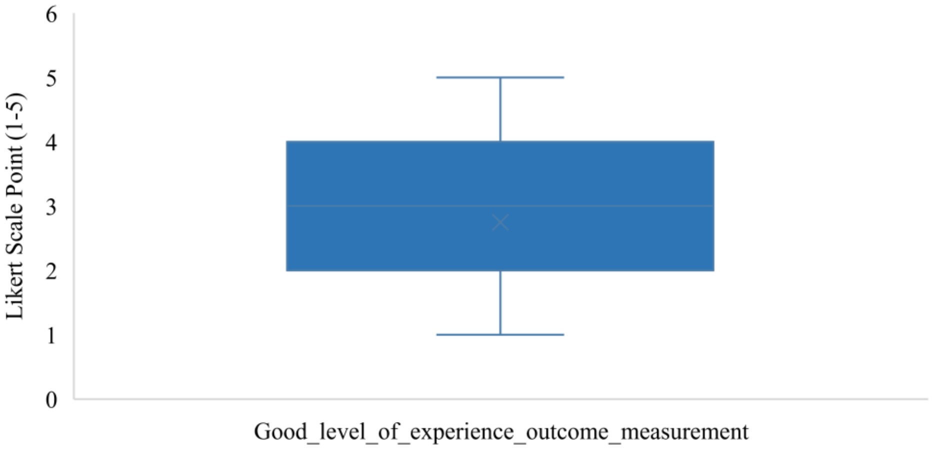
b) A graph to show participant score distribution in response to the statement “I have a good level of experience in the formulation of confabulation”.



c) A graph to show participant score distribution in response to the statement “I have a good level of experience providing intervention for confabulation”.

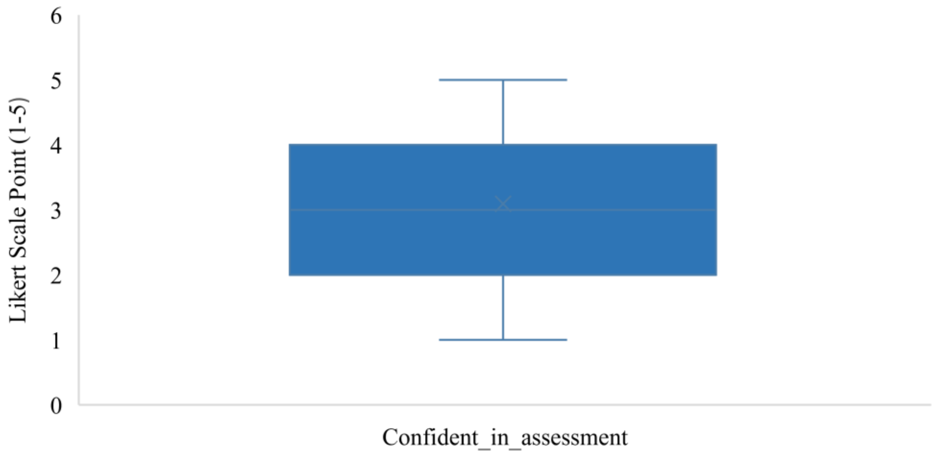


d) A graph to show participant score distribution in response to the statement “I have a good level of experience monitoring the patient outcomes relevant to confabulation”.

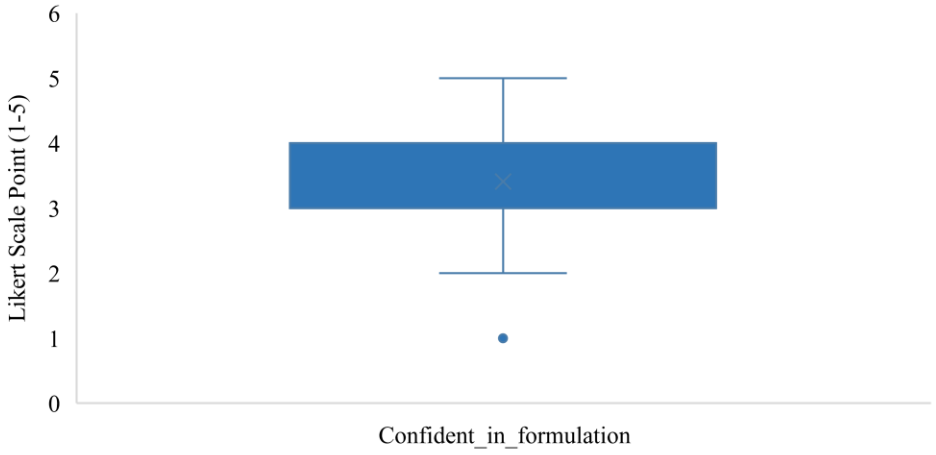


e) A graph to show participant score distribution in response to the statement “Overall I have a good level of experience working with confabulation in clinical practice”.

f) A graph to show participant score distribution in response to the statement “I feel confident in my approach to the assessment of confabulation.”

