Improving social problem solving in individuals with Traumatic Brain Injury - Evaluation of an autobiographical memory cueing procedure

& Research Portfolio

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A change to the triage assessment procedure within Ayrshire & Arran Adult Psychological Therapies Service: Does it save clinician time?

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Prepared in accordance with the guidelines for ***Clinical Psychology Forum*** (journal of the Division of Clinical Psychology, British Psychological Society) (see Appendix 1 for contributors notes)

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Forty word summary (required by Clinical Psychology Forum)

This audit compared the difference in time taken to complete a standardised triage assessment procedure with the original procedure of writing case notes and sending a detailed assessment letter to the referrer. Time was saved by writing a standardised letter to the referrer but this effect was lost due to the variation in time taken to complete other assessment tasks. Recommendations to review the standardised procedure are made.

Abstract

Ayrshire & Arran Adult Psychological Therapies Service (APTS) has a skill mix within the department, including Clinical / Counselling Psychologists, CBT therapists, Counsellors, Assistant Psychologists and Group Analytic Psychotherapists. In order to allow most effective use of this skill mix a triage assessment system operates, which involves patients being offered an initial assessment session which determines their allocation to the most appropriate waiting list. Long waiting lists exist for psychological treatment in APTS, and the initial triage assessment sessions and subsequent letter writing to the referrer uses valuable clinician time which could be used for treatment. Therefore a change to the triage assessment procedure was piloted. The pilot procedure involved sending a short standard letter to the initial referrer and completion of a Standardised Assessment Details (SAD) form outlining valuable information. The length of time taken to complete the pilot procedure was compared with the original procedure which involved writing case notes and sending a detailed assessment letter to the referrer. The standard letter did take significantly less time to complete than the assessment letter, but clinically the time saved was lost due to the variation in time taken to complete other assessment tasks. Clinicians comments indicate that the SAD form and standard letter may require refinement should the procedure be implemented on a permanent basis.

Introduction

Background

Lengthy waiting times for psychological care and the effective use of clinical psychologists have been priority issues for some years and were highlighted in a review of psychological services in Scottish healthcare (SCPMDE 1999).

The Mowbray report (Management Advisory Service 1989) recommended that psychological care should be provided by a combination of accredited therapists delivering psychological therapies (level 1 & 2 skills), and Clinical / Counselling Psychologists providing individually tailored interventions, based on more complex psychological formulations (level 3 skills).

Service-Related Issue

In line with the recommendations of the Mowbray report, Ayrshire & Arran Adult Psychological Therapies Service (APTS) has a skill mix within the department, including Clinical / Counselling Psychologists*, CBT therapists, Counsellors, Assistant Psychologists and Group Analytic Psychotherapists. In addition, results of meta-analytic studies by Wierzbicki & Pekarik (1993) and Stein & Lambert (1995) indicate that psychological therapies can be successfully applied by other appropriately trained professionals, which further supports this skill-mix model of psychological care provision.

In order to allow most effective use of the skill mix within APTS a triage system operates, which involves patients being offered an initial assessment session

**APTS do not differentiate between qualified Clinical and Counselling Psychologists in terms of roles or core skills. The term 'Psychologist' will be used throughout this document to refer to either professional*

which is carried out by either a Psychologist or a CBT therapist. On the basis of this assessment the clinician decides whether patients can benefit from psychological input and if so, which type of treatment option is most appropriate. Patients are then allocated to either short or long term individual treatment with either a Psychologist, Counsellor, CBT therapist or Assistant Psychologist. Alternatively they are allocated to a waiting list for group treatment.

The available groups are Analytic Group Therapy, Anger Management Group, Anxiety Management Group or Depression Group.

Long waiting lists exist for psychological treatment in APTS, and the initial triage assessment sessions and subsequent letter writing to the referrer uses valuable clinician time, which could be used for treatment.

In an attempt to reduce waiting list times by ensuring that clinician time is used most effectively, a change to the triage assessment procedure has therefore been piloted.

Current Audit

The present audit was being carried out in order to investigate how this change to triage assessment procedure impacts on the amount of clinician time devoted to the task. The results will help to inform any decision regarding a permanent change to the system.

The pilot triage assessment procedure will consist of two changes. Firstly, instead of writing a detailed assessment letter to the referrer after the single triage assessment session, the assessing clinician will send a short standard letter. It was envisaged within APTS that this would reduce the total time taken

to complete the assessment process. With the new system a detailed assessment letter would only be sent to the referrer at triage assessment stage if the patient is discharged at that stage, or if the complexity of the case warrants a detailed letter. A full, detailed assessment letter would only be sent once the patient had commenced treatment.

Secondly, instead of case notes, the assessing clinicians will complete a Standardised Assessment Details (S.A.D.) form. Clinician's notes that are entered in to case files vary in length and content and the purpose of the S.A.D. form is to ensure that in the absence of a letter, relevant information which may be required by the referrer or other agencies is still readily available. It was envisaged this would allow decisions to be made regarding patient suitability for a trainee caseload. The S.A.D. form is kept in patient's case notes.

As well as comparing completion time for the original and pilot procedures, clinician's perceptions of how the pilot procedure impacts on their experience of triage assessment were sought.

The amount of time taken to carry out the original triage assessment procedure, including doing a letter, was recorded and compared with the length of time taken to carry out the pilot procedure, in which a short standard letter was sent out instead of a detailed assessment letter.

Clinical Governance

One of the structures which underpins clinical and organisational effectiveness within Ayrshire & Arran Clinical and Consulting Psychology Services is the Monthly Clinical Governance Forum, which plans and undertakes various activities including screening research proposals. A detailed proposal outlining

the design of the current audit was submitted to and approved by the Clinical Governance Forum prior to commencement. It was recommended that the audit did not require ethical approval as it is survey of a pre-planned change to one aspect of an existing triage assessment system.

Aims

1. To examine whether or not clinician time is saved by completing a short standard letter instead of writing a detailed assessment letter to the referrer.

2. To examine clinicians experiences of completing a short standard letter instead of writing a detailed assessment letter.

3. To examine clinicians experiences of using the S.A.D. form as an alternative to case notes.

Method

Design

This study was designed as a service related survey of a pre-planned change to one aspect of an existing triage assessment system.

Time Frame

Clinicians were asked to carry out time recordings between 9TH May 2005 and 20th June 2005.

Participants

The twelve clinicians who carried out the triage assessments within APTS were informed that the proposed change to the procedure was being piloted within the department.

Materials (See Appendix 2)

Instructions for assessing clinicians

Recording sheets for time taken to carry out assessment tasks

S.A.D. form

Example of short standard letter for referrer

Return envelope

Procedure

Twelve clinicians were asked to make four consecutive original triage assessment procedure recordings, one for each patient (stage 1). They were then asked to make four consecutive pilot triage assessment procedure recordings, for four different patients (stage2). It was envisaged that each clinician would therefore make eight assessment recordings, resulting in ninety six recordings in total.

The number of triage assessment sessions that individual clinicians carry out within the department varies. It was recognised that not all clinicians would be able to complete four original and four pilot recordings. They were instructed therefore to make three and three, or two and two original and pilot recordings. This meant that they would be able to complete both original and pilot recordings within the time frame available.

All recording sheets were anonymised and the clinician code was not matched to any name or recorded anywhere. Clinicians were informed of this on their instruction sheets.

Stage 1 -

The triage assessment procedure as it originally operated was audited first. Assessing clinicians were given instructions to record on the anonymous sheets provided, the length of time, in minutes that it took them to complete the following tasks –

1. The assessment session
2. Re-writing or tidying up case notes ***after*** session
3. Scoring of the C.O.R.E. form
4. Completion of proforma (allocation to waiting list)
5. Any communication with referrer for purpose of providing or requesting further information
6. Writing assessment letter to referrer
7. Any additional checking and finalising of letter.

This process was completed by each participating clinician, for an average of 3 successive patients. Once clinicians had completed their recordings they were asked to proceed straight to part B.

Stage 2 –

The pilot triage assessment procedure was audited next. Assessing clinicians were given instructions to record on the anonymous sheets provided, the length of time, in minutes that it took them to complete the following tasks -

1. The assessment session using S.A.D. form

2. Re-writing or tidying up S.A.D. form ***after*** session

3. Scoring of the C.O.R.E. form

4. Completion of proforma (allocation to waiting list)

5. Any communication with referrer for purpose of providing or requesting further information

6a. Writing short standard letter to referrer

OR

6b. Writing more detailed discharge / assessment letter to referrer if required

7. Any additional checking and finalising of letter

This process was completed by each participating clinician, for an average of 3 successive patients. Clinicians were also asked at this stage to answer the four following questions related to the triage assessment procedure –

Q1. How complicated did you find the above tasks in the pilot assessment procedure, compared to the original procedure?

Easier Same Harder

Q2. Did the pilot procedure feel that it took more or less time to complete than the original procedure?

Less Time Same More Time

Q3. Do you feel that the short standard letter is more or less appropriate for the referrer at this stage, compared to the detailed assessment letter?

More Appropriate Same Inappropriate

Q4. Do you think information on SAD form is easy for you or others to access, in absence of detailed letter?

Easier Same Harder

Assessing clinicians were then asked to return their recordings in the envelope provided.

Results

Out of twelve clinicians who carry out triage assessments, seven returned recording forms. There were 19 assessment recordings completed for stage 1 and 18 for stage 2. For each of the 18 pilot procedure recordings all 4 associated clinicians questions were completed.

Table 1. Assessment session with patient

Stage	Task	Number of recordings	Average minutes	Standard Deviation	Range	Minimum Maximum
Stage 1	Session	19	54	9.8	40	40-80
Stage 2	Session	18	57	8.4	30	45-75

The average time taken to complete assessment sessions in stage 1 was 54 minutes and 57 minutes in stage 2. The standard deviations show that the times in both stages had similar levels of variability. Frequency histograms showed that the data was approximately normally distributed and there were no extreme scores.

Table 2. Re-Writing after session

Stage	Re-Write notes	Number of recordings	Average minutes	Standard Deviation	Range	Minimum Maximum
Stage 1	Case Notes	19	9	13.03	35	0-35
Stage 2	SAD Form	18	10	8.1	30	0-30

The average time taken to re-write case notes was 9 minutes and the average time to re-write the SAD form was 10 minutes. The standard deviations show

that there was slightly more variability between the times taken to write case notes that the SAD form. Frequency histograms showed that the data for re-writing case notes was positively skewed indicating that 14 out of 19 sessions took less than 10 minutes to write up after session. The data for re-writing the SAD form was approximately normally distributed with no extreme scores.

Table 3. Scoring Core and completing Proforma

Stage	Task	Number of recordings	Average minutes	Standard Deviation	Range	Minimum Maximum
Stage 1	Core & proforma	19	4	2.8	10	0-10
Stage 2	Core & Proforma	18	5	2.7	8	2-10

The average times taken to complete the CORE form and the Proforma in stage 1 and 2 were 4 and 5 minutes respectively. The standard deviations show that the times in both stages had similar levels of variability. Frequency histograms showed that the data was approximately normally distributed and that there were no extreme scores.

Table 4. Types of letter

Stage	Task	Number of recordings	Average minutes	Standard Deviation	Range	Minimum Maximum
Stage 1	Assessment letter	19	17	14.00	51	4-55
Stage 2	Standard letter	18	9	6.87	24	3-27

The average times taken to write the assessment letter and the standard letter were 17 and 9 minutes respectively. The standard deviations show that there

was more variability in the times taken to complete the assessment letters than the standard letters. Frequency histograms show that the data for assessment letters and standard letters were both positively skewed with no extreme scores.

Recorded times for writing the assessment letter were higher *(X = 17, SD = 14)* than recorded times for writing the standard letter *(X = 9, SD = 6.87)*. The Wilcoxon test *(t=10.25)* was converted to a z-score of *–2.25* with an associated one tailed probability level of *0.01*. It can therefore be concluded that in this sample the standard letter took significantly less time to complete than the detailed assessment letter.

Table 5. Total Times for stages 1 and 2

Stage	Task	Number of recordings	Average minutes	Standard Deviation	Range	Minimum Maximum
Stage 1	Whole Procedure	19	85	17.35	46	64-110
Stage 2	Whole Procedure	18	80	15.86	58	51-109

The average times taken to complete the whole procedure in stages 1 and 2 were 85 and 80 minutes respectively. The standard deviations show that the times in both stages had similar levels of variability. Frequency histograms showed that the data for stage 1 had a bimodal distribution and the data for stage 2 was approximately normally distributed both with no extreme scores.

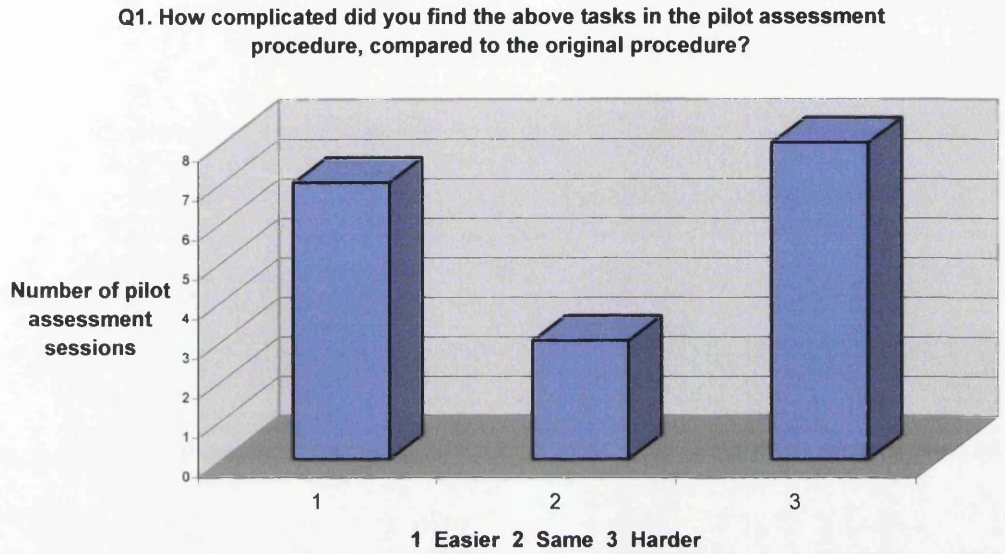
Summary of Time Recordings

The data shows that in this particular sample there is no difference between the total times taken to complete assessments in stage 1 and stage 2. However the standard letter did take a significantly shorter time to complete than the detailed

assessment letter, but this effect appears to be lost due to the variation in times taken to complete other tasks.

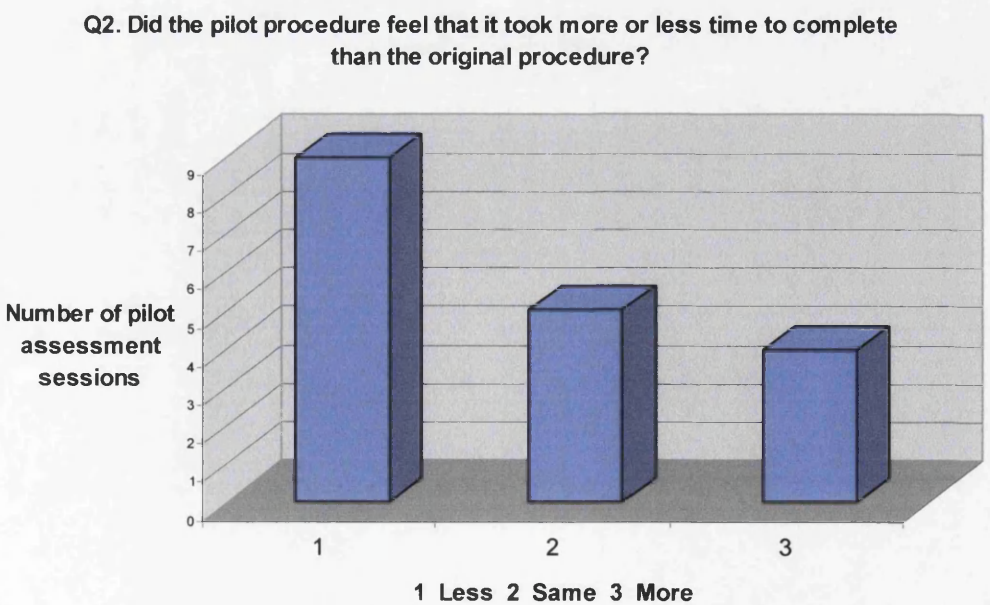
Pilot Assessment Procedure Questions

Graph 1.



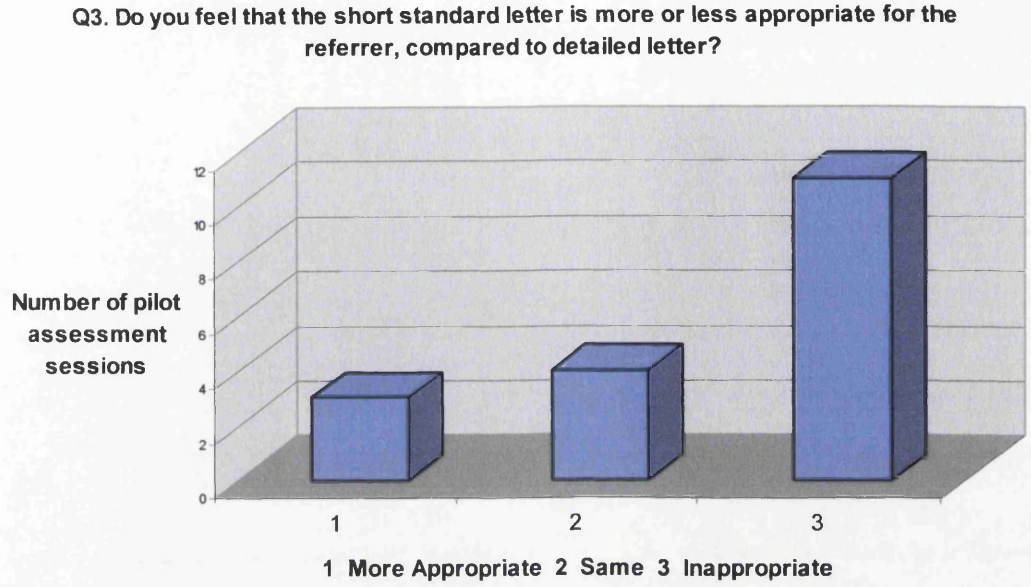
On seven out of the 18 sessions, clinicians reported that the pilot assessment procedure was easier but on eight out of the 18 sessions clinicians reported that it was harder.

Graph 2.



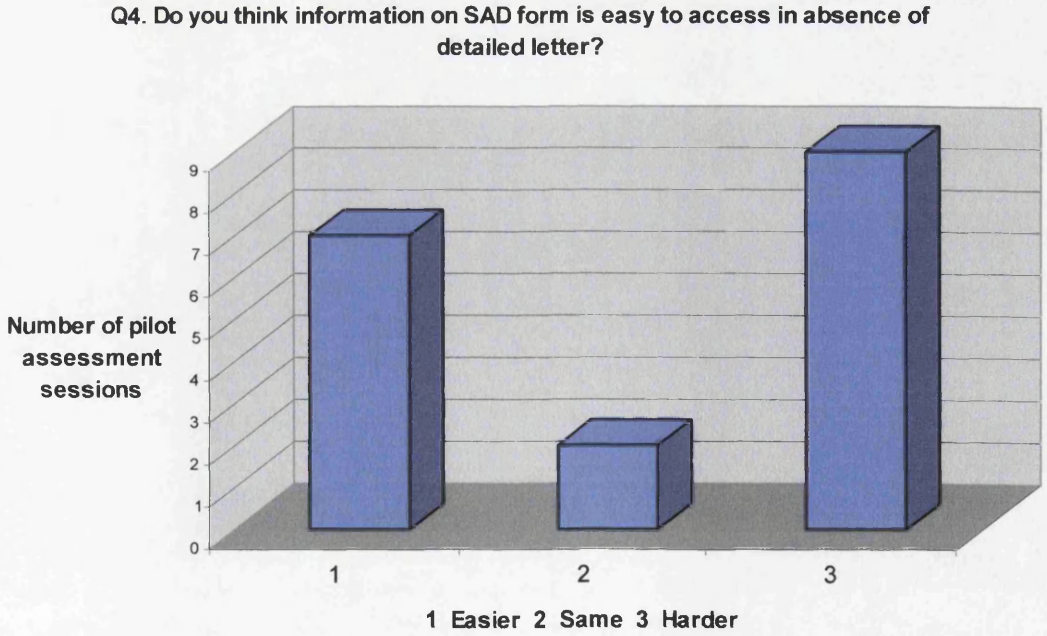
On nine out of the 18 sessions recorded, clinicians reported that the pilot procedure felt like it took less time.

Graph 3.



On eleven out of the 18 sessions, clinicians reported that they felt the standard letter was not appropriate.

Graph 4.



On seven out of 18 recorded sessions clinicians reported that they thought the information was easier to access. On nine out of 18 recorded sessions clinicians reported that they thought the information was harder to access.

Informal feedback

Clinicians also gave informal feedback. Extra comments were written on the forms or verbal feedback was given. These data are reported below in Table 6.

Table 6.

	Comments	Frequency of comment
SAD Form	Different from usual method of writing notes so took extra time	X2
	Form was difficult to use but got easier with practice	X3
	Needs name and clinician signature boxes	X1
	Needs prompter questions for 'anger and irritability' section	X1
	Substance abuse section needs more space	X1
	Not all clinicians handwriting is easily legible so not easy to access for information compared to letter	X1
	'indicators for suitability' section is not necessary – no time to read in session	X1
Standard letter	The standard letter is not detailed enough as like to send copy of letter to patient as well as referrer	X1
	Standard letter could have an 'additional information' section in which to write some more detail.	X1

Discussion

This study investigated the impact of a change to triage assessment procedure on the amount of clinician time devoted to the task. Results indicate that clinician time is saved by completing a short standard letter, instead of writing a detailed assessment letter to the referrer. However, in this sample the time saved appears to be lost due to the variation in time taken to complete other elements of the assessment. Clinicians also reported that on 11 out of the 18 pilot assessment sessions they felt that the standard letter was not appropriate. Opinion regarding the SAD form was divided with approximately half of responses indicating that the SAD form was easier to use and to access for information, and half reporting that it was harder to use and to access for information.

Examination of raw data suggested that clinicians were relatively consistent in their approach to the different assessment tasks. Individual clinicians over 2, 3 or 4 sessions either consistently did not rewrite case notes, or took a comparable amount of time per session to do so. This would suggest clinician's individual way of working is an important factor in determining the impact of changing any element of the procedure. The pilot procedure requested clinicians work differently. This may have increased time taken to carry out tasks for some clinicians, but decreased it for others. This is supported by the feedback offered which highlighted the clinician's view that the SAD form was difficult to use at first, but that it would get easier with practice.

Study limitations

The results of this study should be interpreted with some caution. They are based on a small number of clinicians and assessment sessions. Seven out of twelve assessing clinicians responded. Moreover, some of these did not contain the full eight recordings. This was a limitation in terms of numbers of recorded sessions but clinician's varying diary commitments within the available timeframe were anticipated and unavoidable.

The assessment cases in both of the stages were selected from the waiting list in referral order. While this gives a good indication of the clinical reality of the types of assessments carried out, it may also be an influencing factor in the results. Because the level of complexity of the cases that were assessed in both stages 1 and 2 was not recorded. There may have been significantly more complex cases in either stage. This could have influenced the time taken to complete the assessment tasks. Similarly, no recordings were made of the diagnosis that the assessing clinician made. This factor may also have influenced length of time taken to complete tasks.

The fact that some clinicians offered additional informal feedback regarding their experiences of using the pilot procedure suggests that it would have been useful to have provided the opportunity for clinicians to complete an 'additional comments' section on the recording forms. This was not included at outset as the intention was to keep the inconvenience of requesting recordings to a minimum.

Results therefore suggest that although clinically time was not saved overall, the standard letter did take less time to complete. This is encouraging. Over time clinicians should become more familiar with using the SAD form. It may be

possible to devise ways of saving further time when the procedure is familiar and clinicians carry out triage assessment in a more standardised way.