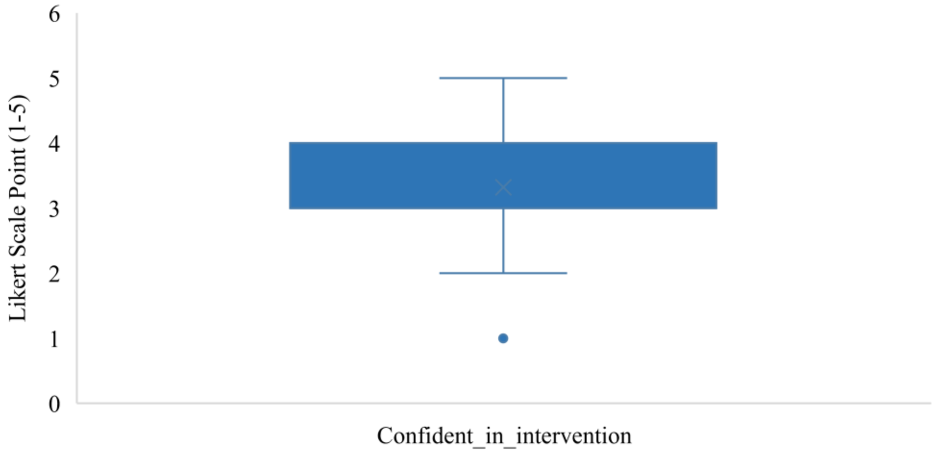


g) A graph to show participant score distribution in response to the statement “I feel confident in my approach to formulating confabulation.”



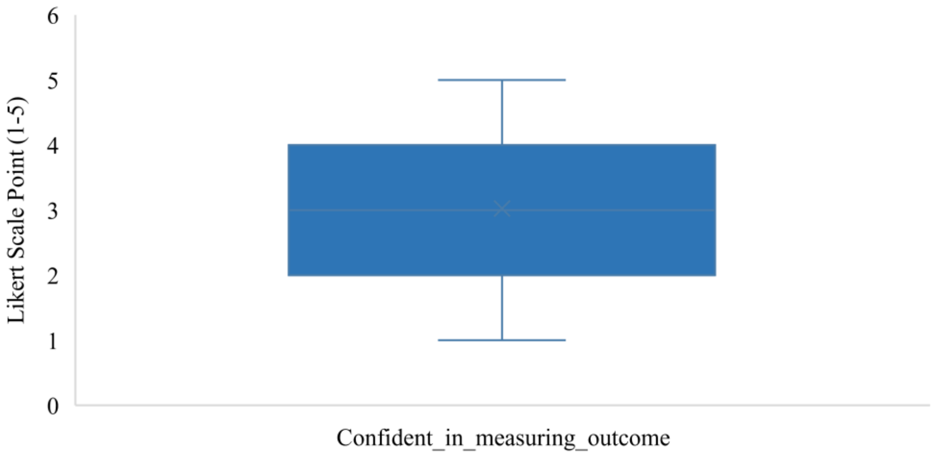
*outlier case number scoring 1 (n=1; 28)

h) A graph to show participant score distribution in response to the statement “I feel confident providing intervention and management approaches for confabulation.”

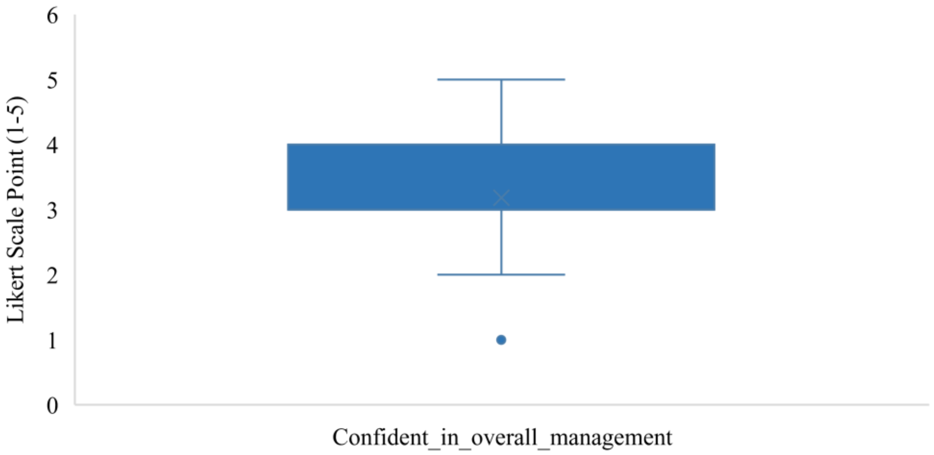


*outlier case number scoring 1 (n=1; 13)

i) A graph to show participant score distribution in response to the statement “I feel confident monitoring out comes in relation to confabulation.”



j) A graph to show participant score distribution in response to the statement “Overall, I feel confident managing confabulation in my current clinical practice.”



*Outlier case number scoring 1 (n=1; 13)

Appendix 2.15: Additional extracts supporting the interview thematic analysis.

Theme	Quotes
1. An individualised approach which acknowledges the holistic context of confabulation.	02: "I don't think of there as being some list of formal assessment tools that I would go to…even if there are formal assessment tools, I don't know very much about them, and we tend to take quite a qualitative approach."
	08: "You can't formulate purely by tests or questionnaires, confabulation has to really be understood in context…brain injury might provide the setting conditions for confabulation but you can't look at a scan or test results and say 'you're going to confabulate, and confabulate about x'".
	05: "we approach [formulation] with the bio-psycho-social formulation model. We would be building upon information gathered during assessment and would always talk about the persons functional ability and the neurological events of the illness, i.e. holistic approach."
	07: "I don't have any standardised tool or diagram specific for confabulation. The way I formulate would be just a very personalised formulation…pulling together what we know academically about confabulation with the individual experiences, the nature of their brain injury and memory difficulties, what's happening day-to-day and how their pre-morbid life may influence it".
	08: "I'm probably a terribly ignorant neuropsychologist but I can't think of a single well-validated intervention."
	08: "Even if there are standardised measures they'll have their limitations. A bespoke measurement, whilst that also has drawbacks, might be more reflective meaningful change and, unlike standardised tools, a bespoke thing is informed by the formulation."
	06: "It's really hard to measure outcomes…so define individuals goals and do goal attainment scaling or a situational analysis, see how often they get into conflict and if we can reduce that."
	07: "Even if it doesn't go away completely, I've seen people live with it much better and feel in control of it and even find a sort of interested curiosity about their memories."
	01: "I'd maybe use GOAT or ACE as a screening tool, to see if there's any improvements and inform the process overall. But I guess it's mostly the 'gut instinct', training and clinical judgement that you have… you're reliant on clinical observations, that's your tool."
	01: "It's dependent on how much time you have with the person to understand the nature of confabulations. If you're only on the ward once, then you have limited time to understand."
	08: "I'll see if there's anything suggestive of confabulation elicited from the standard tests…when people give you an overly detailed description of the accident, when it doesn't sound plausible given the injuries…that's an un-provoked, spontaneous confabulation. If you're doing a logical memory test and people go off on a tangent, elaborate or recall details which were never there, that's more of an elicited confabulation"
	06: "I don't usually apply any kind of formal assessment, it's rather the observation during for example memory testing, but I rarely apply any kind of tests specialised for confabulation."
1a) balancing confrontation with concordance	08: "I think there might be a need for prioritising, well 'in what way is this [confabulation] the most disruptive or debilitating to your life? Let's focus on that'…then you might want to start with one that is held with less