Although, more investigation is required regarding clinician current dissatisfaction with the standard letter. This dissatisfaction may relate to the varying legibility of handwriting on the SAD form which would make it difficult to access assessment information in the absence of a detailed letter. However, the reason for the high level of dissatisfaction is unclear at this stage and further investigation is warranted. This will help to inform any alterations made to the structure of the standard letter should the procedure be implemented on a permanent basis.

In relation to use of the pilot procedure and additional feedback offered, it may be necessary to review the SAD form and the standard letter in relation to structure and format. A further audit of the pilot assessment procedure may be warranted, after amendments have been made to the SAD form and Standard letter, in order to investigate the time taken to complete the assessment tasks when clinicians are more used to this way of working.

Dissemination of findings

A summary report of the findings of this audit will be submitted to the director of Ayrshire & Arran Consulting and Clinical Psychology Services and to the assessing clinicians within APTS.

Issues out-with the scope of the study

It was beyond the scope of this audit to investigate the opinions of the referrers regarding the standard letter. This information may prove useful in determining

whether to permanently implement the pilot procedure and could be gathered in future audit.

Conclusions

The standard letter took less clinician time to complete relative to the detailed assessment letter, but clinically this time saved was lost due to the variation in time taken to complete other elements of assessment procedure. The SAD form and the standard letter will require some refinement should the pilot procedure become permanent. A further audit of the procedure may be warranted to ascertain the length of time taken to carry out the procedure
when it is more familiar to clinicians.

References

Dancey, C. P. & Reidy J. (2002), *Statistics Without Maths for Psychology; Using SPSS for Windows.* Prentice Hall. Second Edition.

Management Advisory service (MAS) (1989) *Review of Clinical Psychology Services Activities and Possible Models.* Cheltenham: MAS

Scottish Council for Postgraduate Medical and Dental Education (1999). *Review of Psychological Services in Scottish Healthcare.*

Stein, D.M. & Lambert, M.J. (1995). Graduate training in Psychotherapy: Are therapy outcomes enhanced? *Journal of Consulting and Clinical psychology,* 63, 182-196.

Wierzbicki, M & Pekarik, G. (1993). A meta-analysis of psychotherapy dropout. *Professional Psychology :Research and Practice,* 24, 190-195.

The efficacy of executive functioning rehabilitation interventions : A Systematic Review

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Prepared in accordance with the guidelines for submission to the **Journal of the International Neuropsychological Society** (see Appendix 3 for contributors notes)

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Abstract

Aim - To evaluate the evidence relating to the efficacy of interventions used to rehabilitate executive dysfunction, in adults with acquired brain injury and schizophrenia. ***Method*** - A structured review of literature identified from psychology, neuropsychology and medical databases was carried out. Inclusion criteria were as follows – (1) Controlled intervention studies, (2) Participants from a schizophrenia population or a traumatic brain injury population, (3) Intervention aimed improving executive functioning, (4) Objective neuropsychological measures of executive functioning or validated measures of activities of daily living that make demands on executive functioning used. The range of interventions used and methodological quality of the studies was reviewed. ***Results*** – Fifteen studies met the inclusion criteria for review. Thirteen studies reported improvement in executive functioning post intervention, but none of the studies measured generalisation of these improvements to everyday life. Overall the methodological quality of the studies was considered to be high. ***Conclusions*** – The majority of the interventions reviewed found significant improvements on the measures used, which suggests that executive functioning deficits are responsive to rehabilitation. However, it is not possible, on the basis of the findings of this review, to determine which aspects of the interventions are responsible for improvements, or which cognitive functions are actually improving. Generalisation of improvements to everyday life should be a focus for future research.

Key words – executive functioning, cognitive rehabilitation, traumatic brain injury, schizophrenia.

Introduction

The term 'executive functioning' has been used as an umbrella term used to describe a range of cognitive processes that incorporate higher level organisational cognitive processes such as planning, monitoring, inhibition, control of attention and working memory (Lezak, 1995). These are abilities that allow a person to plan and organise themselves over long periods of time, and make complex and high level abstract judgements. Reaching a more precise definition of executive functioning has been problematic, as Burgess (1997) highlighted, there is no single measurable behaviour that can be definitively tied to executive functioning.

Over the years, several models of executive functioning have been proposed. More recently, common themes have emerged regarding the key elements of executive skills. These themes include concepts of planning, problem solving and goal management (Baddeley, 1986; Burgess, et al., 2005; Duncan, 1996; 1996; Shallice & Burgess, 1996). These concepts are broad, each being considered to involve component processes such as self monitoring, and task initiation and switching.

Norman and Shallice (1986) proposed a comprehensive model of executive functioning, introducing the concept of a supervisory attention system (SAS). They proposed that the SAS regulates conscious attentional processes required to control behaviour. Baddeley (1986) suggested that the central executive component of his model of working memory is conceptually similar to that of the SAS. Shallice and Burgess (1996) extended the model of the SAS and suggested that a number of different processes work together as a supervisory system, in the process of problem solving. They identified three broad stages in

problem solving – creation of a plan, implementation of the plan and monitoring progress towards achievement of problem solving goals.

Executive dysfunction is associated with damage to, or dysfunction of, the frontal lobes (Stuss & Benson, 1986) and hence deficits in executive functioning may arise from a wide range of neurological conditions including head injury, brain infection, haemorrhage, cerebral vascular accident, progressive degenerative disease, and also, as a result of schizophrenia. It has long been recognised that executive dysfunction is a cause of significant disability, affecting many aspects of everyday living (Crepeau, et al., 1997; Dimitrov, et al., 1996; Malloy, et al., 1993). Executive functioning deficits present major challenges in rehabilitation (Alderman & Burgess, 2003). Not only does executive dysfunction have a direct impact on everyday functioning, but it has been argued that executive functioning deficits can adversely affect how a patient benefits from interventions aimed at treating other deficits. Therefore, executive functioning deficits are associated with a poor response to treatment. (Alderman, 1996; Tamamoto, et al., 2000). It is therefore vital that treatments are available that address executive dysfunction.

Approaches to the rehabilitation of cognitive functions has traditionally fallen into two broad categories (Evans, 2005). Restorative approaches aim to reinstate the lost or impaired function through the use of exercising cognitive skills, with the aim that basic cognitive skills will improve and be applied in everyday functional contexts. Compensatory approaches involve the use of cognitive strategies, external aids or modifications to the environment that improve everyday functioning without aiming to change underling impaired cognitive processes.

In relation to rehabilitation of executive dysfunction, it is suggested that the evidence base relating to effectiveness of treatment approaches remains rather limited (Evans, 2005). However in the last two decades, a number of trials of interventions aimed at improving executive functioning have been reported. Some of these trials have been aimed at people with acquired brain injury, whilst others have been aimed at improving executive functioning in people with a diagnosis of schizophrenia. In recent years there have been a small number of systematic reviews of cognitive rehabilitation in acquired brain injury, some of which have included a review of interventions for executive dysfunction (e.g. Cicerone, et al., 2005). However, the limited evidence available severely restricts the conclusions that can be drawn. No systematic reviews to date have examined the combined evidence from studies with participants with acquired brain injury and participants with schizophrenia. Given the limited evidence in each of these areas alone, at this stage of the development of rehabilitation interventions for executive dysfunction it seems reasonable to examine both sets of evidence together.

One of the challenges that exists when attempting to select studies for review relates to the lack of conceptual clarity in defining executive functioning. The review focused on studies where it was explicitly stated that one aim of the treatment trial was to improve executive functioning. One aim of the review was therefore to identify the range of interventions characterised as treatments for executive dysfunction. Furthermore, the review focused on what might be described as 'impairment-focused' interventions. This does not mean that all studies included were restorative in nature, but simply that there was an explicit focus on improving executive functioning.

Method

Objective

To evaluate the evidence relating to the efficacy of interventions used to rehabilitate executive dysfunction, in adults with acquired brain injury and schizophrenia, by reviewing research studies published up to and including March 2007.

Selection criteria

Studies

In the initial search stage, the inclusion criteria were kept broad to ensure that the range of available types of research papers could be assessed. The initial search revealed the existence of a substantial number of randomised or non randomised controlled group intervention studies, and it was therefore decided to limit the review to papers of this methodological quality only.

Participants

Adults with non progressive brain injury and schizophrenia were considered for inclusion.

Intervention

Any rehabilitation strategy aimed at improving executive functioning (including interventions that have the aim of restoring, retraining or compensating for deficits in executive functioning).

Outcome measures

Studies were included for review if they had used an objective neuropsychological measure of executive functioning or a validated measure of activities of daily living that make demands on executive functioning.

Search Strategy

The search for studies was carried out in March 2007. Electronic databases searched were: Ovid Medline (1950-2007), Cochrane Register of Controlled Trials, PsychINFO, EMBASE, Web Of Science and PsycBITE.

Search terms used were, *executive functioning, executive dysfunction, dysexecutive syndrome, problem solving,* and *frontal lobe,* combined with the terms *rehabilitation, remediation, intervention* and *treatment.*

In addition, reference lists of the selected articles were searched, and specific hand searches of the following journals was conducted: Brain Injury, Neuropsychological Rehabilitation and Schizophrenia Bulletin.

Article Selection

Stage 1

3216 articles were identified as a result of the search strategy previously described. The article titles were read by the main author in order to identify appropriate abstracts which indicated that the study was related to the topic area under investigation. 3182 articles were rejected at this stage leaving 34 articles which were retrieved in their full text form.

Stage 2

Each of the remaining 34 articles was read by the main author. Criteria for inclusion in the review were as follows. Participants were required to be from either a schizophrenia population or non progressive brain injury population. The study was included if it was either a randomised controlled trial or an non randomised controlled trial, that had used an objective neuropsychological

measure of executive functioning or a validated measure of activities of daily living that make demands on executive functioning. Case studies or studies with no control group were not included. This left 15 articles in total that were included in the review.

Analysis

The 15 articles were read by the main author and assessed for study quality using the PEDro Rating Scale (Sherrington, 2000). The PEDro scale was originally designed for the purpose of rating the quality of Randomised Control Trials included in the Physiotherapy Evidence Database (www.pedro.fhs.usyd.edu.au). The PEDro scale is based on the 9-item Delphi scale (Verhagen,1998). The Delphi scale was developed by a team of clinical experts and comprises a list of RCT characteristics, that are considered to be a reflection of study quality. The PEDro scale has been used to rate the quality of over 3000 RCT's in the PEDro database and several systematic reviews (Maher, 2003). It is also used as the methodological quality rating scale on the Psychological Database for Brain Impairment Treatment Efficacy (www.psycBITE.com), therefore it was considered an appropriate rating scale for intervention studies examining the efficacy of executive functioning rehabilitation.

The scale has 11 items. Each item is scored yes/no with one point awarded if the item is scored 'yes'. The first item of the scale is not included in the rating score as it refers to the eligibility criteria of the study and therefore relates to external validity, rather than the other points in the scale which refer to internal validity. The range of possible scores on the scale is 0-10 points. The scale

assesses the following ten criteria using the yes/no format. (Full PEDro Scale and operational definitions can be found in Appendix 4.)

1. Random allocation of participants to interventions
2. Allocation was concealed
3. Intervention groups similar at baseline (most important prognostic indicators)
4. Blinding of all participants
5. Blinding of all therapists who administered therapy
6. Blinding of all assessors who measured at least one key outcome
7. Measures for one key outcome were obtained from more that 85% of participants initially allocated to groups.
8. All participants received either control or intervention as allocated, or if not, data for at least one key outcome was analysed by 'intention to treat'
9. Results of between-intervention group statistical comparisons are reported for at least one key outcome
10. The study provides both point measures and measures of variability for at least one key outcome.

The studies were rated individually on the PEDro scale by the main author and total scores were calculated. In addition to the yes/no scoring format, the PEDro scale scoring sheet also requests details of the location of the evidence in the text to support the yes/no score. Page and line numbers were included which allowed a second, independent rater to quickly and easily verify the original ratings of five studies, chosen at random. Any discrepancies were addressed and resolved through discussion. Table 7 below displays percentage agreement of each point on the PEDro Scale for the five randomly selected studies.

Table 7 – PEDro Inter Rater Reliability

Study	Rater 1	Rater 2	Final rating after discussion	Percentage Agreement
	PEDro Scores	PEDro Scores		
Solberg, et al., (2000)	5/10	5/10	5/10	100%
Medalia, et al., (2001)	7/10	7/10	7/10	100%
Von-Cramon, et al., (1991)	3/10	3/10	3/10	100%
Velligan, et al., (2002)	8/10	7/10*	8/10	100%
Vauth, et al., (2005)	4/10	3/10*	4/10	100%

Results

Summary results for each article are presented in Tables A and B in Appendix 5. The results of the review are presented in three sections. Section 1 outlines the interventions that have been studied. Section 2 presents the results of the methodological review of the studies. Section 3 summarises the findings from the trials.

Section 1. Interventions

In the 15 studies selected for this review, 10 different forms of intervention were studied and these are outlined briefly below.

1. Problem Solving Therapy

Two studies used interventions derived form the model of problem solving proposed by D'Zurilla & Goldfried (1971). Von Cramon, et al., (1991) compared 'problem-solving therapy' (PST) with a control group who received 'memory therapy'. The aim of PST is to teach individuals to reduce complexity of a multistage problem by breaking it down into manageable portions. The approach is based on the problem solving model proposed by D'Zurilla & Goldfried (1971), in which participants are taught to attend systematically to five aspects of the

problem solving process, orientation, definition, alternatives, decision making and verification. Highly individualised prompting was included in the training when barriers to effective problem solving were present. This prompting included verbal and non-verbal cues, in the visual and auditory modality which were faded out as required. These prompts depended on the types of errors being made; insufficient analysis, impulsive decisions, cognitive inflexibility, reduced checking and lack of goal directed ideas. The authors acknowledge that they were unable to present standardised procedures for this aspect of the training, as it relies heavily on clinician expertise. PST was carried out by two therapists over 6 weeks and each participant averaged 25 hour long sessions.

Rath, et al., (2003) used a similar group problem solving training intervention, based on the D'Zurilla & Goldfried (1971) model. Participants who had suffered a traumatic brain injury underwent a 24 session training procedure split into two main sections, firstly focussing on emotional regulation at the problem orientation stage, and secondly, teaching problem solving skills.

The problem orientation component was intended to facilitate the individuals' motivation to apply problem solving skills to problematic situations by implementing standard Cognitive Behavioural Therapy techniques. The purpose of this approach was to address negative affective reactions to problem solving, by encouraging participants to remove barriers to effective use of problem solving skills such as cognitive distortions, misattributions, and illogical thinking (eg. *'If I can't do it as fast as I used to, I can't do it at all'*).

In the problem solving skills component, participants used the CBT techniques learned in the problem orientation component and used a systematic 'stop and think' impulsivity management approach, while systematically working through

four stages of problem solving, problem definition, solution generation, decision making, and follow up.

2. Attention Process Training

The effect of Attention Process Training (APT) on executive functioning was examined by two studies. Sohlberg, et al., (2000) looked at the effect of APT in a brain injured population, and Lopez-Luengo and Vazquez (2003) with participants diagnosed with Schizophrenia. APT not only improves functioning on attention tests alone, but it has been found to improve some aspects of executive control of attention processes (Mateer & Sohlberg, 1988; Neiman, et al., 1990). APT consists of tasks that exercise different aspects of attention including, selective, alternating and divided attention. The tasks place increasing demands on working memory systems and complex attention control systems. Examples of tasks include, auditory attention tasks involving detection of number sequences, alphabetising words, target detection with a distracter noise and complex semantic categorisation tasks requiring set switching. Participants receive twenty four hours of APT over a ten week period. It is hypothesised that the practice effects related to repetition of these tasks improves the executive functioning impairment.

3. Cognitive Remediation Therapy

Penandes, et al., (2006) used a group of participants with a diagnosis of Schizophrenia to compare the effect of a forty hour Cognitive Remediation Therapy (CRT) (Delahunty & Morice, 1996) with a control group receiving a similar number of hours of Cognitive Behavioural Therapy (CBT) and a no treatment group. CRT implements an errorless learning and scaffolding approach to teaching the programme skills. Errorless learning (Wilson, 2002) involves teaching information in a way that does not allow mistakes to be made,

thereby reducing the likelihood of the information being learned incorrectly. Scaffolding was the main instructional technique used, which involves assistance either being provided or withdrawn according to the needs of the participant. Participants were taught how to perform the increasingly complex programme tasks, across three modules. The 'Cognitive Shift' module focussed on flexibility of thought and maintenance of information-set. The 'Working Memory' module targets the executive processes related to memory control, by requiring the participant to work with as many as five information sets at a time. The aim of the 'Planning' module is to teach the participants to apply the skills from the previous modules, to tasks requiring planning. Wykes, et al., (1999 & 2003), also used participants diagnosed with Schizophrenia to compare the same CRT programme used in the Penandes (2006) study, with a control group receiving an equivalent amount of intensive occupational therapy.

4. Autobiographical Memory Cueing

Hewitt, et al., (2006) investigated the effectiveness of an autobiographical memory cueing procedure on brain injured participants ability to complete planning tasks. It is hypothesised that effective problem solving often breaks down when individuals with executive functioning deficits fail to make use of autobiographical memories which may assist in the generation of solutions to a current problem (Dritschel, et al., 1998). In this study, two groups of participants who had suffered a closed head injury were asked to provide a description of how they would plan eight unstructured everyday activities from the Everyday Descriptions Task (Dritschel, 1991). Examples of the activities included '*How would you look for a new car?', 'How would you look for a new place to live?*'. One group underwent training in a procedure aimed at prompting the retrieval of specific memories to support planning, and the other did not. The training consisted of participants being asked to demonstrate the ability to retrieve

memories, specific in time and place before then being instructed to apply this strategy when solving a second set of eight EDT problems. The participants responses were rated for steps in their plan, and the effectiveness of their plan.

5. Analogy Based Problem Solving Training

Man, et al., (2006) investigated the effect of a 20 session analogy based problem solving skill training programme with brain injured participants. The programme consisted of training participants to use analogies which enabled them to solve a problem by referring to previous examples. For example, source problems and solutions were be provided in the training sessions, *'What will happen if you forget to turn off the running bath water?'.* In the testing sessions, target problems to be solved were provided, for example, '*What will happen if you forget to take something out of the oven*?'. Participants were then provided with structured training following the 'Structure Mapping Strategy' (Genter, 1983) to enable them to identify the similarities between the source and target problems, and to apply this strategy in relation to the generation of solutions to the target problems. The training procedure was carried out in relation to identifying effects, identifying causes and providing solutions. The training was delivered to participants using three different modes of delivery, computer assisted, online interactive and therapist delivered.

6. Neurocognitive Enhancement Therapy + Work Therapy

Using sixty five participants with schizophrenia or schizoaffective disorder, Morris, et al., (2001) investigated the effect of Neurocognitive Enhancement Therapy (NET), which consists of up to five hours of computer based training on attention, memory and executive function tasks, a group training on social information processing, and feedback on cognitive performance in the workplace. The computerised training tasks were modified from CogRehab

(Bracy, 1995) software. They consisted of two visual tracking tasks for training sustained visual attention and two tasks requiring sequential recall of words and digits, for training verbal memory. In order to train executive functions a 'Pyramids' task was used in which participants are required to move discs stacked in a pyramid fashion from one post onto another, while obeying the rule that placement of a larger disc on to a smaller one is not permitted. In addition the weekly social information processing group requires participants to prepare structured oral presentations on three topics, 'My job', 'A day at work' and 'What I have learned'. These tasks make demands on memory, executive functioning, social information processing, affect recognition and interpersonal sensitivity. The intervention group received NET and work therapy (WT). WT involved payment for work, individual counselling when problems arose, a group offering support, problem solving, detailed work performance feedback and goal setting and a job coach. The control group received work therapy alone.

7. Problem Solving Remediation (CD-ROM)

A comparison of a problem solving remediation programme, a control memory training programme and a no treatment group was carried out with a group of participants with a diagnosis of schizophrenia in a study by Medalia, et al., (2001). Problem solving strategies were taught to participants via a CD-ROM developed for use in within educational psychology. The content validity of the crime mystery game, called *'Where in the USA is Carmen Sandiego?'* was assessed by 72 rehabilitation professionals who all agreed that it targets planning skills, organisation and deductive reasoning. The participant plays the role of a police detective, who's job is to interpret information given out by the 'Chief' police officer, and use this information to track down and interview witnesses, and gather enough evidence to arrest a suspect. The examiner also assists participants throughout the problem solving process using structured

questions such as '*What are your choices?', 'What are the clues and evidence?*' and '*What would you do differently?*' The game was developed to be intrinsically motivating, which the authors argue maximises task engagement.

8. *Computer Assisted Cognitive Strategy Training +Vocational Rehabilitation*

Vauth, et al., (2005) used computer Assisted Cognitive Strategy Training (CAST) in conjunction with Vocational Rehabilitation, with participants diagnosed with schizophrenia. CAST makes use of an errorless learning teaching approach and the focus is on deficits in sustained and selective attention, verbal memory and planning. To improve sustained and selective attention, self instructions were taught, including '*What next?*' and *'Don't get distracted'.* Maintenance rehearsal, elaborative rehearsal and note-taking were employed to improve verbal memory. A computer-presented cognitive training programme that focussed on corresponding cognitive functions was used to reinforce the strategies learned. An example of the tasks involved is a matching task in which participants must apply trained self instructions while scanning stimuli and identifying differences. Generalisation was trained using 'Coping Cards' (van der Gaag, et al., 1994). The cards contain behavioural coping strategies for participants to use in problematic situations. Components of cognitive adaptation training (Velligan, et al., 1996 & 2000) were also incorporated in to the programme. Participants were trained to alter their job environment to compensate for their deficits using, labels, signs, schedules and rearrangement of objects. The vocational rehabilitation component consisted of 15 hours of job placement activity a week, with increasing demands, weekly work performance feedback, goal setting, individual counselling for problems and a job coach.

9. Cognitive Remediation Training

van der Gaag, et al., (2002) targeted social perception as the main skill for remediation with attention, memory and executive functioning also being targeted as they were considered necessary for emotion perception. This was done with a sample of participants diagnosed with schizophrenia. The cognitive remediation training programme used included a series of exercises that progressively increased in their complexity. This included training on perception of simple stimuli, progressing to complex stimuli, then to reasoning skills training and finally, to training on emotion perception and interpretation of social situations. Training techniques included self instruction (verbally repeating instructions, coping statements and self reinforcing statements), memory enhancement (rehearsal, categorisation, chunking, visualisation and mnemonic aids), inductive reasoning (training on processing key aspects of interpersonal relationships and the thoughts and feelings of others), and emotion recognition training. These training techniques were considered to make demands on executive functioning processes, as complex social and emotion perception requires selective filtering of relevant stimuli, and 'on line' processing of environmental cues.

10. Cognitive Adaptation Training

Velligan, et al., (2002) investigated the effect of Cognitive Adaptation Training (CAT) with schizophrenic participants. CAT is a programme designed to compensate for cognitive deficits. Treatment is targeted towards management of apathy and disinhibition, and the level of structure and support is adjusted according to the level of impairment of executive functions. The programme targets apathy by providing prompting and cueing, to facilitate initiation of each step in a task. For tasks that involve more complex behavioural sequencing

checklists may be used, or signs and equipment may be placed in highly visible locations. Individuals who have problems with disinhibition are often assisted through the removal of distracting stimuli and behavioural triggers, and the use of redirection. These strategies are combined as necessary. The programme is highly individualised as those with greater levels of executive impairment are offered more structure and assistance and more obvious environmental cues as required.

11. Goal Management training

Levine, et al., (2000) studied the effect of a one hour Goal Management Training (GMT) on a brain injured group of participants ability to perform activities requiring, holding goals in mind, analysis of sub goals and monitoring. Duncan's (1986) concept of 'goal neglect' provides the theoretical basis for the GMT technique, which was first devised by Robertson (1996). It is proposed that patients with executive functioning deficits often do not generate sub goals as part of a plan to achieve a main goal. They also often fail to monitor their behaviour in relation to achievement of the goal, resulting in failure of goal directed behaviour. The intervention aims to assist the individual to apply a five stage model of goal management to concrete examples from the persons everyday life. The stages consist of, orientating to the task, setting a main goal, creating a list of steps required to achieve the main goal, learning and carrying out the steps, and checking adherence to their plan. An important feature of GMT is that participants are taught to monitor the effectiveness of their actions, and repeat stages when necessary.

Section 2. Methodological Quality of Studies

All of the studies reviewed apart from von Cramon, et al., (1991) were randomised control trials. The overall methodological quality of the studies was

good, with eleven out of the fifteen studies scoring 5 out of 10 or above on the PEDro scale. The highest scoring studies (7 or 8 out of 10) were Penandes, et al., (2006) & Wykes, et al., (2003), who both used Cognitive Remediation Therapy (Delahunty & Morice, 1996), Medalia, et al., (2001) who used a crime mystery CD-ROM, and Velligan, et al., (2002) who used only compensatory strategies. Table 8 below displays the total scores.

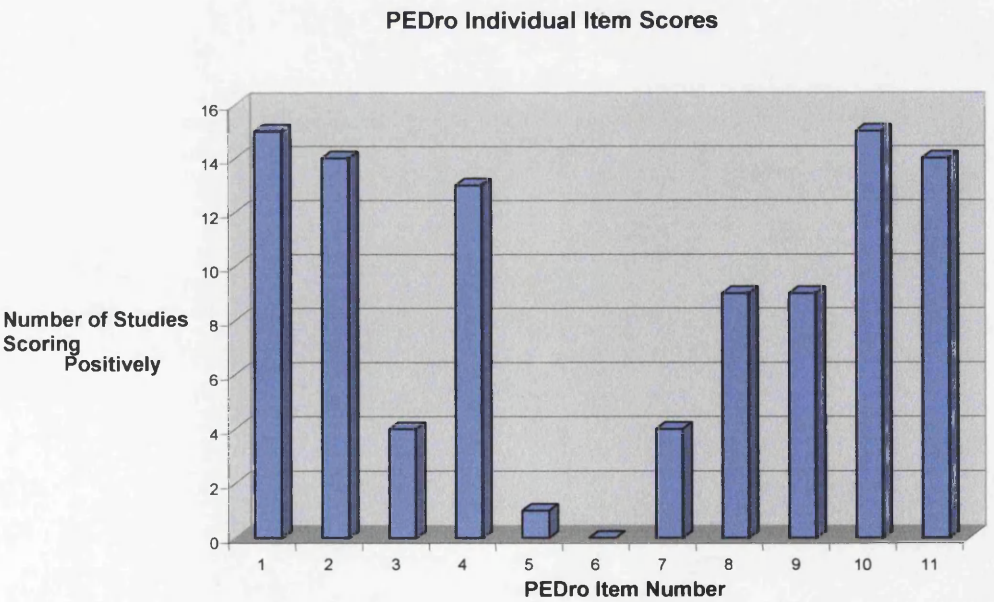
Table 8 – Total PEDro Scores

Study	Total PEDro Score
Rath, et al., 2003	3/10
Sohlberg, et al., 2000	5/10
Lopez-Luengo, et al., 2003	6/10
Hewitt, et al., 2006	5/10
von-Cramon, et al., 1991	3/10
Man, et al., 2006	6/10
Morris, et al., 2001	5/10
Penandes, et al., 2006	8/10
Medalia, et al., 2001	7/10
Vauth, et al., 2005	4/10
van der Gaag, et al., 2002	6/10
Wykes, et al., 1999	6/10
Wykes, et al., 2003	7/10
Velligan, et al., 2002	8/10
Levine, et al., 2000	4/10

Items 5, 6 and 7 on the scale refer to blinding of participants, therapists and assessors. Only one study reported blinding of all participants (Velligan, et al., 2002), no studies reported blinding of therapists who administered the interventions, and four studies reported blinding of assessors who measured one key outcome; Hewitt, et al., (2006), Penandes, et al., (2006), Medalia, et al., (2001) and Velligan, et al., (2002). Blinding of study participants, therapists and assessors is used to reduce performance bias. For example if participants know they are in an intervention or a control group, this may affect their performance. Similarly if therapists and assessors are familiar with study hypotheses and differences between the intervention and control groups, this may influence their behaviour when delivering interventions or scoring performance. Obviously it is particularly difficult to blind therapists when they are delivering psychological interventions that are easily identifiable, or to blind participants who may share

their experiences outside the intervention setting or be aware of their group allocation. Therefore in relation to the items referring to blinding, it is useful to bear in mind that points lost on these items may be due to limitations inherent in delivering easily identifiable psychological interventions, rather than a reflection of poorer study methodology. In addition, the PEDro scale scoring procedure requires authors to explicitly state that the criteria have been met in order for points to be awarded. For example, item 3 refers to whether or not the randomisation procedure was concealed. Studies that simply state that *"participants were randomly allocated to groups"*, with no explicit statement that allocation was concealed, even if this was the case, would not be awarded a point on criteria 3. Therefore, the PEDro scale provides a reasonably conservative assessment of study quality. Graph 5 below displays the number of studies scoring positively for each PEDro item.

Graph 5.



(**1** Inclusion criteria specified, **2** Random allocation of participants to interventions, **3** Allocation was concealed, **4** Intervention groups similar at baseline, **5** Blinding of all participants, **6** Blinding of all therapists who administered therapy, **7** Blinding of all assessors who measured at least one key outcome, **8** Measures obtained from more than 85% of participants initially allocated to groups, **9** All participants received control or intervention as allocated, or 'intention to treat' analysis used, **10** Results of between-intervention group

statistical comparisons reported for one key outcome, **11** Provides both point measures and measures of variability for at least one key outcome.)

Section 3. Study Findings

1. Problem Solving Therapy (PST)

Von Cramon, et al., (1991) found that the PST group and the 'memory therapy' control group were comparable in their pre-treatment scores. The PST group showed significant improvement on a 'planning task' specifically developed for the study ($p=0.01$), and on the Tower of Hanoi task ($p=0.01$). They also showed improvement on three of the five intelligence subtests used, Reasoning, Categorising and Proverbs (all $p<0.01$). These improvements were also confirmed by behavioural ratings of their problem solving performance. The authors report that some generalisation of skills took place in relation to novel situations but no investigation was carried out into possible generalisation to everyday life. Rath, et al., (2003) found that their problem solving training intervention group showed significantly improved performance on Wisconsin Card Sorting Test ($p<0.05$), Self appraised ratings of problem solving skills ($P<0.005$), clear thinking ($p=0.01$) and emotional self regulation ($p<0.01$) subscales of the Problem Solving Questionnaire. The ratings of problem solving ability made by objective observers were also significantly improved ($p<0.005$). The control group did not show significant improvement on these measures. In addition, the improvements made by the intervention group were maintained at six month follow up.

2. Attention Process Training

Sohlberg, et al., (2000) found improvements in performance on the PASAT ($p=0.05$), Stroop & Trails (analysed together $p<0.01$) and memory for locations ($p<0.05$) that were associated with Attention Process Training (APT). These

improvements were significantly greater than the improvements associated with the standard Brain Injury Education control condition. Structured interviews were also carried out with the participants and their subjective reports also suggest that APT has a positive effect on executive control. Improvement due to APT appeared to be on tasks that draw on executive function rather than tasks that involve mainly vigilance or orientating towards sensory signals. The authors also suggest that as the APT tasks were different from the neuropsychological assessments used, the significant improvement found on the tests indicates a generalisation of skills. However no investigation of skill generalisation to everyday tasks was carried out.

In the Lopez-Luengo & Valquez (2003) study, the results showed that attention and memory were not improved in the Attention Process Training (APT) intervention group, but a significant improvement in executive functioning was found, as measured by the Wisconsin Card Sort test ($p<0.05$). The authors concluded that APT appeared to help participants to learn to plan their actions and to analyse the task procedures before starting, which reduced their tendency to respond impulsively. Generalisation of skills to everyday life was not investigated.

3. Cognitive Remediation Therapy

Penandes, et al., (2006) found that executive functioning significantly improved in the Cognitive Remediation Therapy (CRT) intervention group, as measured by the WCST, Stroop and Trail Making Test – B ($p<0.001$), compared to no improvement in the control group. The authors note that in their study, improvements are not due to practice effects on test as a Reliable Change Interval with correction for practice effects was performed, which revealed improvements in the intervention group were not due to practice effects. They conclude that CRT is an effective intervention. Similarly, Wykes, et al., (1999 & 2003) found statistically significant

improvements in the Cognitive Remediation Therapy (Delahunty & Morice, 1993) intervention group for - Verbal Fluency, Hayling, Trails, Stroop and Modified Six elements (confidence intervals reported). The control group did not show significant improvements. Six month follow up data showed that no significant improvements remained, in the intervention group on the cognitive tests, or on the planning tests. However, within the intervention group, 23% of the participants maintained their improvement on planning tests, compared with only 14% of the controls. Regression analysis revealed that cognitive flexibility was related to improvements in social functioning and symptoms (also measured) at 6 month follow up ($p<0.005$ & $p<0.001$). Neither of these studies investigate generalisation of skills to everyday life.

4. Autobiographical Memory Cueing

The results of the Hewitt, et al., (2006) study indicated that use of this autobiographical episodic memory cueing procedure improved the effectiveness of the plans ($p<0.01$), and increased the number of steps in the plans ($p=0.03$) generated by the group who had received the training, compared to the group who had not. The intervention group also retrieved significantly more specific memories ($p<0.01$) that the control group. The authors conclude that this is an effective approach in relation to improving the quality of solutions generated for everyday practical problems, but no generalisation of skills to day to day life was studied.

5. Analogy Based Problem Solving Training

The analogy based problem solving training used by Man, et al., (2006) was found to significantly improve participants basic and functional problem solving skills on the intervention tasks ($p<0.001$ for all three modes of delivery) compared to the control group who demonstrated no significant improvements. In addition,

significant improvements were found in scores on the Category Test ($p<0.01$ for all three groups) which measures identification of similarities, hypothesis generation and testing, and on the Lawton Instrumental Activities of Daily Living Scale (Lawton & Brody 1969) ($p<0.01$ for all three groups). The only group to report a significant improvement in problem solving self efficacy, as measured by the 10 item scale developed for the study, was the therapist administered intervention. The authors conclude that technology assisted problem solving training is an effective mode of delivery, which has potential to increase access to problem solving rehabilitation.

6. Neurocognitive Enhancement Therapy + Work Therapy

In Morris, et al., (2001), the intervention group who participated in Neurocognitive Enhancement Therapy (NET) and Work Therapy (WT), showed significant improvement in executive functioning as measured by the WCST ($p<0.01$), compared to the control group who did not. The authors note that surprisingly, the cognitive exercises in NET that rely so heavily on practice of attention and short term memory, have a greater effect on executive functioning than on simple attention and memory abilities. They state that this outcome was possibly affected by the other elements of the NET programme that also demand use of executive functioning and affect recognition. They conclude that the combination of the elements of NET with WT is likely to be responsible for the favourable outcome.

7. Problem Solving Remediation CD-ROM

Medalia, et al., (2001) found that the intervention group showed significant improvement on The Independent Living Scale-Problem Solving (ILS-PS) (Loeb, 1996) scores ($p<0.009$), compared to the control group and the no treatment group. The ILS-PS consists of five subscales with items designed to assess functional capacity; Memory/Orientation, Managing Money, Managing Home and

Transport, Health and Safety and Social Adjustment. Using principal components analysis a 'Problem Solving' score is derived from items on all of the five scales. This score measures aspects of problem solving required for individuals living independently. Authors conclude that the use of enjoyable and motivating remediation activities are particularly important with a population of schizophrenic patients, as motivation is often poor within this group.

8. *Computer Assisted Cognitive Strategy Training +Vocational Rehabilitation*

Vauth, et al., (2005) found that the Computer Assisted Cognitive Strategy Training (CAST) intervention group showed no significant improvement in planning ability, as measured by the Tower of Hanoi ($p=0.43$). The authors conclude that the Tower of Hanoi task may not be sensitive enough to measure improvement in planning ability related to everyday planning, or that the dose of treatment was insufficient.

9. Cognitive Remediation Training

The results in the van der Gaag, et al., (2002) study showed a beneficial effect of training in the cognitive remediation intervention group compared to the control group, on measures of emotion and social perception, which were the primary targets for rehabilitation, but not on measures of executive functioning, as measured by the WISC (mazes), Word Fluency and WAIS (Picture Arrangement).

10. Cognitive Adaptation Training

Velligan, et al., (2002) did not repeat baseline cognitive measures post intervention. However the Cognitive Adaptation Training (CAT) intervention group showed significant improvement on the Social & Occupational Functioning Scale (SOFAS) ($p<0.003$), the Multnomah Community Ability Scale (MCAS) ($p<0.05$), and on The Quality of Life Scale ($p<0.003$). In addition, the improvements on

SOFAS were also clinically significant for 12 out of 15 participants in the intervention group, compared with 7 out of 15, and 6 out of 15 for the control group and no treatment group.

11. Goal management Training

Levine, et al., (2000) designed three tasks which were designed to test skills in, holding goals in mind, analysis of sub goals and monitoring of performance. These included a proof reading task in which participants had to circle, underline and cross out different types of words, a task that required grouping of information with memorised instructions, and a task requiring information extraction from a complex grid. The intervention group improved significantly in terms of their speed and accuracy across all three measures, in comparison to the control group who did not. Generalisation of skills was not measured however these improvements were demonstrated after only one hour of training.

Discussion

Overall, the studies included in this review reported that significant improvements in executive functioning resulted from the wide range of different interventions studied. Only two out of the fifteen studies reviewed (van der Gaag, et al., 2002; Vauth, et al., 2005) found that their interventions did not result in improvement on measures of executive functioning.

Variability in Treatment Interventions

The lack of consensus relating to a clear definition of executive functioning appears to result in a high degree of variability regarding the emphasis placed on different aspects of executive functioning that are investigated by researchers. This issue is reflected in the range of interventions used across the fifteen studies.

For example, Rath, et al., (2003) base their Problem Solving Therapy intervention on D'Zurilla & Goldfried's (1971) stage model of problem solving and combine this approach with Cognitive Behavioural Therapy (CBT). The intervention aims to improve problem solving by helping participants manage affective and motivational barriers to effective problem solving using CBT, in conjunction with a problem solving skills training approach. However, Attention Process Training, used by Sohlberg, et al., (2000) and Lopez-Luengo & Valquez (2003), targets the rehabilitation of executive control of attentional processes, via repetition of increasingly demanding cognitive tasks. It is hypothesised that the practice effects related to repetition of the tasks improves the executive functioning impairment. It is clear that these are two very different interventions that appear to be targeting different aspects of cognitive functioning.

Similarly, Medalia, et al., (2001) report improvements on a measure of problem solving ability related to independent living as a result of their computerised intervention that targets planning, organisation and deductive reasoning. Velligan, et al., (2002) however, report that a purely compensatory approach involving prompting, cueing, checklists, behavioural sequencing and environmental manipulation resulted in improvements on measurements of social and occupational functioning and quality of life. Again, these very different interventions appeared to produce improvement on a variety of measures used to assess executive functioning ability.

Many of the studies also used interventions that incorporated many different components. For example, Rath, et al., (2003) combined CBT with problem solving training. Morris, et al., (2001) used a computerised attention, memory and executive functioning skill repetition programme, with 'work therapy' which included an information processing group, feedback on work performance,

counselling support group and a job coach as their intervention group. While the combination of many aspects of rehabilitation approaches may produce improvements on a range of measures of executive functioning skills, it does not shed any light on which interventions are producing cognitive change, nor which cognitive processes are responsible for improvement on the outcome measures used.

In addition, length of training intervention was variable with many studies reporting improvements after lengthy training interventions (for example, Von Cramon, et al., (1991) did 25 sessions of Problem Solving Therapy, Sohlberg, et al., (2000) did 10 weeks of Attention Process Training). However Levine, et al., (2000) report significant improvements on tasks which demand use of goal setting and monitoring skills after a single one hour session of Goal Management Training.

Variability in Outcome Measures

The studies included in this review aimed to rehabilitate a range of impaired cognitive functions, some exclusively targeting executive functioning ability, and others targeting executive functioning in addition to other skills. However, a wide range of different tests were used to assess changes in executive functioning skills post intervention. This makes it difficult to make comparisons between studies, or to reach firm conclusions in relation to which cognitive processes are actually improving as a result of the interventions used.

Compensatory vs. Restorative Approaches

In relation to whether the studies used compensatory or restorative approaches, eleven out of the fifteen studies used interventions that might be described as involving cognitive training. However for most it is not clear whether the aim of the

training is to restore normal executive functioning or to train cognitive strategies that compensate for impaired functions. Only two studies (van der Gaag, et al., 2002; Vauth, et al., 2005) clearly state that they combine approaches which aim to retrain executive functions and those which compensate for impaired functions. Surprisingly, these are also the two studies which did not find significant improvements on measures of executive functioning, though in one (van der Gaag, et al., 2002) there was evidence of improved social communication skills which were considered to require improved executive functioning. Velligan, et al., (2002) was the only study that used an exclusively compensatory approach, with evidence of improvement on measures of social and occupational functioning and quality of life. The issue of whether an intervention restores or retrains cognitive functions in comparison to compensating for the impact of the impaired function is complex. Code (2001) points out that the terms, compensation and restoration are often used interchangeably in the literature, and notes that accurately differentiating between a restorative and a compensatory intervention is particularly difficult. Some authors, suggest that their intervention has acted in a restorative capacity, as participants' scores improved on neuropsychological tests that were different from the intervention training tasks (Sohlberg, et al., 2000). However, participants may have been able to apply a compensatory cognitive strategy to different tasks, which possibly points towards generalisation of a new compensatory skill rather than restoration of impaired executive functioning processes.

Generalisation

Some of the studies found that skills were maintained at follow up. Penandes, et al., (2006) found that improvements resulting from Cognitive Remediation Therapy were maintained at six month follow up, Wykes, et al., (2003) found that cognitive flexibility was related to improvements in social functioning at six month follow up,

and Rath, et al., (2003) found that improvements on problem solving measures were also maintained at six moth follow up.

Man, et al., (2006), Medalia, et al., (2001) and Velligan, et al., (2002) all found significant improvements on measures other than neuropsychological tests. They found significant improvement on the Lawton Instrumental Activities of Daily Living Scale (Lawton & Brody, 1969), the Independent Living Scale – (Problem Solving) (Loeb, 1996), and the Social & Occupational Functioning Scale (SOFAS) and Multnomah Community Ability Scales (MCAS – Barker, et al., 1994) respectively. Although these studies have reported improvements on measures of daily functioning other than neuropsychological tests, none of these studies investigated generalisation of improvements to everyday functioning. Explicit investigation of generalisation of skills to everyday life, would be required before firm conclusions can be drawn.

Methodological Quality

In relation to the methodological quality of the studies, it would appear that Cognitive Remediation Therapy (Penandes, et al., 2006; Wykes , et al., 2003), the crime mystery CD-Rom (Medalia, et al., 2001) and the compensatory strategies used by Velligan, et al., (2002), were the interventions that were subject to the most robust investigation according the PEDro rating system. These were the studies that scored either 7 or 8 out of ten, however the overall methodological quality of all of the articles reviewed was considered to be high, given the conservative nature of the PEDro rating system. The results of Rath, et al., (2003) and von Cramon, et al., (1991) should perhaps be interpreted with caution as they both scored only three out of ten. Neither study was awarded points on any of the blinding criteria, and drop out rates were either high or no statement was made regarding drop out rates, or use of intention to treat analysis. It was therefore not

clear from the write-up if post-treatment measures had been obtained from all participants. The participants in the study by Rath, et al., (2003) were also not randomised.

Review Limitations

This review may be limited in relation to the search strategy adopted. Different search terms, or a wider range of search terms may have resulted in the inclusion of additional studies. Restricting the review to controlled intervention studies, and English language studies only, may have also excluded relevant research. In addition, unpublished research was not included in this review, which may have resulted in a bias towards positive findings, as it is common for unpublished research to fail to find positive results.

Conclusions and Recommendations

It would appear that the majority of the interventions reviewed found significant improvements on the measures used, and this does suggest that executive functioning deficits are responsive to rehabilitation. However, it is not possible, on the basis of the findings of this review, to determine which aspects of the interventions are responsible for improvements, or which cognitive functions are actually improving. The methodological quality ratings suggest that cognitive remediation therapy (CRT), purely compensatory strategies and a problem solving training crime mystery game, are the interventions that have been shown to be effective under the most rigorous methodological criteria for investigation. However, this does not imply that the other interventions included, which undoubtedly share therapeutic components with these interventions, are not effective interventions.

The overall positive findings among such a wide range of different interventions, makes recommendation of one particular intervention over another problematic. Generalisation of improvement in executive functioning skills to everyday life was also not a feature of the studies reviewed. In order to clarify if the interventions produce improvements that generalise to everyday functioning, which should be the ultimate aim of cognitive rehabilitation, future research should make this an explicit aim.

References

Alderman, N. (1996). Central executive deficit and response to operant conditioning methods. *Neuropsychological Rehabilitation, 6,* 161-86.

Alderman, N. & Burgess P.W., (2003). Assessment and rehabilitation of the Dysexecutive Syndrome. In R. Greenwood, T.M. McMillan, M.P. Barnes & C. D. Ward (Eds.), *Handbook of Neurological Rehabilitation.* Second Edition. Hove: Psychology Press.

Baddeley, A. D. (1986). *Working Memory.* Oxford: Clarendon Press.

Barker, S., Barron, N., McFarland, B., & Bigelow, D.A. (1994). Community ability scale for chronically mentally ill consumers: I. Reliability and validity. *Community Mental Health Journal, 30,* 363-383

Bracy, O. (1995). *CogRehab Software.* Indianapolis, Ind: Psychological Software Services.

Burgess, P.W. (1997). Theory and methodology in executive function research. In P. Rabbit (Ed.) *Methodology of Frontal and Executive Function.* Hove: Psychology Press.

Burgess, P.W., Simons J.S., Coates, L.M., & Channon, S. (2005). The search for specific planning processes. In R.G. Morris (Ed.) *The Cognitive Psychology of Planning* Oxford: Oxford University Press.

Cicerone, K.D., Dahlberg, C., Malec, J.F., Langenbahn, D.M., Felicetti, T., Kneipp, S., Ellmo, W., Kalmar, K., Giacino, J.T., Harley, J.P., Laatsch, L., Morse, P.A., Catanese, J. (2005). Evidence-based cognitive rehabilitation: Updated review of the literature from 1998 through 2002. *Archives of Physical Medicine and Rehabilitation, 86 (8)*1681-1692

Code, C. (2001) Multifactorial processes in recovery from Aphasia: Developing the foundations for a multilevel framework. *Brain and Language, 77,* 25-44.

Crepeau, F., Scherzer, B.P., Belleville, S., & Desmarais, G. (1997). A qualitative analysis of central executive disorders in a real life work situation. *Neuropsychological Rehabilitation, 7,* 147-65.

Delahunty, A. & Morice, R., (1996). *A Training Programme for the Remediation of Cognitive Deficits in Schizophrenia.* Albury, New South Wales: Department of Health.

Dimitrov, M., Grafman, J., & Hollnagel, C. (1996). The effects of frontal lobe damage on everyday problem solving. *Cortex, 32,* 357-66.

Dritschel, B. (1991). The role of autobiographical memory in describing how to perform everyday activities. European Cognitive Society Conference, Cuomo, Italy.

Dritschel, B., Kogan, L., Burton, A., Burton, E., & Goddard, L. (1998). Everyday planning difficulties following traumatic brain injury: a role for autobiographical memory. *Brain Injury, 12 (10)* 875-886.

Duncan, J. (1986). Disorganisation of behaviour after frontal lobe damage. *Cognitive Neuropsychology, 3,* 271-290.

Duncan, J., Emslie, H., Williams, P., Johnson, R. & Freer, C. (1996). Intelligence and the frontal lobe: The organisation of goal-directed behaviour. *Cognitive Psychology*, *30*, 257-303.