	conviction…so you almost make a hierarchy.…you might then think of outcomes not whether the [confabulation] goes away, but whether you loosen the conviction with which it is held…It would be nice to have a standardised measurement tool but see it very much as a sort of secondary supplementary tool.”
	04: “If I can fill those gaps with the right information then it will hopefully reduce the confabulation frequency….so errorless learning to give information to them so they don’t confabulate.”
	08 “Do they challenge it, endorse it or ignore it.”
	06: “Where the memory deficit is not that severe and they have some insight then I try to confront and challenge their belief…but I try to avoid conflict in their everyday life [this] is probably more important than discussing if the memory was true or not”
	07: “Giving [families] guidance on how to strike a balance between not colluding [with confabulations] but also not just ending up in a back-and-forth every day with someone when it’s not helping.”
	04: “People need to feel that they are in a safe environment because it’s confusing…we can’t do without a good relationship or trust, because otherwise we’re just a stranger telling them something that they believe to be true is not. This just causes distress and disengagement…[challenging] would come at a later stage.”
2. Integration is key 2a) Importing theoretical perspectives and intervention techniques from other conditions.	03: “I’ve found that confabulation is usually something related to a memory deficit and then combined with a problem of insight and awareness…more active kind of defensive denial…this person confabulates because they can’t really cope with the fact that they don’t know something, it doesn’t go with their self-concepts”
	02: “Is it appropriate to think of them as beliefs? I think confabulation is very much like that.”
	01: “I use principles of managing challenging behaviour, because confabulation could come under the categories of challenging behaviour, especially if somebody was verbally aggressive in relation to their confabulation…I think that’s really important in all phases of management.”
	03: “I think about it more in the context of memory disorders or behavioural disorders, sometimes even communication.”
	06: “If the patients are convinced with what they are saying, you can compare it to schizophrenia when people are convinced of delusions, then it’s hard to convince them they’re incorrect…if there is no doubt in the patients and there is no suffering or risk then why would they accept any kind of treatment?”.
	07: “I think a good broad based approach to assessment is just as useful in confabulation as it is in any other ABI related condition…we don’t always need something special for confabulation…you just get a good clinical history, collateral information and cognitive testing- those are three core neuropsychological skills anyway.”
	08: “I don’t think we have very good theoretically driven assessment…I mean I try to bring in my own ideas”.
2b) Importance of the family and wider systems.	05: “If confabulation was present it would absolutely be necessary to have the family involved throughout, right from the start and through to the management…If you don’t have the family then you don’t have the great informer to give us context …how would you know about the confabulations? This makes it clinically difficult.”

	01: “If you identify something that’s helpful and then you make sure that is used in a team. And that’s a fundamental issue working in in-patient or team settings is getting that whole ward-based approach…if one person is not doing their part then it undoes all the work of everybody else.”
	01: “You’re using your clinical observations to guide other therapies and their rehabilitations…if you’re making timely decisions to get rehab in a critical period. If you start to see windows of opportunity that someone can engage in other therapies as part of their rehab, then you share this observation with your team so they can do other parts of the holistic rehabilitation.”
3. Specific challenges relating to the management of confabulation. 3a) Case-specific	05: “When you’re working with people who are more severely cognitively impaired…a lot of our interventions are not always direct 1:1 work, sometimes it’s more indirect and about the environment”
	01: “There wasn’t scope to use logic for that person, their brain injury was more severe, so you were just alongside them as long as there wasn’t any risk.”
	06: “Treatment [of confabulation] depends on several aspects…how severe is the memory deficit…the aetiology…how chronic is the stage and time since injury……do they have some kind of insight?”
	07: “If you’re wanting to use approaches like self-monitoring and reality testing for confabulation intervention then you need a pretty high level of insight and awareness which isn’t there for all people, so for others it’s more about environmental grounding and trying to build a reality in that environment as much as possible.”
	08: “Confabulation’s an attempt to make sense of something…and sometimes you can’t get beyond that, it’s such a powerful thing, it’s the only way they can make sense of their experience. So sometimes it’s very difficult to get over that, it’s such an emotionally powerful kind of barrier to therapy.”
	07: Several of the clients I’ve worked with in later stages were able to do that [self-monitor] but not 100% of the time.”
3b) The prevalence of confabulation	08: “My feeling is the more experienced you are, the more likely you might have come across it.”
	07: “People lack confidence in the cross-over with psychiatric conditions…It makes it difficult for clinicians to know what to do, they think ‘should I treat this as a psychosis or as a dementia, should I send them to a psychiatrist? What should I do? And especially when it’s associated with challenging behaviour.”
	03: “I can’t remember ever having had training, it’s always been a little bit of a side-note.”
	05: “You often feel like confabulation is often at the back of the book or in a glossary, or as an add on to memory…even when you look at Lezak it’s just like ‘page 86’!”
	02: “…we’re sort of saying look [confabulation] is a side portion that comes with the main event, and the main event is the head injury, that’s the thing we really care about.”
	02: “Confabulation lives in this hinterland between neurology and psychiatry, it’s challenging to know where it lands.”
	02: “We presented [a case] to our department and a colleague of mine said why try and change this person’s confabulation…like I was kind of overstepping what was reasonable to even do…there seems to be this attitude, it’s like it’s a symptom of the early brain injury and as the person gets better