D'Zurilla, T.J. & Goldfried, M.R. (1971). Problem Solving and Behaviour Modification. *Journal of Abnormal Psychology*, *78*, 107-126.

Evans, J.J. (2005). Can executive impairments be effectively treated? In *P.* Halligan, & D.T. Wade (Eds), *Effectiveness of Rehabilitation for Cognitive Deficits* Oxford: Oxford University Press.

Genter, G. (1983). Structure mapping: A theoretical framework for analogy. *Cognitive Science, 7,* 155-170.

Hewitt, J., Evans, J.J., & Dritschel, B. (2006). Theory driven rehabilitation of executive functioning: Improving planning skills in people with traumatic brain

injury through the use of an autobiographical episodic memory cueing procedure. *Neuropsychologia, 44 (8)*1468-1474.

Lawton, M.P. & Brody, E.M. (1969). Assesment of older people: Self maintaining and instrumental activities of daily living. *Gerontologist, 9*, 179-186.

Levine, B., Robertson, I. H., Clare, L., Carter, G., Hong, J., Wilson, B.A., Duncan, J., Stuss, D.T. (2000). Rehabilitation of executive functioning: An experimental-clinical validation of Goal Management Training. *Journal of the International Neuropsychological Society, 6*, 299-312.

Lezak, M.D. (1995). *Neuropsychological Assessment.* New York: Oxford University Press.

Loeb, P.A. (1996). *Independent Living Scales Manual.* San Antonio, TX: Psychological Corporation.

Lopez-Luengo, B., & Vazquez, C. (2003). Effects of Attention Process Training on cognitive functioning of schizophrenic patients. *Psychiatry Research. 119 (1-2)* 41-53

Maher, C.G., Sherrington, C., Herbert, R.D., Mosely, A.M., & Elkins, M. (2003). Reliability of the PEDro Scale for Rating Quality of Randomized Controlled Trials. *Physical Therapy. 83 (8)* 713-721

Malloy, P., Bihrle, A., Duffy, J. and Cimino, C. (1993). The orbitomedial frontal syndrome. *Archives of Clinical Neuropsychology, 8,* 185-201.

Man, D.W.K., Soong, W.Y.L, Tam, S.F. & Hui-Chan, C.W.Y. (2006). A randomized clinical trial study on the effectiveness of a tele-analogy-based problem-solving programme for people with acquired brain injury (ABI). *Neurorehabilitation 21 (3)* 205-217

Mateer, C.M. & Sohlberg, M.M. (1988). A paradigm shift in memory rehabilitation. In H. Whitaker (Ed.), *Neuropsychological Studies of Nonfocal Brain Injury: Dementia and Closed Head Injury*, 202-225. New York: Springer-Verlag.

Medalia, A., Revheim N., Casey, M. (2001). The remediation of problem-solving skills in schizophrenia. *Schizophrenia Bulletin, 27 (2)* 259

Morris, B., Bryson, G., Greig, T., Corcoran, C., Wexler, B. (2001). Neurocognitive Enhancement Therapy With Work Therapy: Effects on Neuropsychological Test Performance. *Archives of General Psychiatry 58,* 763-768.

Neiman, H., Ruff, R.M., & Baser, C.A. (1990). Computer assisted attention training in head injured individuals: A controlled efficacy study of an out patient programme. *Journal of Clinical and Consulting Psychology, 58,* 811-817.

Norman, D. & Shallice, T. (1986). Attention to action: Willed and automatic control of behaviour. In R. Davidson, G. Schwartz & D. Shapiro, (Eds) *Consciousness and Self Regulation: Advances in Research and Theory.* New York: Plenum Press.

PEDro - *Physiotherapy Evidence Database* (www.pedro.fhs.usyd.edu.au).

Penandes, R., Catalan, R., Salamero, M., Boget, T., Puig, O., Guarch, J. & Gasto, C. (2006). Cognitive Remediation Therapy for outpatients with chronic schizophrenia: A controlled and randomized study. *Schizophrenia Research, 87,* 323-331

Rath, J.F., Simon, D., Langenbahn, D.M., Sherr, R.L., Diller, L. (2003). Group treatment of problem-solving deficits in outpatients with traumatic brain injury: A randomised outcome study. *Neuropsychological Rehabilitation, 13 (4)* 461-488

Robertson, I.H., (1996). *Goal Management Training: A clinical manual.* Cambridge, UK: Psy-Consult.

Shallice, T. & Burgess, P.W. (1996). The domain of the supervisory process and temporal organisation of behaviour. Philosophical Transaction: *Biological Sciences, 351,* 1405-12.

Sherrington, C., Herbert, R.D., Maher, C.G., Moseley, A.M. (2000). PEDro: a database of randomised trials and systematic reviews in physiotherapy. *Manual Therapy 5,* 223–226.

Sohlberg, M. & Mateer, C.A. (1987). Effectiveness of an attention training programme. *Journal of Clinical and Experimental Neuropsychology, 19,* 117-130.

Sohlberg, M., McLaughlin, K., Pavese, A., Heidrich, A., Posner, M. (2000). Evaluation of Attention Process Training and Brain Injury Education in Persons

with Acquired Brain Injury. *Journal of Clinical and Experimental Neuropsychology 22 (5)* 656-676

Stuss, D.T. & Benson, D.F. (1986). *The Frontal Lobes.* New York: Raven Press.

Tamamoto, F., Sumi, Y., Nakanishi, A., Okayasu, K., Maehara, T. & Katayama, H. (2000). Usefulness of cerebral blood flow measurements to predict the functional outcome for rehabilitation in patients with cerebrovascular disease. *Annals of Nuclear Medicine, 14,* 47-52.

van der Gaag, M., Woonings, F.M.J., van den Boschm R.J., Slooff, C.J., & Lowerens J.W. (1994) Cognitive training of schizophrenic patients: A behavioural approach based on experimental psychopathology. In: W.D. Spaulding, (Ed.), *Cognitive Technology in Psychiatric Rehabilitation pp.* 139-158 Lincoln, NE: University of Nebraska Press

Van der Gaag , M., Kern, R.S., van den Bosch R.J., Liberman R.P. (2002). A controlled trial of cognitive remediation in schizophrenia. *Schizophrenia Bulletin, 28 (1)* 167.

Vauth, R., Corrigan, P.W., Clauss, M., Dietl, M. (2005). Cognitive Strategies Versus Self-Management Skills as Adjunct to Vocational Rehabilitation. *Schizophrenia Bulletin, 31 (1)* 55

Velligan, D.I. & Bow-Thomas, C.C. (2000). Two case studies of cognitive adaptation training for outpatients with schizophrenia. *Psychiatric Services, 51 (1)* 25-29.

Velligan, D.I, Mahurin, R.K., True, J.E., Lefton, R.S., & Flores. C,V. (1996). Preliminary evaluation of cognitive adaptation training to compensate for cognitive deficits in schizophrenia. *Psychiatric Services, 47,* 415-417.

Velligan, D., Prihoda, T.J., Ritch, J., Maples, N. (2002). A randomized single-blind pilot study of compensatory strategies in schizophrenia outpatients. *Schizophrenia Bulletin, 28 (2)* 283.

Verhagen, A.P., de Vet, H., de Bie, R.A., Kessels, A.G.H., Boers, M., Bouter L.M, & Knipschild, P.G. (1998). The Delphi List: A Criteria List for Quality Assessment of Randomized Clinical Trials for Conducting Systematic Reviews Developed by Delphi Consensus. *Journal of Clinical Epidemiology, 51 (12)* 1235–1241.

Von-Cramon, D.Y., Matthes Von-Cramon, G. & Mai, N. (1991). Problem solving deficits in brain injured patients: A therapeutic approach. *Neuropsychological Rehabilitation, 1 (1)* 45-64.

Wilson, B.A. (2002). Towards a comprehensive model of cognitive rehabilitation. *Neuropsychological Rehabilitation, 12 (2)* 97-110.

Wykes, T., Reeder, C., Corner, J., Williams, C., & Everitt, B. (1999). The effects of neurocognitive remediation on executive processing in patients with schizophrenia. *Schizophrenia Bulletin, 25 (2),* 291.

Wykes, T, Reeder, C., Corner, J., Williams, C,. & Everitt, B. (2003). Are the results of cognitive remediation therapy (CRT) durable? Results from an exploratory trial in schizophrenia. *Schizophrenia Research 61,* 163-174.

Improving social problem solving in individuals with Traumatic Brain Injury - Evaluation of an autobiographical memory cueing procedure

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Summary

This project aims to investigate whether individuals with Traumatic Brain Injury can be taught to improve their ability to solve social problem solving vignettes, by making use of their memories of previous experiences in which they solved similar problems in the past.

Introduction

Executive Functioning Difficulties and TBI

Individuals who have sustained a Traumatic Brain Injury (TBI) involving frontal lobe damage, frequently suffer from 'executive functioning' problems. These problems involve difficulties with making complex and high level abstract judgements, the organisation of memories, and also planning, organising and problem solving. These difficulties present a significant challenge for both the professional and the individual in relation to effective rehabilitation.

With specific reference to novel problem solving, Shallice and Burgess (1996) suggest that a 'Supervisory Attention System' operates, in order to create a plan, implement the plan and monitor the success of the plan. At the initial planning stage of this process the role of autobiographical memory retrieval is thought to be particularly important. Specifically, the assertion is that the generation of solutions to novel problems may be enhanced by recalling specific autobiographical memories of solving the same or similar problems in the past.

The term 'autobiographical memories' refers to memories containing information about an individual's own past experiences. These memories have been referred to by Conway & Rubin (1993) as having three categories. (1) Lifetime periods such as, 'when I lived with X'. (2) general events, for example 'holidays

in Italy', and (3) single specific events with a date and time, 'opening my presents last Christmas'.

Previous research has supported the notion that recollection of relevant *specific* autobiographical memories (those with a date and time) may assist in the process of solving novel problems. Ross (1984) found that retrieval of previous learning experiences influenced learning of a cognitive skill, and Seifert (1994) suggests that performance on reasoning tasks can be improved by retrieving past experiences.

This link between problem solving and autobiographical memory retrieval has also been documented within the depression literature. It has been demonstrated that depressed people find it difficult to retrieve specific autobiographical memories (Williams, 1996), and that their problem solving ability is also impaired (e.g. Gotlib & Asarnow, 1979; Marx, Williams & Claridge, 1992). Evans, Williams, O'Loughlin & Howells, (1992) and Goddard, Dritschel & Burton, (1996) also suggest that the ability to retrieve relevant autobiographical memories plays a central role in effective problem solving.

Dritschel, et al., (1998) investigated this proposed relationship between autobiographical memory retrieval and problem solving in a head-injured group of participants and concluded that failure to make use of specific autobiographical memories may be one of the reasons why this population performs poorly in unstructured planning and problem solving situations.

Hewitt, et al., (2006) investigated the effectiveness of an autobiographical memory cueing procedure on brain injured participants ability to complete planning tasks. In this study, two groups of participants who had suffered a

closed head injury were asked to provide a description of how they would plan eight unstructured everyday activities from the Everyday Descriptions Task (Dritschel, 1991). Examples of the activities included 'How would you look for a new car?', 'How would you look for a new place to live?'. One group underwent training in a procedure aimed at prompting the retrieval of specific memories to support planning, and the other did not. The results of this study indicated that use of this autobiographical episodic memory cueing procedure improved the effectiveness of the plans generated by the group who had received the training, compared to the group who had not. The results of this study suggest that this procedure may be a useful rehabilitation tool.

Social Cognition and TBI

Not only do individuals who have sustained TBI have difficulty solving practical problems, such as those included in the ETD task used by Hewitt, et al., (2006), but they often have considerable difficulty in situations involving social interaction with others (Damasio, et al., 1991).

Bechara, et al., (1994;1997) suggests that individuals with frontal lobe damage often do not trigger a normal emotional response to stimuli, including socially relevant stimuli. It is suggested that these 'emotional hunches' are crucial in social situations in which it is not practical to analyse all possible courses of action due to the complexity of the situation. The function of the emotional hunch is therefore to steer decision making towards the best outcome for the individual, based on past experience in similar situations. It follows that for individuals with this type of damage, negotiating the best course of action in complex social interactions is likely to be problematic.

This raises the issue of whether the autobiographical memory cueing procedure that improved solution generation to everyday practical problems in the Hewitt, et al., (2006) study, may also prove to be useful in the social or interpersonal problem scenarios encountered by individuals with frontal lobe damage.

Social Problem Solving

A stage model of problem solving is useful for examining the role of autobiographical memories in relation to Social Problem Solving (SPS). Most problem solving models incorporate five main stages. Problem orientation, definition, generation of solutions, decision making and implementation (D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1982). Evans, et al., (1992) suggested two main reasons why specific autobiographical memories are thought to play a role in the process of SPS. Firstly, referring to previous experiences at the problem definition stage may enhance understanding of the context of the problem, and secondly, they may increase chances of success by helping to create a greater number of alternative solutions.

D'Zurilla & Nezu (1982) refer to the term Social Problem Solving as the process of 'real world' problem solving, as it affects a person's ability to function in a real life social environment. SPS deals with a range of problems which could impact on functioning including –

1. *Impersonal Problems* – Stolen property, Insufficient finances.
2. *Interpersonal Problems* – Conflicts or disputes within relationships.
3. *Intrapersonal Problems* – Emotional, behavioural, cognitive, health
4. *Community/Societal Problems* – Crime, discrimination etc.

The ability of individuals who have sustained TBI to solve *interpersonal* and *intrapersonal* problems is of particular interest in the present study. These types of social problems, as outlined in the model above, can be argued to require more subtle and sophisticated problem solving strategies, compared to the practical everyday planning situations, which have tended to be the focus of previous research. The emotional and interpersonal nature of these types of problems adds an additional component to the problem solving process. Previous research has demonstrated that this often presents a particular difficulty for individuals with frontal lobe damage (Damasio, et al.,1991; Bechara, et al.,1994).

Present Study

Hewitt, et al., (2006) investigated the effect of an autobiographical memory cueing procedure on participants ability to generate effective solutions to practical everyday problems. However, little research has examined social problem solving in the brain injured population. The present study will explore whether this type of intervention could also be implemented to increase the effectiveness of solutions generated for interpersonal, and intrapersonal problem situations, in addition to the practical activity planning tasks included in the Everyday Descriptions Task (Dritschel, 1991).

Aims & Hypotheses

Aims

Research Question - Can individuals with Traumatic Brain Injury improve their ability to solve social problems via an autobiographical memory cueing procedure?

As previously stated, this study will extend the findings of Hewitt, et al., (2006). The present study will use the Autobiographical Memory Interview (Kopelman, et al., 1990) to more accurately measure participant's ability to retrieve autobiographical memories. Also, the control group will be given additional practice at completing the SPS vignettes, but without any teaching on accessing specific memories. This is to ensure that any difference between the two groups is not a result of the intervention group having additional practice as a result of undergoing the teaching session.

Hypotheses

1. It is hypothesised that the intervention group who undergo training in a procedure aimed at prompting the retrieval of specific autobiographical memories, will show a greater improvement in their ability to solve social problem scenarios than the group who do not undergo the training.

2. It is hypothesised that for the intervention group at time 2 (post training), there will be a significant correlation between problem solving ability, *as measured on the problem solving task,* and the number of specific memories recalled. Based on previous research findings, *it is expected that little variation will exist in problem solving ability within the group before the training.*

3. It is also predicted that participants who have more severe impairment in autobiographical memory will benefit less from the intervention than those with less severe impairment – prompting to recall specific memories is unlikely to be effective in those people who have a specific impairment in their ability to recall detailed autobiographical events. Therefore it is hypothesised that there will be a correlation between scores on a measure of autobiographical episodic memory (the Autobiographical Memory Interview Incidents Score) and a measure of improvement in performance from time 1 to time 2.

Plan of Investigation

Design

This study utilises a mixed experimental design, with random allocation of participants into two groups. The between group factor is group (group 1 & group 2), and the within group factor is time (time 1 & time 2). The dependant variables are the participant's performance on the problem solving vignettes, (1) effectiveness of plan, (2) number of steps in the plan and (3) number of specific memories retrieved.

Procedure

Time 1

In the first session, participants will complete a set of neuropsychological tests. They will then complete a set of social problem solving vignettes in which they will are given a social problem (e.g. You and your boss are not getting along well. The scenario ends with you and your boss getting along well) and asked to

describe how they would solve the problem (e.g. how they would deal with the situation in which they are not getting on with their boss). They will have a maximum of five minutes to respond to each of the problem vignettes. Participants will be informed that there are no right or wrong answers, and that their responses to the problem vignettes will be audio taped. Participants will then be informed that the session has ended and will be reminded to return at the correct date and time, on a different day, to complete the second session.

After completion of the neuropsychological tests and Set A of the problem solving vignettes, the first 10 participants will be randomly allocated to either Group 1 or 2 using a standard allocation procedure. Group 1 will be the control group, and group 2 will receive the intervention. If the estimated IQ, measured by the Speed and Capacity of Language Processing Test (Baddeley, Emslie & Nimmo-Smith, 1993) is not equal across the two groups, then the following participants will be allocated to group 1 or 2 on an individual basis, depending on their estimated IQ scores. This allows the researcher to proceed with Time 2 with the participants which have already been allocated to either the control or intervention group. Although this does not necessarily guarantee equal groups on the basis of IQ, this is deemed to be the most appropriate method of allocation given the time constraints.

Estimated completion time for Time 1 is 2 hours. Regular breaks will be scheduled.

Time 2

In the second session, participants in group 1 will be provided with some practice vignettes to complete, but will receive no additional teaching. They will then complete the second set of problem vignettes, Set B.

Group 2 will be given specific training following a set protocol. Participants will be informed that previous research has indicated that people are able to solve problems more effectively if they are able to remember specific examples of when they solved a similar problem in the past. The researcher then provides an example of recalling specific memories to solve a problem. The researcher provides examples until the participant demonstrates that they understand the importance of retrieving specific memories, by being able to provide examples of retrieving specific memories from their own personal experience. A cue card will then be placed in front of the participants for the rest of the duration of the procedure. The card will display the written prompt, '*Try to think of a specific time and place where you solved a similar problem in the past.*'

Estimated completion time for Time 2 is 90 minutes. Regular breaks will be scheduled.

After the sessions the researcher will transcribe the taped oral responses of the participants. The transcripts will be blind rated by a trained rater, on the basis of (1) effectiveness of plan, (2) number of steps in the plan and (3) number of specific memories retrieved, using the scoring criteria described below (*see Problem Solving Vignettes*).

Participants

In order to be included in the study, participants will have experienced a severe head injury, defined either by the length of post-traumatic amnesia being greater than 24 hours, or loss of consciousness greater than 6 hours.

Using the above inclusion criteria, participants who have sustained a severe head injury and have less severe executive impairment may also be included in the sample. Previous research of this nature has utilised a head injured population on the basis that there is a high probability that this group will have executive functioning impairments. As it would be difficult to recruit individuals who had been identified through neuropsychological testing to have primarily executive functioning impairments, a brain injured population is useful in this respect. Including those with less severe executive functioning impairment, may ultimately reduce the effect size, however this is considered more reasonable in terms of recruitment than trying to find specific individuals.

Participants will not be included in the study if they suffered pre-morbid psychiatric or neurological problems, currently suffer from severe aphasia, or are currently abusing alcohol or drugs. Those who have previously been involved in any rehabilitation programme which specifically involved training in planning or problem solving will also be excluded from this study. Participants age, and time since head injury will be recorded.

Recruitment

Thirty participants will be recruited from two brain injury rehabilitation centres and two charitable day centres. Participants will be asked to take part in the study by letter which will be posted to their home address by administration staff from the brain injury centres. Only those participants who are deemed able to consent by the Brain Injury Centre managers will be invited to participate in the study. (See Appendix 7 for recruitment documentation)

Measures

A set of neuropsychological tests will be administered in order to characterise the participants. The tests measure executive functioning skills, autobiographical memory retrieval, everyday memory skills, anxiety and depression, and an estimation of cognitive decline since brain injury.

1. *The Rivermead Behavioural memory Test* (Wilson, Cockburn & Baddeley, 1985). This provides a measure of general everyday memory functioning, and new memory and learning. It attempts to measure a range of everyday memory problems reported in individuals who experience memory difficulties.

2. *Speed and Capacity of Language Processing Test* (Baddeley, Emslie & Nimmo-Smith, 1993). This includes two tests and, discrepancy in performance between the tests is used as a measure of cognitive decline resulting from the brain injury.

3. *The Hayling Test* (Burgess & Shallice, 1997). This test provides a measure of response initiation and response suppression. These skills are often impaired in those with frontal lobe damage.

4. *The Brixton Test* (Burgess & Shallice, 1997). This test measures rule detection and rule following, again skills that are often impaired after frontal lobe damage.

5. *The Modified Six Elements Test* (Burgess, Alderman, Wilson, Emslie & Evans, 1996). This is a planning and organisation task, in which the participant must follow set rules, and divide up their time in order to attempt all tasks

provided. This requires planning and organisation skills which are often impaired in individuals with frontal lobe damage.

6. The Autobiographical Memory Interview (Kopelman, Wilson, & Baddeley, 1990). This test specifically assesses the participant's ability to access autobiographical memories.

7. The Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983). This test provides a measure of both anxiety and depression which may affect the participants performance on the experimental tasks.

Problem Solving Vignettes

The social problem solving vignettes will be based on those from the Means-Ends Problem Solving test (Platt & Spivak, 1975). The MEPS comprises 10 vignettes which outline a social problem scenario and the final outcome of the problem. For example, '*You notice that friends are avoiding you. This situation ends with you and your friends getting along well.*' Respondents are asked to explain their strategy for reaching the outcome in the vignette. The MEPS has also been shown to be effective when used in its shortened form, using only 4 vignettes rather than 10 (Platt & Spivak, 1975). In this study, participants will respond to 8 vignettes during stage 1 (set A) which will consist of 4 intrapersonal and 4 interpersonal social problems scenarios. In stage 2, 8 vignettes (set B) will consist of 4 different intrapersonal and 4 different interpersonal social problem scenarios.

Set A - 8 vignettes (See Appendix 6)

Set B – 8 vignettes

Responses to the individual vignettes will be scored according to the criteria developed by Platt & Spivak (1975). This will include firstly, a score representing the number of steps in the plan and secondly, a score derived from a 7 point likert scale which measures the effectiveness of the solution. Two total scores for each participant will be generated by summing the steps in the plan scores and effectiveness scores across the 8 vignettes.

The 16 social problem vignettes that will be included in this study are intended to represent scenarios which fit into the interpersonal or intrapersonal problem types as defined by D'Zurilla & Nezu (1982). They will be rated according to problem type by independent raters, who will be presented with definitions of three of D'Zurilla & Nezu (1982) problem types; Interpersonal, Intrapersonal and Impersonal. They will then be asked to allocate each scenario to one of the three problem categories. As all of the vignettes that will be used in this study are intended to be either interpersonal or intrapersonal problems, some of the original practical problems fro the Everyday Descriptions Task (Dritschel, 1991) will be included among the vignettes intended for inclusion in the present study. The purpose of this is to avoid the raters becoming confused if they consistently give similar ratings for all of the vignettes, and to ensure that the vignettes chosen for this study are different from those used in the original Hewitt, et al., (2006) study and do not fall into the impersonal problem category.

Settings and Equipment

Participants will be invited to attend whichever venue they already regularly attend, the charitable day centre or one of the brain injury rehabilitation centres. They will complete the neuropsychological tests and the intervention tasks in a consulting room provided by either centre.

Data Collection and Storage

Participant data will be recorded through the use of numerical identifiers placed on all recording documents, and audio equipment. No personal identifiers will be included in the study, however the treatment centres will have a secure record of identification numbers and corresponding names and addresses for contact purposes. Participants will be required to sign consent forms which will also be stored securely. All data will be entered into an SPSS statistical analysis package and securely stored on computer. All data and recording information will be retained and stored securely by the Department of Psychological Medicine for the required period of time following completion of the study.

Power Calculation and Sample Size Estimation

The previous study of Hewitt, et al., (2006) is the most comparable study on which to base a power calculation to determine the required sample size. This study used 30 participants split into two groups of 15. The key contrast in this study is between the experimental group and the control group in terms of the level of change from pre- to post training. Using data from this study, the effect size of the change score (post training minus pre-training) was large (d=0.97), resulting in power of 0.85. A similar effect size is anticipated in the planned study and hence for the present study the aim will be to recruit a similar sample size of 30 participants.

With regard to hypothesis 2, Hewitt, et al., (2006) found a correlation of r=0.63 between the measure of effectiveness of the solution and the number of specific memories. Assuming a similar effect size, and N=15, alpha=0.05 (1 sided) this results in a power of 0.81.

Hypothesis 3 predicts that there will be an association between scores on the Autobiographical Memory Interview Incidents Score (AMI) and a measure of improvement in social problem solving performance from time 1 to time 2. Given the relationship between specific autobiographical memories and problem solving ability (Evans, et al.,1992; Goddard, et al., 1996), it is expected that a reasonably strong correlation will exist between the AMI and the improvement in problem solving ability measured by the task in this study. However, even with a strong correlation (r=0.5), with a sample size of 15 it is likely that this aspect of the study would be under powered (for r=0.5, alpha = 0.05 1 sided, N=15, power = 0.59). Given that this relationship has not been examined in this way before it is considered acceptable to view this as an opportunity to examine the effect size (size of the correlation) with a view to future studies which could adjust the sample size to reflect the likely effect size.

Data Analysis

Two mixed model Analysis of Variance (ANOVA) will be carried out, each with one within-participant factor (time 1 v time 2), and one between group factor (group 1 v group 2) for each of the dependent variables (1) the effectiveness of the plan, (2) the number of relevant steps in the plan and (3) the number of specific memories recalled.

To address hypothesis 3, correlational analysis will also be carried out on the intervention group data, comparing scores on the Autobiographical Memory Interview, problem solving ability and number of specific memories recalled.

Practical Applications

Rehabilitation of executive functioning difficulties in individuals who have sustained Traumatic Brain Injuries.

Timescale

Data collection:	August 2006 – March 2007
Data analysis:	April 2007
Write up:	May 2007 – July 2007

Ethical Issues

As this study utilises an experimental design in which the control group does not receive an intervention of potential benefit to the participants, this raises an ethical issue. In order to overcome this, the control group will be offered the teaching component of the intervention after the required data has been collected for the study.

Ethical approval will be sought in July 2006, from the NHS Greater Glasgow Primary Care Division Local Research Committee 1 – Community Mental Health. (See Appendix 8)

References

Baddeley, A., Emslie, H. & Nimmo-Smith, I. (1993). The Spot-the-word test: A robust estimate of verbal intelligence based on lexical decision. *British Journal of Clinical Psychology, 32*, 55-65.

Bechara, A. Damasio, A. R., Damasio, H., Anderson, S.W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition 50*, 7-15

Bechara, A., Damasio, H., Tranel, D., & Damasio, A.R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science, 275*, 1293–1295.

Burgess, P.W., Alderman, N., Wilson, B.A., Emslie, H., & Evans, J. (1996). The Modified Six Elements Test. In Wilson, B.A., Alderman, M., Burgess, P., Emslie, H., & Evans, J. (1996). *The Behavioural Assessment of the Dysexecutive Syndrome*. Flempton: Thames Valley Test Company.

Burgess, P.W. & Shallice, T. (1997). *Hayling and Brixton tests*. London.

Conway, M.A. & Rubin, D.C. (1993). The Structure of Autobiographical memory. In A.F. Collins , S.E. Gatherole, M.A. Conway, & P.E. Morris (Eds.) *Theories of Remembering*. Hillsdale NJ, Lawrence Erlbaum Associates.

Damasio, A.R., Tranel, D., & Damasio, H. (1991). Somatic markers and the guidance of behavior. In H. Levin, H. Eisenberg, & A. Benton (Eds.), *Frontal lobe function and dysfunction, 217-228. New* York: Oxford University Press.

Dritschel, B. (1991). The role of autobiographical memory in describing how to perform everyday activities. European Cognitive Society Conference, Cuomo, Italy.

Dritschel, B., Kogan, L., Burton, A. Burton, E. & Goddard, L. (1998). Everyday planning difficulties following traumatic brain injury: a role for autobiographical memory. *Brain Injury, 12 (10)* 875-886.

D'Zurilla, T.J.& Goldfried M.R. (1971). Problem Solving and Behaviour Modification. *Journal of Abnormal Psychology, 78*, 107-126.

D'Zurilla, T.J. & Nezu, A.M. (1982). Social Problem-Solving in Adults. In P.C. Kendall (Ed), *Advances in cognitive-behavioural research and therapy, 1*, 201-274. New York: Academic Press.

Evans, J., Williams, J.M.G, O'Loughlin, S.,& Howells, K. (1992). Autobiographical memory and problem-solving strategies of parasuicidal patients. *Psychological Medicine*, 22, 399-505.

Goddard, L., Dritschel, B. & Burton, A. (1996). The role of Autobiographical Memory in Problem-Solving and Depression. *Journal of Abnormal Psychology, 36*, 499-451.

Gotlib, I. H., & Asarnow, R. F. (1979). Interpersonal problem-solving skills in mildly and moderately depressed university students. *Journal of Consulting and Clinical Psychology*, 47, 86-95.

Hewitt, J., Evans, J.J., & Dritschel, B. (2006). Theory driven rehabilitation of executive functioning: Improving planning skills in people with traumatic brain injury through the use of an autobiographical episodic memory cueing procedure. *Neuropsychologia. 44 (8)* 1468-1474.

Kopelman, M.D. Wilson, B.A. & Baddeley, A.D. (1990). *The Autobiographical Memory Interview.* Thames Valley Test Company.

Marx, E. M., Williams, J.M.G., Claridge, G.S. (1982). Depression and social problem-solving. *Journal of Abnormal Psychology, 101*, 78-86.

Platt, J.J.& Spivak, G. (1975). *Manual for the Means-End Problem-Solving Test (MEPS): A measure of interpersonal problem solving skill.* Philadelphia. Hahnemann Medical College and Hospital.

Ross, B.H. (1984). Remindings and their effects in learning a cognitive skill. *Cognitive Psychology, 16*, 371-416.

Shallice, T. & Burgess, P. (1996). The domain of supervisory processes and temporal organisation of behaviour. In A. Roberts, & T.W. Robins, (Eds.) (1998). *The Prefrontal Cortex: Executive and Cognitive Functions.* New York: Oxford University Press.

Siefert, C. (1994). The role of goals in retrieving analogical cases. In K. Holyoak & J. Barnden (Ed), *Analogy, metaphor and reminding.* Westport, CT: Ablex Publishing.

Williams, J.M.G. (1996). Depression and the specificity of autobiographical memory. In D. Rubin (Ed), *Remembering our past: Studies in autobiographical memory*. Cambridge, England: Cambridge University Press.

Wilson, B.A., Cockburn, J. & Baddeley, A.D. (1985). *The Rivermead Behavioural Memory Test.* Bury St Edmunds, Suffolk: Thames Valley Test Company.

Zigmond, A.S. & Snaith, R.P. (1983). The Hospital Anxiety and Depression Scale. Windsor: NFER Nelson.

Improving social problem solving in individuals with Traumatic Brain Injury - Evaluation of an autobiographical memory cueing procedure

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Abstract

Individuals who have sustained a Traumatic Brain Injury (TBI) involving frontal lobe damage, frequently suffer from 'executive functioning' problems which can adversely affect their ability to effectively manage situations involving social interaction with others (Damasio, et al., 1991). Previous research has supported the notion that recollection of relevant *specific* autobiographical memories (those with a date and time) may assist in the process of solving novel problems. The present study explored whether an autobiographical memory cueing procedure could be implemented to increase the effectiveness of solutions generated for social problem situations. Twenty three participants who had suffered a closed Traumatic Brain Injury were randomly allocated to either the control group, or to the intervention group in which they received teaching on how to use autobiographical memories to support the generation of solutions to a set of eight social problems. The results suggest that the intervention was partially effective in improving the solutions generated, as the number of steps in the plans increased post intervention, but the ratings of how effective the solutions were did not. Anecdotal observations of participants responses suggest that this type of intervention may increase emotion focussed rumination which interferes with effective solution generation, therefore possible adaptations to the intervention are suggested.

Introduction

Executive Functioning Difficulties and TBI

Individuals who have sustained a Traumatic Brain Injury (TBI) involving frontal lobe damage, frequently suffer from 'executive functioning' problems. These problems involve difficulties with making complex and high level abstract judgements, the organisation of memories, and also planning, organising and problem solving (Lezak, 1995). These difficulties present a significant challenge for both the professional and the individual in relation to effective rehabilitation.

With specific reference to novel problem solving, Norman and Shallice (1986) have proposed a particularly comprehensive model of executive functioning which outlines the role of a supervisory attention system (SAS). They propose that the SAS regulates conscious attentional processes required to control behaviour. Shallice and Burgess (1996) extended this model of the SAS and suggested that a number of different processes work together as a supervisory system which operates in order to create a plan, implement the plan and monitor the success of the plan. They suggest that at the initial planning stage of this process the role of autobiographical memory retrieval is thought to be particularly important. Specifically, the assertion is that the generation of solutions to novel problems may be enhanced by recalling specific autobiographical memories of solving the same or similar problems in the past.

The term 'autobiographical memories' refers to memories containing information about an individual's own past experiences. These memories have been referred to by Conway & Rubin (1993) as having three categories. (1) Lifetime periods such as, 'when I lived with X'. (2) general events, for example 'holidays

in Italy', and (3) single specific events with a date and time, 'opening my presents last Christmas'.

Previous research has supported the notion that recollection of relevant *specific* autobiographical memories (those with a date and time) may assist in the process of solving novel problems. Ross (1984) found that retrieval of previous learning experiences influenced learning of a cognitive skill, and Seifert (1994) suggests that performance on reasoning tasks can be improved by retrieving past experiences.

This link between problem solving and autobiographical memory retrieval has also been documented within the depression literature. It has been demonstrated that depressed people find it difficult to retrieve specific autobiographical memories (Williams, 1996), and that their problem solving ability is also impaired (e.g. Gotlib & Asarnow, 1979; Marx, et al.,1992). Evans, et al., (1992) and Goddard, et al., (1996) also suggest that the ability to retrieve relevant autobiographical memories plays a central role in effective problem solving.

Dritschel, et al., (1998) investigated this proposed relationship between autobiographical memory retrieval and problem solving in a head-injured group of participants and concluded that failure to make use of specific autobiographical memories may be one of the reasons why this population performs poorly in unstructured planning and problem solving situations.

Hewitt, et al., (2006) investigated the effectiveness of an autobiographical memory cueing procedure on brain injured participants ability to complete planning tasks. In this study, two groups of participants who had suffered a

closed head injury were asked to provide a description of how they would plan eight unstructured everyday activities from the Everyday Descriptions Task (EDT) (Dritschel, 1991). Examples of the activities included 'How would you look for a new car?', 'How would you look for a new place to live?'. One group underwent training in a procedure aimed at prompting the retrieval of specific memories to support planning, and the other did not. The results of this study indicated that use of this autobiographical episodic memory cueing procedure improved the number of relevant steps in plans as well as the overall effectiveness of the plans generated by the group who had received the training, compared to the group who had not. The results of this study suggest that this procedure may be a useful rehabilitation tool.

Social Cognition and TBI

Not only do individuals who have sustained TBI have difficulty solving practical problems, such as those included in the EDT task used by Hewitt, et al., (2006), but they often have considerable difficulty in situations involving social interaction with others (Damasio, et al., 1991).

Bechara, et al., (1994 & 1997) suggests that individuals with frontal lobe damage often do not trigger a normal emotional response to stimuli, including socially relevant stimuli. It is suggested that these 'emotional hunches' are crucial in social situations in which it is not practical to analyse all possible courses of action due to the complexity of the situation. The function of the emotional hunch is therefore to steer decision making towards the best outcome for the individual, based on past experience in similar situations. It follows that for individuals with this type of damage, negotiating the best course of action in complex social interactions is likely to be problematic.

This raises the issue of whether the autobiographical memory cueing procedure that improved solution generation to everyday practical problems in the Hewitt, et al., (2006) study, may also prove to be useful in the social and interpersonal problem scenarios encountered by individuals with frontal lobe damage.

Social Problem Solving

A stage model of problem solving is useful for examining the role of autobiographical memories in relation to Social Problem Solving (SPS). Most problem solving models incorporate five main stages. Problem orientation, definition, generation of solutions, decision making and implementation (D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1982). Evans, et al., (1992) suggested two main reasons why specific autobiographical memories are thought to play a role in the process of SPS. Firstly, referring to previous experiences at the problem definition stage may enhance understanding of the context of the problem, and secondly, they may increase chances of success by helping to create a greater number of alternative solutions.

D'Zurilla and Nezu (1982) refer to the term Social Problem Solving as the process of 'real world' problem solving, as it affects a person's ability to function in a real life social environment. SPS deals with a range of problems which could impact on functioning including –

1. *Impersonal Problems* – Stolen property, Insufficient finances.
2. *Interpersonal Problems* – Conflicts or disputes within relationships.
3. *Intrapersonal Problems* – Emotional, behavioural, cognitive, health
4. *Community/Societal Problems* – Crime, discrimination etc.

The ability of individuals who have sustained TBI to solve *interpersonal* and *intrapersonal* problems is of particular interest in the present study. These types of social problems, as outlined in the model above, can be argued to require more subtle and sophisticated problem solving strategies, compared to the

practical everyday planning situations, which have tended to be the focus of previous research. The emotional and interpersonal nature of these types of problems adds an additional component to the problem solving process. Previous research has demonstrated that this often presents a particular difficulty for individuals with frontal lobe damage (Bechara, et al.,1994; Damasio, et al.,1991).

Present study

Hewitt, et al., (2006) investigated the effect of an autobiographical memory cueing procedure on participants ability to generate effective solutions to practical everyday problems. However, little research has examined social problem solving in the brain injured population. The present study explored whether this type of intervention could also be implemented to increase the effectiveness of solutions generated for interpersonal, and intrapersonal problem situations, which differ from the practical activity planning tasks included in the Everyday Descriptions Task (Dritschel, 1991).

Aims & Hypotheses

Aims

Research Question - Can individuals with Traumatic Brain Injury improve their ability to solve social problems via an autobiographical memory cueing procedure?

As previously stated, this study extended the findings of Hewitt, et al., (2006). In the present study, social problem scenarios were used, instead of the Everyday Descriptions Task. The Autobiographical Memory Interview (Kopelman, et al., 1990) was not used to assess participants autobiographical memory retrieval in

the Hewitt, et al., (2006) study. It was included in the present study to more accurately measure participant's ability to retrieve autobiographical memories. Also, the control group was given additional practice at completing the SPS vignettes, but without any teaching on accessing specific memories. This was to ensure that any difference between the two groups was not a result of the intervention group having had additional practice as a result of undergoing the teaching session.

Hypotheses

1. It was hypothesised that the intervention group who underwent training in a procedure aimed at prompting the retrieval of specific autobiographical memories, would show a greater improvement in their ability to solve social problem scenarios than the group who did not undergo the training.

2. It was hypothesised that for the intervention group at time 2 (post training), there would be a significant correlation between problem solving ability, as measured on the problem solving task, and the number of specific memories recalled. Based on previous research findings, it was expected that little variation would exist in problem solving ability within the group before the training.

3. It was also predicted that participants who had more severe impairment in autobiographical memory would benefit less from the intervention than those with less severe impairment – prompting to recall specific memories is unlikely to be effective in those people who have a specific impairment in their ability to recall detailed autobiographical events. Therefore it was hypothesised that there would be a correlation between scores on a measure of autobiographical

episodic memory (the Autobiographical Memory Interview Incidents Score) and a measure of improvement in performance from time 1 to time 2.

Method

Participants

23 participants were recruited from a brain injury rehabilitation centre and from local support groups run by a brain injury charity (Headway). Participants were selected for inclusion in the study if they had suffered a severe head injury, defined by loss of consciousness greater than 6 hours, and post traumatic amnesia greater than 24 hours. All participants were able to speak and read English, and were in the 16-64 age range. Participants were excluded from the study if they suffered from severe aphasia, if they were currently abusing alcohol or drugs, if they suffered from any other neurological condition or if they had previously received specific problem solving rehabilitation. Ethical approval for the study was granted by the NHS Greater Glasgow Primary Care Division, Local Research Committee – Community Mental Health, on the 18th December 2006 (Appendix 8). Written consent to take part in the study was obtained from all participants.

Using data from the original Hewitt, et al., (2006) study, the effect size of the change score (post training minus pre-training) was large (d=0.97), resulting in power of 0.85. A similar effect size was anticipated in the current study therefore recruitment of a similar sample size of 30 participants was planned. However, due to time constraints and the nature of the difficulties experienced by this particular population, the full 30 participants were not recruited.

Randomisation

The first 10 participants were randomly allocated to either Group 1, the control group or group 2, the intervention group, using a standard allocation procedure. Participants were asked to attend the centre for the first session, and the principal researcher randomly selected an interview pack from a prepared set containing an equal number of packs labelled either group 1 (control) or group 2 (intervention). The labels were not visible during random selection. This ensured that participants were randomly allocated to groups, and that the numbers in each group would be equal at the end of the study. Due to time constraints in relation to recruitment it was decided that if the estimated pre-morbid intellectual ability, measured by the Spot the Word Test (Baddeley, et al., 1993) was not equal across the two groups, then the subsequent participants would be allocated to group 1 or 2 on an individual basis, depending on their estimated pre-morbid intellectual ability scores. This would allow the researcher to proceed with the second phase of the study with the participants which had already been allocated to either the control or intervention group. The Speed and Capacity of Language Processing (SCOLP) scores for the first ten participants were found to be normally distributed, therefore parametric analysis was carried out. Results of an unrelated t-test showed that there was no significant difference in mean scores ($t = 0.67$, $DF = 8$, $p > 0.195$) between group 1 ($X = 1.2$, $SD = 3.34$) and group 2 ($X = 0$, $SD = 2.12$). Therefore the subsequent participants were randomly allocated to either group 1 or 2 using the same random allocation procedure. There were no significant differences between the SCOLP scores ($t = 0.67$, $df = 21$, $p = 0.5$) across the two groups after allocation of all 23 participants.

Measures

Neuropsychological Tests

A set of neuropsychological tests was administered in order to measure, executive functioning skills, autobiographical memory retrieval, everyday memory skills, anxiety and depression, and to provide an estimation of cognitive decline since brain injury.

1. *The Rivermead Behavioural memory Test* (Wilson, et al., 1985). This provides a measure of general everyday memory functioning, and new memory and learning. It attempts to measure a range of everyday memory problems reported in individuals who experience memory difficulties.

2. *Speed and Capacity of Language Processing Test* (Baddeley, et al., 1993). This includes two tests and, discrepancy in performance between the tests is used as a measure of cognitive decline resulting from the brain injury.

3. *The Hayling Test* (Burgess & Shallice, 1997). This test provides a measure of response initiation and response suppression. These skills are often impaired in those with frontal lobe damage.

4. *The Brixton Test* (Burgess & Shallice, 1997). This test measures rule detection and rule following, again skills that are often impaired after frontal lobe damage.

5. *The Modified Six Elements Test* (Burgess, et al., 1996). This is a planning and organisation task, in which the participant must follow set rules, and divide up their time in order to attempt all tasks provided. This requires planning and

organisation skills which are often impaired in individuals with frontal lobe damage.

6. The Autobiographical Memory Interview (Kopelman, et al., 1990). This test specifically assesses the participant's ability to access autobiographical memories.

7. The Hospital Anxiety and Depression Scale. (Zigmond & Snaith, 1983). This test provides a measure of both anxiety and depression which may affect the participants performance on the experimental tasks.

Development of Social Problem Solving Vignettes

The social problem solving vignettes are based on those from the Means-Ends Problem Solving test (Platt & Spivak, 1975). The MEPS comprises 10 vignettes which outline a social problem scenario and the final outcome of the problem. For example, '*You notice that friends are avoiding you. This situation ends with you and your friends getting along well.*' Respondents are asked to explain their strategy for reaching the outcome in the vignette. The MEPS has also been shown to be effective when used in its shortened form, using only 4 vignettes rather than 10 (Platt & Spivak, 1975).

The 16 social problem vignettes included nine of the original MEPS vignettes and eight that were specifically developed for this study. Two parallel sets of vignettes were required, one set for baseline and another set for use after the intervention (Appendix 6). D'Zurilla & Nezu (1982) highlight four different problem categories, interpersonal, intrapersonal, impersonal and societal. The vignettes used in this study were intended to fall into both the interpersonal problem category, identified as conflicts within relationships, and the

intrapersonal problem category, which refers to an individual's emotional, behavioural, cognitive or health problems. The two sets included four interpersonal problems and four intrapersonal problems each. Set A included four interpersonal problems referring to situations involving a partner, a friend, a family member, and an acquaintance. The intrapersonal problems referred to physical health, a personal loss, a life transition and activity levels. The parallel version, set B, included these same problem types, but the specifics of the problem were changed. For example both sets have a partner related problem. In set A the problem reads, '*You have an argument with your partner and they leave you. The story ends with you both getting along well'*. In set B the partner related problem reads, '*Your partner is disappointed with you because you broke a promise. The story ends that you are happy together.'* Both problems require the participant to outline how they would resolve a dispute with their partner.

The vignettes were also categorised by thirteen independent raters, according to problem type. Raters were presented with a list of the problem solving vignettes and the problems from the Everyday Descriptions Task which were used in the Hewitt , et al., 2006 study. They were then presented with three of D'Zurilla & Nezu (1982) problem categories, Interpersonal, Intrapersonal and Impersonal, and their definitions, and were asked which problem category they felt best described each problem. This was considered important to ensure there was a distinct difference between the problems used in this study compared to those in the Hewitt , et al., (2006) study, and to ensure they fitted the definitions of either interpersonal or intrapersonal problem type. Table 9 below shows the number of raters who agreed with the vignette category allocation. Agreement was high as either all raters, or twelve out of the thirteen raters agreed with the category allocation. Only six out of thirteen raters scored vignette B6 in the correct

category, and eight out of thirteen scored A6 and B7 in the correct category. The reason for this would appear to be that all three of these problems refer to an intrapersonal problem type that has *arisen* out of a loss of a relationship, rather than the problem being a dispute within a current relationship. This possibly accounts for the lower rate of agreement for these vignettes. However, as all of these vignettes fell within the categories of either interpersonal or intrapersonal problems (as opposed to impersonal, practical problems) the decision was made to retain the items.

Table 9 – Vignette Category Allocation

Vignette Number	**Category**	**Number of raters who agreed with category**
A1	Interpersonal	13/13
A2		13/13
A3		12/13
A4		13/13
A5	Intrapersonal	13/13
A6		8/13
A7		13/13
A8		12/13
B1	Interpersonal	13/13
B2		13/13
B3		13/13
B4		12/13
B5	Intrapersonal	13/13
B6		6/13
B7		8/13
B8		13/13

Procedure

Time 1

In the first session, all participants completed the set of neuropsychological tests outlined above. They then completed Set A of the social problem solving vignettes, consisting of 4 interpersonal and 4 intrapersonal vignettes (See Appendix 9). They were informed that there were no right or wrong answers and

were given a maximum of five minutes to respond to each problem. After completion of the vignettes they were asked if they were using any particular solution to solve the problems. Their responses were tape recorded for transcription after the session. Participants were then informed that the session had ended and were reminded to return at the correct date and time, on a different day, to complete the second session.

Time 2

In the second session, participants in group 1 (control group) were provided with four practice vignettes to complete in the same manner as in time 1 (See Appendix 9). No additional teaching was provided. The purpose of this was to control for the additional exposure to vignettes and opportunity to practice that the treatment group received. They then completed Set B of the problem vignettes, containing the parallel versions of the four interpersonal and four intrapersonal problem scenarios.