	confabulation gets better. So that seems to be a sort of fatalistic approach right?”
	02: “In an acute general hospital it’s not taken that seriously in general, or as something to delve into the meaning of and formulate…that doesn’t come from a lack of interest on my part it comes with the demands that are made on me by the people I’m working with, so a doctor.”
3c) We don’t know we’re just trying our best.	05: “I don’t know enough of the interventions, perhaps it’s not a topic that we’re regularly seeing interventions specifically targeted for.”
	04: “I’ve not had that extensive experience…I think that’s the main challenge, the uncertainty of knowing if you’re doing the right thing…there’s a lack of guidance so you’re just going with your own judgement and sometimes it’s like ‘am I doing this right?”
	02: “For my purpose in this job, in acute general hospital, there’s not often the time or a need to get into the weeds.”
	06: “I think the lack of awareness into these deficits is of course a challenge…and yes, of course we don’t have a manual.”
	03: “I see people with confabulation not being supported and accused of being manipulative by paid support workers or families…one of the issues we have in this country is that staff are very poorly paid and don’t get paid to train…in a facility [confabulation] is regarded as something that they’re stigmatised for, ‘you’re telling tales’.”
	08: “The challenge is the limited theoretical basis for assessment, if you haven’t got a theoretical assessment you haven’t got a theoretically driven intervention.”
	01: “I’ve had the luxury of only ever working in neuropsychology…there’s things I do quite automatically… I met [a case] early in my career and it’s been really opportune as I’ve used that experience as a way of working with other clients.”
3d) The emotional impact of confabulation.	01: “Sometimes confabulation does resolve…but for some who are more severely impaired it doesn’t…having these conversations with staff and families is key in managing confabulation…helping people have realistic expectations…If I find it exhausting and I’m not on the ward all the time what’s it like for nurses or family members if [the patients] gone home and they’re dealing with it every day? I think that’s the biggest barrier, having that resilience and capacity to keep doing the same stuff repeatedly because that’s really exhausting.”
	06: “I think it’s hard for the relatives to understand that the confabulations are not done on purpose that they are part of a deficit, but they feel insulted and take them seriously and of course the relationship may be challenged.”
	01: “If you’ve got somebody on the ward who is getting annoyed with staff because they believe they should be doing this or that, you know it’s exhausting to deal with all the time. If you can make staff feel more educated about it and understand the impact this has on yourself then that’s helpful.”
	01: “If somebody is quite aggressive towards you it’s really hard not to get upset, hard to keep yourself together and not take it personally…I’ll openly say there are times where I sit and think ‘oh god, here we go again’…I think tools and anything else you have is an extra bonus – but for me the biggest barrier is environment, staff, communicating information and managing your own stuff, doing the same thing day in day out.”
	01: “I use really quick simple strategies that I also use with my patients, ‘STOP, BREATHE, CHECK-IN, RE-ENGAGE’. It’s about being honest about how difficult it is, using supervision. There’s been many times where I’ve come back to my office and thought ‘today has been really hard’… that’s why I do spend a lot of time working with staff, I want them to be able to acknowledge that as well.”
	03: “It’s really tough working with families because they can be very blunt, the way they respond to confabulation. Often they’re expressing their own exasperation.”

4. The way forward	01: “If I didn’t have this knowledge and my own internal database I would love [a tool], if I have a trainee it’d be great to have a tool to share with considerations for confabulation... I’d love to hear what other people use or how they manage and respond.”
	07: “It would be really nice to have stuff that’s published describing the range of options available to people…the range of assessment, formulation, intervention and outcome measurement options.”
	04: “I think with confidence, we need things that tell us what to do, some guidance.”
	07: “Your questionnaire made me think ‘I wonder if that would sometimes be useful in clinical practice’.”

Appendix 2.16: Future recommendations (interview).

Recommendations
1. Tool to support assessment - checklist including different presentations and symptoms - Patient and informant questionnaire (cross-check information)
2. Education booklets for families/carers
3. Platform to share approaches amongst health professionals and encourage cross-talk between professions
4. Tools to support outcome measurement - behaviour monitoring: severity/intensity, frequency, duration, impact (distress) of confabulations - scales: monitor associated distress, confidence in recognising/managing beliefs, level of conviction, awareness, orientation -
5. Guidance, suggested treatment paradigm
6. Document detailing: - range of management options (tools/methods/approaches) - factors relevant to assessment/formulation/treatment

Appendix 2.17: Final approved Major Research Proposal.

OSF link: https://osf.io/xd2z6/?view_only=9b9e0c360482475ab87f03f59b47ab22