Group 2 (intervention group) were given specific training following a set protocol (See Appendix 9). Participants were informed that previous research has indicated that people are often able to solve problems more effectively if they are able to remember specific examples of when they solved a similar problem in the past. The researcher then provided examples of recalling specific memories to solve a problem, using the same four practice problem scenarios given to Group 1. The first two problems included examples of the researcher's specific memories and example problem solutions which were closely related to the specific memory. The participant read out the problem, the memory and the solution and when the researcher was satisfied that the participant understood the link between the memory and the solution they were asked to generate their own specific memories and related solutions for the remaining practice

vignettes. A cue card was then placed in front of the participants for the rest of the duration of the procedure. The card displayed the written prompt, '*Try to think of a specific time and place where you solved a similar problem in the past.*'

After completion of the vignettes participants were asked if they had accessed autobiographical memories while generating their solutions. They were asked how many of the vignettes they used this strategy for, A none, B one - two, C three - five, or D six - eight. Their responses were tape recorded for transcription after the session.

Scoring

At time 1, responses to the individual vignettes were scored according to the criteria developed by Platt & Spivak (1975), (Appendix 10). This included firstly, a score representing the number of steps in the plan and secondly, a score derived from a 7 point likert scale which measures the effectiveness of the solution. Two total scores for each participant were generated by summing the steps in the plan scores and effectiveness scores across the 8 vignettes.

Scoring of the vignettes for time 2 followed the same procedure as for time 1. In addition the number of specific memories recalled were also scored. These memories were rated according to the scoring procedure used for the autobiographical recall section in the Autobiographical Memory Interview (Kopelman, et al., 1990). 3 points were awarded for an episodic memory specific in time and place, 2 points for a personal but non specific event, or specific event but no time and place recalled, 1 point for a vague personal memory and 0 points for no response or a response based on a semantic memory. This

resulted in a score representing the total number of specific memories recalled, and a second score representing the level of specificity of the memories.

11 randomly selected transcripts of participant data were subject to a second rating by a scorer who was blind to group membership. These scores were correlated with the original scores. The steps in the plan and effectiveness data was all normally distributed therefore parametric analysis was carried out. Data for specific and total memories were not normally distributed therefore non parametric analysis was carried out. All scores were significantly positively correlated, however the steps and effectiveness scores for pre training did not show as strong a correlation as the other scores. It is not clear why this is the case but more variation may have been present in participants' responses before the training, possibly making scoring more difficult. This inconsistency could be addressed in future studies. Results are shown in Table 10 below –

Table 10 – Inter rater correlations

Variable	**Pearson's correlation**	**Variable**	**Spearman's rho correlation**
Steps in plan pre-training	r=0.51, p=0.05	Specific Memories pre-training	rho=0.66, p<0.05
Steps in plan post-training	r=0.95, p<0.001	Specific Memories post-training	rho=0.97, p<0.001
Effectiveness pre-training	r=0.53, p<0.05	Total Memories pre-training	rho=0.84, p<0.001
Effectiveness post-training	r=0.72, p<0.05	Total Memories post-training	rho=0.78, p=0.01

Results

11 participants were allocated to group 1 (control) and 12 participants to group 2 (intervention). Table 11 below displays the results of the neuropsychological tests. There were no significant differences between the two groups in relation to their performance on any of the neuropsychological tests. The mean age in

group 1 was 43.6 (SD 7.68) and the mean time since head injury was 45.7 (SD=25.2) months. In group 2, the mean age was 42.6 (SD=10.7) and mean time since head injury was 48 months (SD = 27.5). No significant difference existed between the two groups in relation to age or time since head injury.

Table 11. Means and Standard Deviations for each group on neuropsychological tests.

Test	Group 1 (Control) Mean	Std. Dev	Group2 (Intervention) Mean	Std. Dev
AMI Autobiographical Score (Acceptable range 19-27, Borderline 16-18, probably abnormal 13-15, abnormal <12)	21.18	4.7	21.16	4.93
Hayling Test (Scaled scores – Impaired 1-3, Average 4-7, Superior 8-10)	4.27	2.32	3.58	2.74
Brixton Test (Scaled scores – Impaired 1-3, Average 4-7, Superior 8-10)	4.81	2.04	4.5	2.06
RBMT (screening score – normal 10-12, poor 7-9, mod impair 3-6, severe impair 0-2)	6.66	2.64	7.75	2.45
SCOLP (Vocabulary minus speed of processing scaled score – see manual for tables, Baddeley, et al., 1993)	1.00	3.22	0.08	3.26
HADS Anxiety score (Normal 0-7, Borderline 8-10, Clinical caseness 11+)	8.00	3.71	9.58	5.33
HADS Depression score (Normal 0-7, Borderline 8-10, Clinical caseness 11+)	6.27	3.71	6.91	4.58
BADS modified six elements score (Subtest profile score only- Max 4. Control mean 3.52, *sd* 0.8)	3.09	0.83	2.5	1.08

Hypothesis 1. *The intervention group who undergo training in a procedure aimed at prompting the retrieval of specific autobiographical memories, would show a greater improvement in their ability to solve social problem scenarios than the control group.*

Means and standard deviations for each group, at each time point, for each of the measures are displayed in Table 12. Exploratory data analysis indicated that the data for steps in the plan and the effectiveness of the plan were normally

distributed, therefore it was considered appropriate to use parametric analysis to examine the effect of the intervention.

Table 12. Means and Standard Deviations for each group, at each time point, for each of the measures

Problem Solving Vignette	Group 1 (control)		Group 2 (intervention)	
Measure	Mean	Std. Dev	Mean	Std. Dev
Steps in plan – Time 1	28.81	17.8	28.33	17.71
Steps In plan – Time 2	32.8	18.31	40.63	16.17
Effectiveness of plan – Time 1	28.81	10.1	28.83	13.67
Effectiveness of plan – Time 2	33.6	11.05	35.18	10.87
Specific Memories – Time 1	0.45	1.5	1.33	2.70
Specific Memories – Time 2	1.8	4.13	8.36	7.87
Total Memories – Time 1	17	41.36	19.75	30.65
Total Memories – Time 2	12.9	18.87	75.18	55.96

Data for problem solving ability were analysed using two mixed model ANOVAs, one for the first dependent variable, the steps in the plan and one for the second dependent variable, the effectiveness of the plan. Each ANOVA had one within participant factor (Time 1 versus Time 2) and one between participant factor (Group1 versus Group 2).

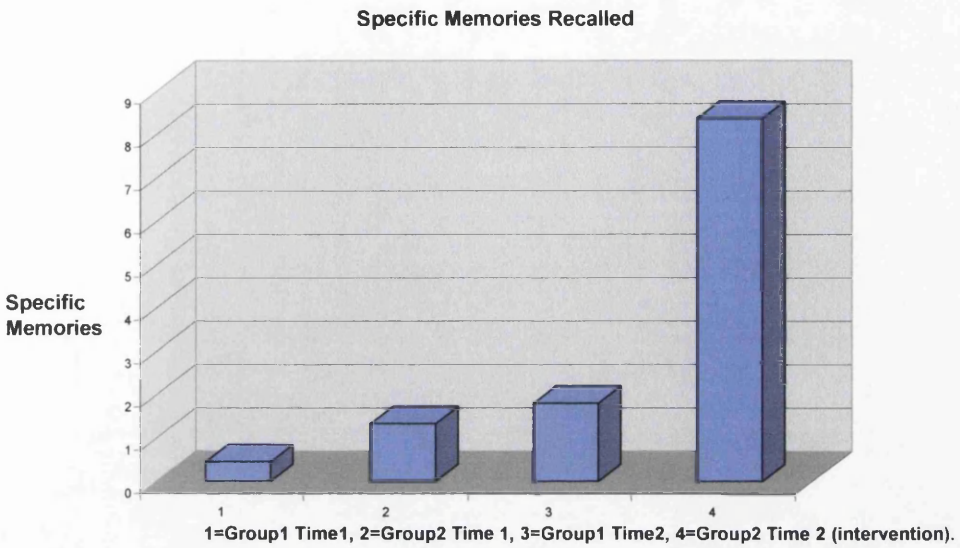
Results showed that for the measure of steps in the plan, there was no main effect of group ($F = 0.08$, d.f. = 1, $p > 0.05$), a significant main effect of time ($F = 10.89$, d.f. = 1, $p < 0.01$), and a significant group by time interaction ($F = 4.55$, d.f. = 1, $p < 0.05$). The size of the effect ($Eta^2=0.19$) corresponds with a Cohen's *d* of 0.9, which according to Cohen's (1998) criteria is just above a large effect size. The result of no main effect of group suggests that there was no difference between the two groups in relation to the number of steps in the plan that were reported. A significant effect of time however suggests that at time 2, both participants in group 1 and group 2 reported a higher number of steps in their

plans at time 2 compared to time 1. The presence of a significant group by time interaction suggests that the intervention contributed to the increase in scores in the intervention group at time 2.

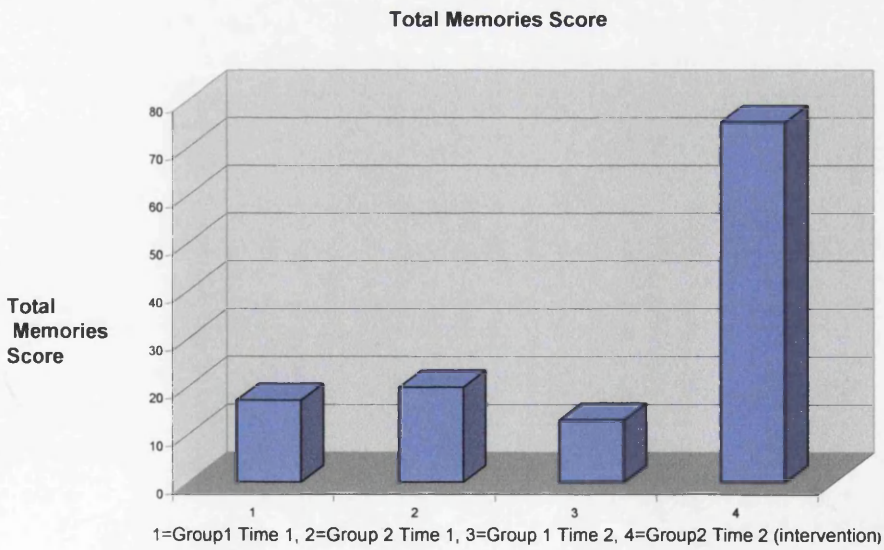
For the measure of effectiveness of the plan, results showed that there was no main effect of group ($F = 0.004$, d.f. = 1, $p > 0.05$), a significant effect of time ($F = 12.19$, d.f. = 1, $p < 0.01$), but no group by time interaction effect ($F = 0.56$, d.f. = 1, $p > 0.05$). The result of no main effect of group again suggests that the two groups did not differ in relation the effectiveness of the plans they reported. However, a significant main effect of time suggests that at time 2, both the control and the intervention group produced more effective plans. No group by time interaction effect indicates that the effectiveness of the plans produced by the intervention group was not improved by the application of the intervention.

Data for the number of memories recalled are displayed in Graph 6 and 7 below which clearly show that in the intervention group at time 2, the participants recalled more specific and more general memories compared to the control group or the intervention group at time 1.

Graph 6 – Specific Memories recalled for both groups at time 1 and time 2.



Graph 7 - Total memories score for both groups at time 1 and time 2.



Additional data analysis was carried out to further investigate the effect of the different problem types on the effectiveness of the plan scores. It was considered possible that the intervention may have had a significant effect for

either the interpersonal problems, or on the intrapersonal problems that was not detected when the analysis was run on the combined total score for effectiveness of the plans.

Means and standard deviations for both groups, at each time point, for each of the problem types are displayed in Table 13 below. Exploratory data analysis indicated that the effectiveness of the plan data, for each problem type was normally distributed, therefore it was considered appropriate to use parametric analysis to examine the effect of the intervention on the different problem types.

Table 13

Time	Problem type	Group 1		Group 2	
		Effectiveness of the plan		Effectiveness of the plan	
		Mean	Standard Dev	Mean	Standard Dev
Time 1	Interpersonal	**13.1**	*(Sd = 5.4)*	**15.9**	*(Sd = 6.3)*
	Intrapersonal	**13.4**	*(Sd = 5.3)*	**15.7**	*(Sd = 5.8)*
Time 2	Interpersonal	**16.2**	*(Sd = 5.1)*	**18.5**	*(Sd = 4.9)*
	Intrapersonal	**16.1**	*(Sd = 5.7)*	**17.6**	*(Sd = 6.5)*

Two mixed model ANOVAS were carried out, one for the first dependent variable, Interpersonal problem type and one for the second dependent variable, Intrapersonal problem type. Each ANOVA had one within participant factor (Time 1 versus Time 2) and with one between group factor (Group 1 versus Group 2).

Results showed that for the Interpersonal problems, there was no main effect of group ($F = 1.167$, d.f. = 1, $p > 0.05$), a significant main effect of time ($F = 12.3$, d.f. = 1, $p < 0.01$), and no significant group by time interaction ($F = 0.028$, d.f. = 1, $p > 0.05$). For the Intrapersonal problems, there was no main effect of group

(F = 0.52, d.f. = 1, $p > 0.05$), a significant main effect of time (F = 4.97, d.f. = 1, p < 0.05), and no significant group by time interaction (F = 0.02, d.f. = 1, p > 0.05). These results indicate that problem type did not have an impact on the effectiveness of the plans generated in the intervention group.

Hypothesis 2 – *There will be a significant correlation between problem solving ability (effectiveness and steps in the plan) and the number of specific memories recalled, for the intervention group at time 2.*

Data relating to the number of specific memories and the total number of memories recalled were significantly skewed and therefore were analysed using non-parametric statistics.

Spearman's rank correlations revealed no significant correlations when comparing specific memories recalled with firstly, steps in the plan (rho=0.19, p>0.05) and secondly, effectiveness of the plan (rho=0.06, p>0.05). Similarly, no significant correlation was found when the total memory score was compared to the effectiveness of the plans (rho=0.41, p>0.05). These non significant results indicate that specific memory retrieval was not related to increased effectiveness of solutions or number of steps in the plan, nor was recall of general memories related to effectiveness of solutions. However a significant positive correlation was revealed when the total memory score was compared with the number of steps in the plan (rho=0.56, p<0.05) indicating that when any type of memory was recalled, whether general or specific in nature, participants produced an increased number of steps in their plans.

Hypothesis 3 – *There will be a significant correlation between performance on the Autobiographical Memory Interview and the improvement in the number of*

steps in the plan and the effectiveness of the plan, post-training compared to pre-training.

The data relating to improvements in scores from pre-training to post-training for steps in the plan and effectiveness of the plan were normally distributed, therefore parametric analysis was considered appropriate. Pearson correlation analysis revealed a significant negative correlation between the Autobiographical Memory Interview scores and the improvement in the effectiveness of the plans ($r = -0.38$, $p = 0.04$), but no significant correlation for the improvement in steps in the plan ($r = -0.18$, $p = 0.2$). This indicates that, contrary to the hypothesis, the participants with poorer Autobiographical Memory Interview scores improved more following the training intervention than those with better AMI scores.

Discussion

The results from this study indicate that the training intervention was partly effective in improving the problem solving ability of a group of participants with traumatic brain injury, as measured by their verbal reports of how they would plan to solve a set of social problem vignettes.

The training intervention significantly increased the number of steps that the participants in the intervention group produced in their solutions to the problems, compared to those who did not receive the intervention. A large effect size suggests that this difference is likely to be clinically as well as statistically significant. However, the intervention did not improve the rating for the level of effectiveness of the plans generated by participants in the intervention group, compared to those who did not receive the training. In addition effectiveness of

the plan scores were not related to whether the problem was of an interpersonal or an intrapersonal nature.

There are several possible explanations for these findings. In contrast to the results of Hewitt, et al., (2006), both groups improved in terms of effectiveness and number of steps from Time 1 to Time 2 (i.e. there was a main effect of time). This suggests a 'practice' effect. In the present study an additional control for simple exposure to more vignettes experienced in the treatment group was introduced which involved the control group completing four 'practice' vignettes before moving on to the second set of vignettes. It is possible that this contributed to better performance of the control group, so reducing the impact (effect size) of the intervention group. One interpretation of this is that simple practice at this type of task may bring about improvements. Another possibility is that the second set of vignettes are in some sense 'easier' than the first. We do not have any specific evidence to confirm or refute this, but this is something which future studies could examine or control for (via counterbalancing of vignettes in the pre and post-intervention condition). Another possible explanation for the findings is that the participants in this study have more impairment in the area of problem solving than those in the Hewitt, et al., (2006) study. Overall the scores on the background tests were broadly comparable to those in the Hewitt, et al., (2006) study with some being poorer and others better. However, the current sample of participants is drawn from a more economically deprived area than the original Hewitt, et al., (2006) study and as a result, the life experiences of the participants prior to sustaining a head injury may not have supported the development of highly effective social problem solving strategies. Therefore, the intervention may have encouraged the participants to think more carefully about their solutions, but their actual skill

level in relation to the types of problems presented was inadequate in relation to generating more effective solutions.

Although the intervention was shown to be effective in increasing the number of specific and general memories recalled by the participants in the intervention group, the number of specific memories was not correlated with the number of steps in the plan, nor with the effectiveness of the plan. This indicates that increased recall of specific memories was not associated with improvement in problem solving ability. However, the score for total memories was positively correlated with the steps in the plan scores, indicating that when all types of memories were included, this was associated with an increase in the number of problem solving steps that were produced. This suggests that memories of a more general nature, for example, recalling time periods in ones life, or situations that arose on more than one occasion appeared to increase the number of problem solving steps produced. This appears to contradict much previous research which suggests that recall of specific memories supports problem solving (Evans, et al., 1992; Goddard, et al., 1996). The reasons for this finding are not clear. It could be argued that situations involving interpersonal and intrapersonal difficulties are less likely to be confined to a single time and place. Many of the vignettes referred to relationship difficulties with neighbours, work colleagues or partners and friends. It is possible, for example that disputes with neighbours regarding noise levels, or problems with work colleagues are likely to have developed over a period of time, therefore drawing on memories of how difficulties were managed over extended time periods could be considered appropriate. Another possibility is that these types of problems, triggered an emotional response from participants when they were asked to think of a time when something similar happened before. This emotional response may have interfered with their ability to focus on the task of generating a solution. This

possible explanation is supported by the anecdotal observations of the researchers who rated the participants responses. Many of the participants reported that they were facing the actual problems outlined in the vignettes and they often produced very long answers, containing a high level of emotional rumination with little focus on how to effectively solve the problem. It has been shown recently (Bessell, et al., in press) that ruminative self-focus reduced specificity of autobiographical recall in a group of individuals with acquired brain injury. Hence it is possible that the training intervention triggered recall of some memories, but that this in turn triggered higher levels of rumination which then contributed to less effective use of memories in the problem solving process.

It was predicted that those who had better autobiographical memory recall, as measured by the AMI, would benefit more from the intervention, evidenced by a positive correlation between the AMI score and the improvement in problem solving ability, from pre-intervention to post-intervention. However this was not the case. The finding of a significant negative correlation between the AMI scores and the improvement in the effectiveness of the plans indicates the opposite, that those with poorer autobiographical memory recall benefited more from the intervention, in relation to their effectiveness scores. We had hypothesised that a poor score on the AMI would reflect impaired access to autobiographical memories which would prevent retrieval of such memories for use in the problem-solving vignettes. However, another possibility is that poor performance on the AMI is (like poorer performance on the first set of vignettes) a reflection of impaired strategic retrieval processes rather than a loss of specific memories. If this is the case then it is possible that those who perform poorly on the AMI have the most to gain from a training intervention aimed to increase specific memory retrieval. In future studies it might be interesting to test whether

performance on a task like AMI improves as a result of a specific memory retrieval training programme.

Study Limitations

The intervention described in this study only provided minimal training in relation to the autobiographical memory cueing technique, which was delivered in one session. The participants were prompted to use the technique only once in relation to the post training vignettes, and thereafter a written prompt was visible to the participants throughout the remainder of the task. No structure was implemented in relation to the participants' verbal responses to the problems. It is possible that more intensive teaching and repetition of prompting to use the technique and to stay focussed on the goal of solving the problem would be required to increase the effectiveness of this strategy. Given the possibility suggested above that participants increased the level of what might be described as 'rumination' in response to the intervention, it seems possible that adding in additional components to the intervention aimed at helping participants manage the emotional content of such memories and to stay 'on task', using a form of Goal Management Training (Levine, et al., 2000) might be beneficial.

This particular technique could be incorporated into a wider and more structured intervention aimed at supporting the generation of solutions to these types of social problem solving scenarios. However, as part of an effective rehabilitation strategy, the possibility that emotional responses triggered by the recall of autobiographical memories may interfere with problem solving requires consideration. For example Rath (2003) describe a successful problem solving rehabilitation intervention in which the authors specifically address the issue of negative emotional reactions that interfere with problem solving at the problem orientation stage. They use standard Cognitive Behavioural Therapy techniques

to encourage participants to remove barriers to effective use of problem solving skills such as cognitive distortions, misattributions, and illogical thinking (eg. *'If I cant do it as fast as I used to, I cant do it at all'*). It is possible that a similar approach, if combined with the intervention outlined in this study, may reduce the level of distracting emotional rumination that is perhaps interfering with effective solution generation.

Although the participants' problem solving ability was partly improved by the intervention, this gives no indication that the intervention improved day to day social problem solving skills.

A further limitation of this study relates to statistical power and sample size as this study did not recruit the intended 30 participants.

Conclusions

The results of this study suggest that this particular intervention did improve the participants' ability to generate more steps in their plans to the social problem solving vignettes, but this effect did not extend to increasing the effectiveness of their plans. It is possible that because the problems included in this study differ from the practical problems used in the Hewitt, et al., (2006) study in relation to their emotional complexity, the memories recalled as a result of the intervention elicited an emotional response from participants which interfered with effective solution generation. As a result, in relation to social problems of this nature this intervention may be more effective as part of a more comprehensive and structured rehabilitation approach, which also addresses the emotional reaction of the participants.

References

Baddeley, A., Emslie, H. & Nimmo-Smith, I. (1993). The Spot-the-Word test: A robust estimate of verbal intelligence based on lexical decision. *British Journal of Clinical Psychology, 32*, 55-65.

Bechara, A. Damasio, A. R., Damasio, H., Anderson, S.W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition 50*, 7-15.

Bechara, A., Damasio, H., Tranel, D., & Damasio, A.R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science, 275*, 1293–1295.

Bessell, N.A., Watkins, E. & Williams, H. (in press). Depressive rumination reduces specificity of autobiographical memory recall in acquired brain injury. *Journal of the International Neuropsychological Society.*

Burgess, P.W., Alderman, N., Wilson, B.A., Emslie, H., & Evans, J. (1996) The Modified Six Elements Test. In Wilson, B.A., Alderman, N., Burgess, P.W., Emslie, H., & Evans, J. (1996). *The Behavioural Assessment of the Dysexecutive Syndrome.* Flempton: Thames Valley Test Company.

Burgess, P.W. & Shallice, T. (1997). *Hayling and Brixton Tests.* London.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioural Sciences.* Second Edition. Lawrence Erlbaum Associates.

Conway, M.A. & Rubin, D.C. (1993). The Structure of Autobiographical memory. In A.F. Collins, S.E. Gatherole, M.A. Conway, & P.E. Morris (Eds) *Theories of Remembering.* Hillsdale NJ, Lawrence Erlbaum Associates.

Damasio, A.R., Tranel, D., & Damasio, H. (1991). Somatic markers and the guidance of behavior. In H. Levin, H. Eisenberg, & A. Benton (Eds.), *Frontal Lobe Function and Dysfunction, (pp. 217-228). New* York: Oxford University Press.

Dritschel, B. (1991). The role of autobiographical memory in describing how to perform everyday activities. European Cognitive Society Conference, Cuomo, Italy.

Dritschel, B., Kogan, L., Burton, A. Burton, E. & Goddard, L. (1998). Everyday planning difficulties following traumatic brain injury: a role for autobiographical memory. *Brain Injury, 12 (10)* 875-886.

D'Zurilla, T.J.& Goldfried M.R. (1971). Problem Solving and Behaviour Modification. *Journal of Abnormal Psychology, 78,* 107-126.

D'Zurilla, T.J. & Nezu, A.M. (1982). Social Problem-Solving in Adults. In P.C. Kendall (Ed), *Advances in Cognitive-Behavioural Research and Therapy,* (pp. 201-274), New York: Academic Press.

Evans, J., Williams, J.M.G., O'Loughlin, S., & Howells, K. (1992). Autobiographical memory and problem-solving strategies of parasuicidal patients. *Psychological Medicine, 22,* 399-505.

Goddard, L., Dritschel, B. & Burton, A. (1996) The role of autobiographical Memory in Problem-Solving and Depression. *Journal of Abnormal Psychology, 36*, 499-451.

Gotlib, I. H., & Asarnow, R. F, (1979). Interpersonal problem-solving skills in mildly and moderately depressed university students. *Journal of Consulting and Clinical Psychology, 47*, 86-95.

Hewitt, J., Evans, J.J., & Dritschel, B. (2006). Theory driven rehabilitation of executive functioning: Improving planning skills in people with traumatic brain injury through the use of an autobiographical episodic memory cueing procedure. *Neuropsychologia. 44, (8)* 1468-1474.

Kopelman, M.D. Wilson, B.A. & Baddeley, A.D. (1990) *The Autobiographical Memory Interview.* Bury St. Edmunds: Thames Valley Test Company.

Levine, B., Robertson, I. H., Clare, L., Carter, G., Hong, J.,Wilson, B.A., Duncan, J., & Stuss, D.T. (2000). Rehabilitation of executive functioning: An experimental-clinical validation of Goal Management Training. *Journal of the International Neuropsychological Society, 6*, 299-312.

Lezak, M.D. (1995). *Neuropsychological Assessment.* 3rd edition. New York: Oxford University Press.

Marx, E. M., Williams, J.M.G., Claridge, G.S. (1992). Depression and social problem-solving. *Journal of Abnormal Psychology, 101*, 78-86.

Norman, D & Shallice, T. (1986). Attention to action: Willed and automatic control of behaviour. In, R Davidson, G. Schwartz and D. Shapiro (Eds), *Consciousness and Self Regulation: Advances in Research and Theory* New York: Plenum Press.

Platt, J.J. & Spivak, G. (1975). *Manual for the Means-End Problem-Solving Test (MEPS): A Measure of Interpersonal Problem Solving Skill.* Philadelphia Hahnemann Medical College and Hospital.

Rath, J.F., Simon, D., Langenbahn, D.M., Sherr, R.L., & Diller, L. (2003). Group treatment of problem-solving deficits in outpatients with traumatic brain injury: A randomised outcome study. *Neuropsychological Rehabilitation, 13 (4)*, 461-488

Ross, B.H. (1984). Remindings and their effects in learning a cognitive skill. *Cognitive Psychology 16*, 371-416.

Shallice, T. & Burgess, P. (1996). The domain of supervisory processes and temporal organisation of behaviour. In A. Roberts, & T.W. Robins (Eds.) (1998). *The Prefrontal Cortex: Executive and Cognitive Functions.* New York: Oxford University Press.

Siefert, C. (1994). The role of goals in retrieving analogical cases. In K. Holyoak & J. Barnden (Ed), *Analogy, Metaphor and Reminding (pp. 95-125)*. Westport, CT: Ablex Publishing.

Williams, J.M.G. (1996). Depression and the specificity of autobiographical memory. In D. Rubin (Ed), *Remembering Our Past: Studies in Autobiographical Memory* (pp. 244-267). Cambridge, England: Cambridge University Press.

Wilson, B.A., Cockburn, J. & Baddeley, A.D. (1985). *The Rivermead Behavioural Memory Test.* Bury St Edmunds, Suffolk: Thames Valley Test Company.

Zigmond, A.S. & Snaith, R.P. (1983). The Hospital Anxiety and Depression Scale. Windsor: NFER Nelson.

Generalisation of Phobic Anxiety Reduction Between Multiple Feared Situations.

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Abstract

The case of a patient who meets diagnostic criteria for panic disorder with agoraphobia, specific phobia, and claustrophobia (DSM-IV) is presented. The patient experiences phobic levels of anxiety and panic attacks, in relation to using various forms of public transport, being in crowded public areas, and enclosed spaces such as lifts, and toilet cubicles. She exhibits a high level of avoidance to at least fourteen other situations. This presents a challenge in relation to treatment, as it raises the question of whether all situations will require the same level of intervention, or if gains made in one feared situation will generalise to other feared situations.

The aim of the proposed study is to investigate, using a single case experimental design, whether a systematic desensitisation treatment approach which is effective for one feared situation, produces any generalisation of anxiety reduction in relation to other feared situations.

A multiple baseline design is described. The dependent variables are the Subjective Units of Distress Scores (SUDS) related to the different feared situations. The researcher is interested in any change in anxiety ratings when comparing the SUDS related to the feared situation being targeted for treatment, with the estimated SUDS for the other feared situations being monitored but not yet treated. Any change in SUDS relating to the untreated feared situations indicate a possible generalisation effect of the intervention applied to the targeted feared situation.

Daily SUDS rating data would be illustrated graphically and visual analysis would be carried out. A finding of no generalisation would be revealed by

baseline levels of SUDS on the untreated situations remaining stable throughout the period of treatment of the first target situation. A finding of generalisation would be revealed by reductions of anxiety on the untreated situations following treatment of the first target situation. Visual inspection would be supported by statistical analysis using an appropriate time series analysis. In this case the C statistic would be applied (Tyron, 1982) as it has been shown that this method can be used with relatively short time-series data (Arnau and Bono, 1998).

The results of this proposed study would help clinicians to decide which clinical approach to adopt when faced with a patient with multiple feared situations.

Appendix 1. 1

Clinical Psychology Forum

Notes to Contributors

- Please follow the Society's *Style Guide*. A pdf copy can be downloaded from the Society's website.
- Articles of 1000-2000 words (including references) are welcomed. Send two hard copies of your contribution and also your e-mail address in case the editors need to contact you. Please do not send a disk or electronic copy until asked.
- When sending copy, make sure it is double spaced, in a reasonably sized font and that all pages are numbered.
- Give a 40-word summary (maximum) at the beginning of the paper.
- Contributors are asked to use language which is psychologically descriptive rather than medical and to avoid using devaluing terminology; i.e. avoid clustering terminology like 'the elderly' or medical jargon like 'person with schizophrenia'. If you find yourself using quotation marks around words of dubious meaning, please use a different word. If you do not wish to follow this guideline, please include a note explaining your particular use of language.
- We reserve the right to shorten, amend and hold back copy if needed.
- Articles submitted to *Clinical Psychology Forum* will be sent to members of the editorial collective for refereeing. We shall then communicate directly with authors.
- Include a word count at the end (including references).
- Spell out all acronyms the first time they appear. Include the first names of all authors and give their affiliations, and remember to give a full postal address for correspondence.
- Give references in the Society's style, and if a reference is cited in the text make sure it is in the list at the end.
- Don't include tables and figures unless they save space or add to the article.
- Ask readers to request a copy of your questionnaire from you rather than include the whole of it in the article.

Appendix 2.1

AUDIT TITLE

A change to the triage assessment procedure within Ayrshire and Arran Adult Psychological Therapies Service: Does it save clinician time?

INFORMATION FOR CLINICIANS

As requested by Adult Psychological Therapies Service clinicians in 2004, a change to the triage assessment system is now being piloted within the department.

It was suggested by APTS clinicians that valuable clinician time could be saved by changing the triage assessment procedure (details of the change are outlined below). This audit will assess the impact of this change on the length of clinician time devoted to triage assessment. This will involve clinicians recording the length of time it takes to carry out the triage assessment. The results from this audit will help to inform any decision regarding a permanent change to the triage system, and the final report will be available in July 2005.

AIMS

To examine whether or not clinician time is saved by completing a short standardised letter to the referrer at triage stage, rather than a detailed assessment letter.

To examine whether or not the information contained in the SAD form is easy to access in absence of detailed letter.

To explore clinicians experiences of carrying out triage assessment using the new procedure.

CLINICIAN INVOLVEMENT

Procedure: * *The following recording sheets are anonymous. Clinician codes have not been matched to names or recorded anywhere* *

STAGE 1 – Record time taken to carry out current practice

Materials Included :
Instruction sheet
Recording forms

STAGE 2 – Record time taken to complete SAD form instead of detailed assessment letter

Materials Included :
Instruction sheet
Recording forms and questions
SAD form
Standard letter for referrer
Envelope for returning recording sheets

Please start making STAGE 1recordings with your next triage assessment patient

- Please try to make recordings for four assessment patients at STAGE 1 and four at STAGE 2. If this is not possible within the allocated time frame please make recordings for three patients at both stages, or two patients at both stages.
- After you have completed STAGE 2 this is the end of the audit.
- Please have all recording forms returned to Ms Marie Holmes (Trainee Clinical Psychologist) at P7 by **03/06/05.**
- After this date please return to the *original* triage assessment procedure.

Please direct any queries to myself, or my supervisor Karen Porter, at Pavilion 7 on 01294 323564.

THANK YOU

INSRUCTIONS **STAGE 1**

PLEASE RECORD THE **CURRENT** TRIAGE ASSESSMENT PROCEDURE

1. Please make recordings for the next four individual patients that you assess. The four following forms have patient numbers already inserted for your convenience.

2. Please complete in minutes on the following forms, how long it takes you to complete all of the tasks related to the current triage assessment procedure.

   Please note – Write N/A if you did not carry out a particular task. E.g. you may or may not re-write notes or communicate with the referrer.

Once you have completed the recordings – proceed immediately to STAGE 2

TRIAGE ASSESSMENT RECORDING FORM – STAGE 1

Clinician Code	Date of Assessment	Patient Number
		1

Please record the length of time, in minutes, that it takes to do the following –
(Please write N/A if you did not carry out certain tasks on this occasion)

Assessment Task	**Length of time taken (minutes)**
1. The assessment session	
2. Re-writing or tidying up case notes ***after*** session	
3. Scoring of the C.O.R.E. form	
4. Completion of proforma	
5. Any communication with referrer for purpose of providing or requesting further information	
6. Writing assessment letter to referrer	
7. Any additional checking and finalising of letter	

INSRUCTIONS **STAGE 2**

THIS IS THE **NEW PILOT** TRIAGE ASSESSMENT PROCEDURE

1. Please make recordings for the next four individual patients that you assess. The four following forms have patient numbers already inserted for your convenience.

Please change your usual practice by -

- Completing the SAD form, rather than usual assessment, which will be stored in case-notes.
- Not writing a detailed assessment letter to the referrer. Instead send the short standard letter to the referrer. Your secretary has a blank copy of this letter.

Please Note – If you discharge a patient after this session **or if the patient has a complex presentation **or** if you feel that it is necessary to write a more detailed letter to the referrer, then please continue with your usual practice. Please detail this on the form but still record.**

2. Please complete the four following forms

- Please record in minutes how long it takes you to complete all of the tasks related to the STAGE 2 triage assessment procedure.
- Please complete the four questions included on the recording form.

Please note – Write N/A if you did not carry out a particular task. E.g. you may or may not re-write SAD form or communicate with the referrer.

3. Once you have completed the STAGE 2 recordings, please return all forms to Ms Marie-Louise Holmes Trainee Clinical Psychologist, APTS, Pavilion 7, Ayrshire Central Hospital, no later than **03/06/05**

Once you have completed STAGE 2 please return to the *original* triage assessment procedure.

THANK YOU

TRIAGE ASSESSMENT RECORDING FORM – STAGE 2

Clinician Code	Date of Assessment	Patient Number
		1

Please record the length of time, in minutes, that it takes to do the following –
(Please write N/A if you did not carry out certain tasks on this occasion)

Assessment Task	**Length of time taken (minutes)**
1. The assessment session using SAD form	
2. Re-writing or tidying up SAD form ***after*** session	
3. Scoring of the C.O.R.E. form	
4. Completion of proforma	
5. Any communication with referrer for purpose of providing or requesting further information	
6a. Writing **short standard** letter to referrer	
6b. Writing more detailed assessment/discharge letter to referrer if required	
7. Any additional checking and finalising of letter	

Please circle your answer -

Q1. How complicated did you find the above tasks in the pilot assessment procedure, compared to the original procedure?

Easier Same Harder

Q2. Did the pilot procedure feel that it took more or less time to complete than the original procedure?

Less Time Same More Time

Q3. Do you feel that the short standard letter is more or less appropriate for the referrer at this stage, compared to the detailed assessment letter?

More Appropriate Same Inappropriate

Q4. Do you think information on SAD form is easy for you or others to access, in absence of detailed letter?

Easier Same Harder

Appendix 2.2

SHORT STANDARD LETTER

Insert address details and date here

Dear (referrer).....

Thank you for referring (name)..... to Adult Psychological Therapies Service.

I met with (name).....on (date).....at (location)..... to complete an initial assessment appointment.

(name)..... presented with (disorder/symptoms)..... .....of .....duration.

I considered that (name).....would benefit from further psychological input. I have therefore placed their name on the waiting list

(highlight as appropriate)
to be seen by a Cognitive Behavioural Psychotherapist /Psychologist /Counsellor/ Assistant Psychologist

for the Anxiety Management Group/ Depression Group/Anger Management Group/ Group Analytic Psychotherapy.

Currently, there is a waiting time of approximately .....months for this treatment option.

You will receive a more comprehensive assessment letter when (name)..... commences treatment.

Please do not hesitate to contact me if you require any further information.

Yours sincerely,

.....

(if appropriate cc)

Appendix 2.3

Date **STANDARDISED ASSESSMENT DETAILS (S. A. D.)**

INFORMATION TO BE GATHERED BY ASSESSOR AT INTERVIEW

PROBLEM AREAS

(Symptoms, onset, contributing and maintaining factors – cognitive, affect, behavioural, social - details of any previous episodes and when last felt well)

COPING STRATEGIES

(Cognitive, affect, behavioural, social. Account of any historical or current therapeutic contacts)

RELATIONSHIPS

(Nature of experiences & relationships in primary & secondary family, with friends & colleagues. Social, emotional & practical support. Loss of, or conflict with, any important individuals?)

PHYSICAL HEALTH

(Onset, treatment, level of impairment to functioning)

MEDICATION

(Historical and current)

LIFE CIRCUMSTANCES

(Education, employment, daily activities, social life, housing – has the way you have been feeling interfered with any of these?)

MENTAL STATE EXAMINATION

- **Mood**

(How is your mood typically? Have you wanted to cry? Do you have thoughts of worthlessness or hopelessness?)

- **Risk of self harm or suicidal behaviour**

(Historical and current detailed account. For example, has your mood ever been so low that you have thought about harming yourself?)

- **Anxiety**

(Nature and symptoms of the anxiety. For example, have you been feeling anxious or frightened? Is this in specific situations? Do you experience sudden attacks of panic?)

- **Interests or hobbies**

(What things do you get pleasure from? Has this pleasure diminished?)

- **Appetite and weight**

(Has your appetite or weight changed?)

- **Sleep**

(What is your typical sleep pattern? Has this changed?)

- **Agitation, restlessness or retardation**

(Is it difficult to sit still? Do you feel slowed down?)

- **Fatigue or loss of energy**

(Have you been getting tired recently?)

- **Memory and concentration**

(Has it been difficult to think straight or remember things?)

- **Substance Abuse**

(Historical & current account. How much alcohol do you consume? Do you take any illicit drugs?)

INVOLVEMENT OF POLICE OR COURTS

(Historical & current account. For example, have you now or in the past had involvement with the courts or the police?)

PATIENT'S GOALS FOR THERAPY

(Including immediate tasks that patient can work on, for example, activity scheduling, relaxation)

POINTERS FOR ASSESSOR TO CONSIDER WHEN MAKING DECISION REGARDING APPROPRIATENESS OF PSYCHOLOGICAL THERAPY

INDICATORS OF SUITABILITY FOR PSYCHOTHERAPY

(Unlikely to be able to assess fully but note any important factors)

- motivation/readiness to change
- acknowledgement of maladaptive patterns
- ability to reflect
- psychological mindedness
- circumscribed focus
- quality of therapeutic relationship (openness, engagement)
- supportive life circumstances

PROVISIONAL FORMULATION / CASE SUMMARY

DECISION REGARDING PSYCHOLOGICAL THERAPY?

Suitability for treatment - discharge at assessment? or what treatment option?

Appendix 3.1

Instructions for Contributors – Journal of the International Neuropsychological Society

Aims and Scope:
The *Journal of the International Neuropsychological Society* welcomes original, creative, high quality research papers covering all areas of neuropsychology. The focus of articles may be primarily experimental, more applied or clinical. Contributions will broadly reflect the interest of all areas of neuropsychology, including but not limited to: development of cognitive processes, brain-behavior relationships, adult and pediatric neuropsychology, neurobehavioral syndromes, such as aphasia or apraxia, and the interfaces of neuropsychology with related areas such as behavioral neurology, neuropsychiatry, and cognitive neuroscience. Papers that utilize behavioral, neuroimaging, and electrophysiological measures are appropriate. Book reviews will also be published. To assure maximum flexibility and to promote diverse mechanisms of scholarly communication, the following formats are available in addition to *Regular Research Articles:*
Brief Communications are shorter research articles; *Rapid Communications* are intended for "fast breaking" new work, that does not yet justify a full length article, and which are put on a fast review track; *Neurobehavioral Grand Rounds* are unique case studies, which are published in tandem with an introduction by an expert in the field to put the case into a more global perspective; *Critical Reviews* are thoughtful considerations of topics of importance to neuropsychology, including associated areas, such as functional brain imaging, neuroepidemiology, and ethical issues; *Dialogues* provide a forum for publishing two distinct positions on controversial issues in a point counterpoint form; *Symposia* consist of several research articles that are thematically linked; *Letters to the Editor* respond to recent articles in the *Journal of the International Neuropsychological Society;* and *Book Reviews. Critical Reviews*, *Dialogues*, and *Symposia* may be invited by the appropriate Department Editor or proposed by individual authors. Such proposals should be discussed with the Editor-in-Chief or the Department Editor before submission. *Book Reviews* are invited by the Book Review Editor.

Originality and Copyright To be considered for publication in the *Journal of the International Neuropsychological Society*, a manuscript cannot have been published previously, nor can it be under review for publication elsewhere. Papers with multiple authors are reviewed with the assumption that all authors have approved the submitted manuscript and concur with its submission to the *Journal of the International Neuropsychological*
Society.

A Copyright Transfe rAgreement, with certain specified rights reserved by the author, must be signed and returned to the Editor by the corresponding author of accepted manuscripts, prior to publication. This is necessary for the wide distribution of research findings, and the protection of both author and the society under copyright law.

Disclosure Form
An **Author Disclosure Form** must be signed by the corresponding author at the time the manuscript is submitted. This form includes an attestation that the manuscript is original and not under review in another journal, research was conducted in compliance with institutional guidelines, and any potential conflict of interest has been reported. Such disclosure will not preclude publication, but it is critical because of the potential of negative or positive bias.
Potential conflicts of interest include funding sources for the reported study or financial interest in a test or product or with a company that publishes a test that is being investigated
in the manuscript. In addition to signing this attestation, compliance with institutional research standards for animal or human research (including a statement that the

research was completed in accordance with the Helsinki Declaration http:00www.wma.net0e0policy017-c_e.html) should be included in the methods section of the manuscript, and funding sources and other potential conflicts of interest should be included in the acknowledgements. See the Author Disclosure Form on website for specific details.

Manuscript Submission and Review

The *Journal of the International Neuropsychological Society* uses online submission and peer review. Paper submissions are not accepted. Authors who are not able to submit their manuscripts online are asked to contact the editorial office at: jins@unm.edu. The website address for submissions is: http:00mc.manuscriptcentral.com0cup0jins, and complete instructions are provided on the website. Prior to online submission, please consult http:00www.ncbi.nlm.
nih.gov0entrez0query.fcgi?db5mesh for 6 keywords or mesh terms that are different from words in the title. Accurate mesh terms will increase the probability that your manuscript will be identified in online searches. Please follow the instructions carefully to avoid delays. The menu will prompt the author to provide all necessary information, including the manuscript category, the corresponding author including phone number, fax number and e-mail address, and suggested reviewers. The website will automatically acknowledge receipt of the manuscript and provide a manuscript reference number. The Editor-in-Chief will assign the manuscript for review to an Associate or Department Editor and at least two other reviewers. Every effort will be made to provide the author with a review within 6 to10 weeks of manuscript assignment. *Rapid Communications* will be reviewed within 6 weeks. If the Editor requests that revisions be made to a manuscript before publication, a maximum of 3 months will be allowed for preparation of the revision, except in
unusual circumstances.

Manuscript Length

In order to increase the number of manuscripts that can be published in the *JINS*, please adhere to the following length requirements. Please provide a word count on the title page for abstract and for manuscript (not including abstract, tables, figures, or references). Manuscripts will be returned if they exceed length requirements.

Regular Research Articles: Maximum of 5,000 words (not including tables, figures, or references) and a 200 word abstract.

Brief Communications: Maximum of 2,500 words (not including abstract, tables, figures, or references) and a 150 word abstract, with a maximum of two tables or two figures, or one table and one figure, and 20 references.

Rapid Communications: Maximum of 1,000 words (not including abstract, tables, figures, or references) and a 150 word abstract, with a maximum of two tables or two figures, or one table and one figure, and 10 references.

Critical Reviews: Maximum of 7,000 words (not including abstract, tables, figures, or references) and a 200 word abstract. ***Critical Reviews*** **must be pre-approved by the Department Editor. Please e-mail your abstract to jins@unm.edu in order to receive prior approval.**

Dialogues: Maximum of 2,000 words for each segment (not including abstract, tables, figures, or references) and a 100 word abstract, with a maximum of two tables or two figures, or one table and one figure and 20 references. ***Dialogues*** **must be pre-approved by the Department**
Editor. Please e-mail your abstract to jins@unm.edu in order to receive prior approval.

Symposia: Maximum of 5,000 words (not including abstract, tables, figures, or references) and a 200 word abstract. ***Symposia*** **must be pre-approved by the Department Editor. Please e-mail your abstract to jins@unm.edu in order to**

receive prior approval. Neurobehavioral Grand Rounds: Maximum of 5,000 words with an informative literature review (not including abstract, tables, figures, or references) and a 200 word abstract.

Letters to the Editor: Maximum of 500 words (not including table, figure, or references) with up to five references, one table, or one figure.

Book Reviews: Approximately 1,000 words.

Manuscript Preparation and Style The entire manuscript should be typed double-spaced
throughout using any word processing program. Unless otherwise specified, the guideline for preparation of manuscripts is the *Publication Manual of the American Psychological Association* (5th edition) except for references with 3 or more authors (see References section). This may be
ordered from: APA Order Dept., 750 1st St. NE, Washington, DC 20002-4242, USA. Pages should be numbered sequentially beginning with the Title Page. The Title Page should contain the full title
of the manuscript, the full names and affiliations of all authors, a contact address with telephone and fax numbers and e-mail address, and the word count for abstract and for manuscript (excluding title page, abstract, references, tables, and figures). At the top right provide a short title of up to 45 characters preceded by the lead author's last name. Example: Smith-Memory in Parkinson's Disease. This running headline should be repeated at the top right of every following page. The Abstract and Mesh terms (Keywords) on *page 2* should include a brief statement of the problem, the method, the key findings, and the conclusions. Six mesh or key words should be provided (see http:00www.ncbi.nlm.nih.gov0 entrez0query.fcgi?db5mesh for list), and they should not duplicate words in the title. The full text of the manuscript should begin on *page 3.* For scientific articles, including *Regular Research Articles*, *Brief Communications*, *Rapid Communications*, and *Symposia*, the format should include an Abstract, Introduction, Method, Results, and Discussion. This should be followed by References, Appendixes, Acknowledgments, Tables, Figures, and Figure Legends. The use of abbreviations, except those that are widely used,
is strongly discouraged. They should be used only if they contribute to better comprehension of the manuscript. Acronyms should be spelled out at first mention. Metric system (SI) units should be used.

Special Note Regarding Figures Please upload your figure(s) in either a .doc or pdf. format. When uploading figures (color or black and white), they need only be a high enough resolution for the reviewers and editors to identify the information you are trying toconvey. However, if your manuscript is accepted for publication, your figures must meet the following criteria: High quality digital images (600 dpi or higher) should be provided in PDF, EPS, or TIFF formats. If a digital image is not available, please scan in the image. Figures should be numbered consecutively as they appear in the text. Any indication of features of special interest should also be included. Figures should be twice their intended final size and authors should do their best to construct figures with notation and data points of sufficient size to permit legible photo reduction to one column of a two-column format. Color figures can be accepted. All color graphics must be formatted in CMYK and not in RGB, because 4-color separations cannot be done in RGB. However, the extra cost of printing these figures must be paid by the author, and the cost typically ranges from $700 to $1500 per figure. Tables and figures should be numbered in Arabic numerals.
The approximate position of each table and figure should be provided in the manuscript: [INSERT TABLE 1 HERE]. Tables and figures should be on separate pages. Tables should have short titles and all figure legends should be on separate pages.

References
References should be in American Psychological Association, 5th Edition, style (see the examples presented below). Text references should be cited as follows: ". . . Given the critical role of the prefrontal cortex (PFC) in working memory (Cohen, et al., 1997;

Goldman-Rakic, 1987; Perlstein, et al., 2003a, 2003b) . . ." with multiple references in alphabetical order. Another example is: "For example, Cohen, et al., (1994, 1997), Braver, et al., (1997), and Jonides and Smith (1997) demonstrated . . ." References cited in the text with three or more authors should state, et al.,. (e.g.,
Smith, et al.,) even at first mention (**this deviates from the APA5th Edition style**). However, in the reference section all authors should be listed. Reference entries should be alphabetically listed in the reference section with all authors being cited. Examples of the APA reference style are as
follows:

Scientific Article: Haaland, K.Y., Price, L., & LaRue, A. (2003). What does the WMS-III tell us about memory changes with normal aging? *Journal of the International Neuropsychological*
Society, 9, 89–96.
Book: Lezak, M.D., Howieson, D.B., & Loring, D.W. (2004). *Neuropsychological Assessment.* New York: Oxford University Press
Book Chapter: Knopman, D. & Selnes, O. (2003). Neuropsychology of Dementia. In K.M. Heilman & E.E. Valenstein (Ed.), *Clinical Neuropsychology*. NewYork: Oxford University Press.
Report at a Scientific Meeting: Rothi, L.J.G. (2003, February). Use-dependent learning and
neural plasticity: A revision of the pessimism surrounding neurorehabilitation. International Neuropsychological Society, Honolulu, Hawaii.
Manual, Diagnostic Scheme, etc.: American Psychiatric Association (1994). *Diagnostic and*
Statistical Manual of Mental Disorders (4th ed.).Washington, DC: American Psychiatric Association Press.
Proofs The publisher reserves the right to copyedit manuscripts. The corresponding author will receive PDFs for final proofreading. These should be checked and corrections returned within 2 days of receipt. The publisher reserves the right to charge authors for excessive corrections.
Offprints and PDF Files The corresponding author will receive a free pdf. This pdf can also be mounted on the authors' web pages. Offprints must be ordered when page proofs are returned. The offprint order form with the price list will be sent with your PDF.

Appendix 4. 1

PEDro Scale

Rating Scale for RCT's, non-RCTs, and Case Series

For each item, please justify scoring (for both YES and NO responses), by at least mentioning page and paragraph numbers.	**Rater 1** _____	**Rater 2** _____	**Consensus** _____
1. eligibility criteria were specified	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
2. subjects were randomly allocated to interventions (in a crossover study, subjects were randomly allocated an order in which treatments were received)	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
3. allocation was concealed	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
4. the intervention groups were similar at baseline regarding the most important prognostic indicators	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
5. there was blinding of all subjects	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
6. there was blinding of all therapists who administered the therapy	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
7. there was blinding of all assessors who measured at least one key outcome	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
8. measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
9. all subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by "intention to treat"	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
10. the results of between- intervention group statistical comparisons are reported for at least one key outcome	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:
11. the study provides both point measures and measures of variability for at least one key outcome	yes ☐ no ☐ where:	yes ☐ no ☐ where:	yes ☐ no ☐ where:

Appendix 4.2

Appendix.
Operational Definitions for the 11 PEDro Criteria

Criterion	Operational Definition
All criteria	Points are awarded only when a criterion is clearly satisfied. If, on a literal reading of the trial report, it is possible that a criterion was not satisfied, a point should not be awarded for that criterion.
Criterion 1	This criterion is satisfied if the report describes the source of subjects and a list of criteria used to determine who was eligible to participate in the study.
Criterion 2	A study is considered to have used random allocation if the report states that allocation was random. The precise method of randomization need not be specified. Procedures such as coin tossing and dice rolling should be considered random. Quasi-randomization allocation procedures such as allocation by hospital record number or birth date, or alternation, do not satisfy this criterion.
Criterion 3	Concealed allocation means that the person who determined if a subject was eligible for inclusion in the trial was unaware, when this decision was made, of which group the subject would be allocated to. A point is awarded for this criterion, even if it is not stated that allocation was concealed, when the report states that allocation was by sealed opaque envelopes or that allocation involved contacting the holder of the allocation schedule who was "off-site."
Criterion 4	At a minimum, in studies of therapeutic interventions, the report must describe at least one measure of the severity of the condition being treated and at least one (different) key outcome measure at baseline. The rater must be satisfied that the groups' outcomes would not be expected to differ, on the basis of baseline differences in prognostic variables alone, by a clinically significant amount. This criterion is satisfied even if only baseline data of subjects completing the study are presented.
Criteria 4, 7–11	Key outcomes are those outcomes that provide the primary measure of the effectiveness (or lack of effectiveness) of the therapy. In most studies, more than one variable is used as an outcome measure.
Criteria 5–7	Blinding means the person in question (subject, therapist, or assessor) did not know which group the subject had been allocated to. In addition, subjects and therapists are only considered to be "blind" if it could be expected that they would have been unable to distinguish between the treatments applied to different groups. In trials in which key outcomes are self-reported (eg, visual analog scale, pain diary), the assessor is considered to be blind if the subject was blind.
Criterion 8	This criterion is satisfied only if the report explicitly states both the number of subjects initially allocated to groups and the number of subjects from whom key outcome measurements were obtained. In trials in which outcomes are measured at several points in time, a key outcome must have been measured in more than 85% of subjects at one of those points in time.
Criterion 9	An intention-to-treat analysis means that, where subjects did not receive treatment (or the control condition) as allocated and where measures of outcomes were available, the analysis was performed as if subjects received the treatment (or control condition) they were allocated to. This criterion is satisfied, even if there is no mention of analysis by intention to treat, if the report explicitly states that all subjects received treatment or control conditions as allocated.
Criterion 10	A between-group statistical comparison involves statistical comparison of one group with another. Depending on the design of the study, this may involve comparison of 2 or more treatments or comparison of treatment with a control condition. The analysis may be a simple comparison of outcomes measured after the treatment was administered or a comparison of the change in one group with the change in another (when a factorial analysis of variance has been used to analyze the data, the latter is often reported as a group × time interaction). The comparison may be in the form hypothesis testing (which provides a *P* value, describing the probability that the groups differed only by chance) or in the form of an estimate (eg, the mean or median difference, a difference in proportions, number needed to treat, a relative risk or hazard ratio) and its confidence interval.
Criterion 11	A point measure is a measure of the size of the treatment effect. The treatment effect may be described as a difference in group outcomes or as the outcome in (each of) all groups. Measures of variability include standard deviations, standard errors, confidence intervals, interquartile ranges (or other quartile ranges), and ranges. Point measures and/or measures of variability may be provided graphically (eg, standard deviations may be given as error bars in a figure) as long as it is clear what is being graphed (eg, as long as it is clear whether error bars represent standard deviations or standard errors). Where outcomes are categorical, this criterion is considered to have been met if the number of subjects in each category is given for each group.

Table A – Article Summary Data

Author		Participant number & Sample	Design	Intervention Type	Assessment	Results	Grade of study (pedro)
1	**Rath, et al., (2003)**	N = 60 Traumatic Brain Injury	Randomised Control Trial	• Problem solving training incorporating – *Problem orientation training* (emotional control) & Problem solving training (solution generation)	• Wisconsin Card Sorting Test • Self appraised problem solving skills • PSQ – Clear Thinking + Emotional self regulation subscales • Objective observer ratings	• Intervention group showed statistically significant improvement on outcome measures ($p<0.05$, $P<0.005$, $p=0.01$, $p<0.01$, $p<0.005$) • Improvements maintained at six month follow up.	3/10
2	**Sohlberg, et al., (2000)**	N = 14 Traumatic Brain Injury	Randomised Control Trial (crossover design)	• Attention Process Training (Sohlberg & Mateer 1987) Incorporating – Repetition of increasingly complex selective, alternating and divided attention tasks.	• Trail Making Test • PASAT • Stroop • Memory for locations	• Attention Process Training improved performance on executive attention tasks, in comparison to control condition ($p=0.05$, $p<0.01$, $p<0.05$) • Generalisation present as tasks different from Neuropsychological assessments.	5/10
3	**Lopez-Luengo, et al., (2003)**	N=24 Schizophrenia	Randomised Control Trial	•Attention Process Training (Sohlberg & Mateer 1987) Incorporating – Repetition of increasingly complex sustained, selective, alternating and divided attention tasks.	• Wisconsin Card Sort Test.	• Intervention group showed significant improvement ($p<0.05$) when control group did not.	6/10
4	**Hewitt, et al., (2006)**	N 30 Traumatic Brain Injury	Randomised Controlled Trial	• Autobiographical Memory Cueing Procedure	• Rivermead • SCOLP • Hayling • Brixton • Modified Six Elements • Everyday Descriptions Task, measured by - Steps in plan &Effectiveness of plan	Intervention group showed statistically significant improvement on EDT outcome measures. Effectiveness of plan ($p<0.01$) Steps in the plan ($p=0.03$) Memories recalled ($p<0.01$)	5/10

5	**Von-Cramon, et al., (1991)**	N = 61 Traumatic brain Injury CVA 8 other	Non Randomised Control Trial	• Problem Solving Training Orientation, Definition, Alternatives, Decision making, Verification.	5 Intelligence subtests • Reasoning • Categorising, Analogies,& Similarities • Proverbs • Tower of Hanoi • Planning Task (developed for study)	Intervention group showed statistically significant improvement on – 3 of 5 subtests, Reasoning, Categorising & Similarities ($p < 0.01$) Tower of Hanoi ($p=0.01$) Planning task ($P=0.001$) Improvements confirmed by behavioural ratings	3/10
6	**Man, et al., (2006)**	N=103 Traumatic Brain Injury Cerebrovascular accident Arterioventricular malfomation	Randomised Control Trail	•Analogy based problem solving training programme •Three experimental groups using different modes of delivery – •Computer assisted •Online •Therapist administered	• Basic problem solving skills • Functional problem solving skills • Category Test • Lawton Intrumental Activites of Daily Living Scale • 10 item problem solving self efficacy scale – developed for study	All three intervention groups showed significant improvements, on Basic and Functional problem solving skills assessments ($p<0.001$) and on the Category Test ($p<0.01$) and Lawton ADL Scale ($p<0.01$). Only the therapist administered training group reported significantly increased problem solving self efficacy as measured by the 10 item scale ($p<0.01$)	6/10
7	**Morris, et al., (2001)**	N=65 Schizophrenia & Schizoaffective disorder	Randomised Control Trial	• Neurocognitive Enhancement Therapy (Payment for completing attention, memory and executive function training, social information processing group, feedback on work performance.) •Work Therapy (Payment for work, individual counselling, a group offering support, problem solving, detailed work performance feedback, goal setting, job coach.	• Wisconsin Card Sort	The intervention group who received NET + WT improved significantly on WCST scores ($p<0.01$) compared to the control group who only received WT.	5/10

8	**Penandes, et al., (2006)**	N=60 Schizophrenia	Randomised Control Trial	•Cognitive remediation Therapy Manual –(Delahunty & Morice 1996) (Flexible thinking, Working memory, Planniing – self ordered – goal orientated-schema formation – manipulation.)	• Wisconsin Card Sort • Stroop • Trail Making - B	The intervention group showed significant improvements on executive functioning measures ($p<0.001$) compared to the control group who did not. This improvement was maintained at 6 month follow up.	8/10
9	**Medalia , et al., (2001)**	N=54 Schizophrenia	Randomised control trial	•Problem solving training - Educational Psychology crime mystery CD-ROM (Planning, Organising & Deductive Reasoning)	• WAIS-R-CT (verbal knowledge, judgement & problem solving) • Independent Living Scale (Problem Solving)	The intervention group showed significant improvement on The Independent Living Scale-PS scores ($p<0.009$) compared to the control group and the no treatment group. WAIS-R-CT Showed no significant improvement.	7/10
10	**Vauth, et al., (2005)**	N=138 Schizophrenia	Randomised Control Trial	•Computer Assisted Cognitive Strategy Training (CAST) + Vocational Rehabilitation	•Tower of Hanoi	The intervention group showed no significant improvement in planning ability, as measured by the Tower of Hanoi ($p=0.43$)	4/10
11	**van der Gaag, et al., (2002)**	N=42 Schizophrenia	Randomised Control Trial	•Cognitive Remediation Training (Self instruction, Memory enhancement, Inductive reasoning, Compensatory strategies)	• WISC (Mazes) • Word Fluency • WAIS (picture Arrangement)	The Intervention group showed no significant improvement in executive functioning on measures used ($p=ns$), compared to the control group.	6/10
12	**Wykes, et al., (1999)**	N=33 Schizophrenia	Randomised Control Trial	• Neuro-cognitive remediation Therapy (Manual - Delahunty & Morice 1996) (Flexible thinking, Working memory, Planning – self ordered – goal orientated-schema formation – manipulation.)	<u>Cognitive Tests –</u> • Hayling Sentence Completion Task • Trials • Response Inhibition • Controlled Oral Word Fluency Test • Stroop Neuropsychological Screening Test • Wisconsin Card Sorting Test	Statistically significant improvements were found in the intervention group for - Verbal Fluency, Hayling, Trails, Stroop and Modified Six elements. (confidence intervals reported)	6/10

					Planning domain - • Tower of London • Modified Six Elements		
13	**Wykes , et al., (2003)**	N=33 Schizophrenia	Randomised Control Trial	• Neuro-cognitive remediation Therapy (Manual - Delahunty & Morice 1993) (Flexible thinking, Working memory, Planning – self ordered – goal orientated-schema formation – manipulation.)	Cognitive Tests – • Hayling Sentence Completion Task • Trials • Response Inhibition • Controlled Oral Word Fluency Test • Stroop Neuropsychological Screening Test • Wisconsin Card Sorting Test Planning Tests - • Tower of London • Modified Six Elements	6 Month follow up data from Wykes (1999). No significant intervention group improvements remained at 6 month follow up on the cognitive tests, or on the planning tests. However, within the intervention group, 23% of the participants maintained their improvement on planning tests, compared with only 14% of the controls. Regression analysis revealed that cognitive flexibility was related to improvements in social functioning and symptoms (also measured) at 6 month follow up ($p<0.005$ & $p<0.001$).	7/10
14	**Velligan, et al., (2002)**	N=45 Schizophrenia	Randomised Control Trial	•Cognitive Adaptation Training (Velligan & Bow-Thomas 2000) (Prompting, cueing, checklists, behavioural sequencing, environmental manipulation)	• Wisconsin Card Sorting Test • Trails A&B • Verbal fluency • Digit Span • Continuous performance test • California Verbal Learning Test • Social & Occupational Functioning Scale (SOFAS) • Multnomah Community Ability Scale (MCAS) • The Quality of Life Scale (QOL)	Baseline cognitive measures not repeated post test. The intervention group showed significant improvement on the SOFAS ($p<0.003$), MCAS ($p<0.05$), and on the QOL ($p<0.003$). The improvements on SOFAS were also clinically significant for 12 out of 15 participants in the CAT group, compared with 7 out of 15, and 6 out of 15 for control and follow up only.	8/10

15	**Levine et al., (2000)**	N=30 Traumatic Brain Injury	Randomised Control Trail	•Goal management Training (GMT) (Orientating, goal setting, creation of sub goals, encoding of sub goals,and monitoring)	Tasks designed for study - • Proof reading • Grouping • Room Layout Speed and accuracy across all three measures	Speed and accuracy across all three measures improved in the GMT group, proofreading ($p<0.05$), grouping ($p<0.05$), room layout ($p<0.05$)compared to the control group who did not.	4/10

Table B - PEDro Ratings

Study	*1.Eligibility Criteria Specified (not included in rating score)*	2.Random allocation (or random crossover)	3.Allocation Concealed	4.Intervention groups similar at baseline on most important prognostic indicators	5.Blinding of all participants	6.Blinding of all therapists who administered the intervention	7.Blinding of all assessors who measured at least one key outcome	8.Measures for one key outcome obtained from more than 85% of participants initially allocated to groups	9.All participant received treatment or control (or 'intention to treat' analysis used)	10.Results of between group statistical comparisons are reported for at least one key outcome	11.Point measures and measures of variability reported fort one key outcome.	**Total Score**
Rath, et al., (2003)	*yes*	yes	no	no	no	no	no	no	no	yes	yes	**3/10**
Sohlberg, et al., (2000)	*yes*	yes	no	no	no	no	no	yes	yes	yes	yes	**5/10**
Lopez-Luego, et al., (2003)	*yes*	yes	no	yes	no	no	no	yes	yes	yes	yes	**6/10**
Hewitt, et al., (2006)	*yes*	yes	no	yes	no	no	yes	no	no	yes	yes	**5/10**
Von Cramon, et al., (1991)	*yes*	no	no	yes	no	no	no	no	no	yes	yes	**3/10**
Man, et al., (2006)	*yes*	yes	no	yes	no	no	no	yes	yes	yes	yes	**6/10**
Morris, et al., (2001)	*yes*	yes	no	yes	no	no	no	no	yes	yes	yes	**5/10**
Penandes, et al., (2005)	*yes*	yes	yes	yes	no	no	yes	yes	yes	yes	yes	**8/10**
Medalia, et al., (2001)	*yes*	yes	no	yes	no	no	yes	yes	yes	yes	yes	**7/10**
Vauth, et al., (2005)	*yes*	yes	no	yes	no	no	no	no	no	yes	yes	**4/10**
Van der Gaag, et al., (2002)	*yes*	yes	yes	yes	no	no	no	yes	no	yes	yes	**6/10**
Wykes, et al., (1999)	*yes*	yes	no	yes	no	no	no	yes	yes	yes	yes	**6/10**
Wykes, et al., (2003)	*yes*	yes	yes	yes	no	no	no	yes	yes	yes	yes	**7/10**
Velligan, et al., (2002)	*yes*	yes	yes	yes	yes	no	yes	yes	yes	yes	no	**8/10**
Levine, et al., (2000)	*yes*	yes	no	yes	no	no	no	no	no	yes	yes	**4/10**
Totals	***15/15***	**14/15**	**4/15**	**13/15**	**1/15**	**0/15**	**4/15**	**9/15**	**9/15**	**15/15**	**14/15**	

Appendix 6.1

Social Problem Solving Vignettes

SET A

Interpersonal	***Partner*** You have an argument with your partner and they leave you. The story ends with you both getting along well.	***Friend*** Your close friend is upset with you because you borrowed a special item and lost it. The story ends with you both getting along well.	***Family*** A parent fails to treat you with respect. The story ends with you and your parent respecting each other.	***Other*** You are having trouble getting along with someone at work. The story ends with you getting along well with this person.
Intrapersonal	***Health*** You have started to feel overweight and unattractive despite people telling you that you are not. The story ends with you being happy with your appearance.	***Loss*** Your much loved family pet has died and you feel very sad. The story ends with you not feeling so sad anymore.	***Transition*** You used to be a happy person but since moving to a new neighbourhood you have become withdrawn and cry a lot. The story ends with you being happy again.	***Activities*** You used to have hobbies and do things that were fun, but you don't do these things now and feel bored. The story ends with you not feeling bored any more.

SET B

Interpersonal	***Partner*** Your partner is disappointed with you because you broke a promise. The story ends that you are happy together.	***Friend*** You notice that your friends are avoiding you. The story ends with you and your friends getting along well.	***Family*** You are not getting along with your sibling because they are not doing enough to take care of your elderly parents. The story ends with you getting along well.	***Other*** You are having trouble with a neighbour who is very noisy and this disturbs your sleep. The story ends with you getting along well with your neighbour.
Intrapersonal	***Health*** You realise that you are drinking too much alcohol and this is causing you problems. The story ends with you controlling your drinking well.	***Loss*** A relative that you were close to has died and you feel very sad. The story ends with you feeling not so sad any more.	***Transition*** You have recently ended a long term relationship and feel quite lonely. The story ends with you not feeling lonely any more.	***Activities*** You feel bored and you would like to start working or find a new job. The story ends with you doing a job that you enjoy.

Appendix 7.1

Problem Solving Study

Letter of invitation to participate

Would you be interested in taking part in a research project that is being jointly run by the Community Treatment Centre for Brain Injury and the University of Glasgow?

The project looks at helping people with brain injury to solve social problems, or in other words, problems that they might come across in their relationships with other people. More information is available on the attached information sheet, but the basics of what the project involves are –

1. We will invite you to attend one session of around 2 hours during which we will ask you to do some basic tasks which will assess your memory, concentration and problem solving.

2. During this first session we will also ask you to think of ways that you might solve some social problems involving how to get on well with other people.

3. We will then ask you to return for a second session, lasting around 1 and ½ hours, on a different day. During this session we will give you some practice at solving the same types of problems that you did in the first session, and then ask you to solve some different social problems.

We would very much appreciate your involvement in this research but understand that you may not wish to be involved or may have other commitments at this time.

If you are interested in taking part then please return the 'Return Form' to Marie-Louise Holmes, or call or email her at the address below.

Remember, even if you agree to take part you are completely free to withdraw from the project at any time, without needing to give us a reason.

Marie-Louise Holmes
Trainee Clinical Psychologist, Principal Researcher
m.holmes.1@research.gla.ac.uk
Telephone – 07734 739 758

Professor Jonathan Evans
Professor of Applied Neuropsychology, Research Supervisor
Telephone - 0141 211 3978

University of Glasgow
Department of Psychological Medicine
Academic Centre
Gartnavel Royal Hospital
Glasgow
G12 0XH

Appendix 7.2

Participant Information Sheet

Title "Improving social problem solving in individuals with Traumatic Brain Injury - Evaluation of an autobiographical memory cueing procedure"

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully. Ask the researcher if there is anything that is not clear, or if you would like further information. Take time to decide whether or not you wish to take part.

Some Background Information

Often, people with a brain injury can find it hard to solve problems relating to how to get on well with other people, or what we call 'social problems'. This research looks at ways in which it might be possible to help brain injured people to solve these types of problems more effectively. It is hoped that brain injury rehabilitation centres will be able to use our technique to help other people with brain injury solve their social problems better.

Why have I been chosen?

You have been given this information sheet because you have had a brain injury and we need people who have had a brain injury to take part in this study. Altogether, around 30 people from Scotland will be studied in this project.

Do I have to take part?

Taking part is completely voluntary. It is up to you to decide. If you do decide to take part, you are free to withdraw at any time, without giving a reason and any information collected from you will be destroyed. If you decide to take part you will be asked to sign a consent form. This is to say that you have read this information sheet and have had the chance to talk about this project with the researcher.

What is involved in taking part?

If you decide to take part there will be two stages in which you will come to the centre and complete some tasks with the researcher.

1. At the first stage you will be asked to complete some memory, concentration and problem solving tasks. You will then be asked to solve eight short hypothetical problems, about how to get on well with other people, and how to make yourself feel happier. This will take about 2 hours and you can have a break at any time.

2. During the second session, the researcher will remind you about the problems that you solved in the last session. You will be randomly allocated to receive either a form of training in solving social problems or to receive additional practice in solving problems. We are trying to find out if either of these options helps improve the ability to solve problems. Following the brief training or the extra practice, then you will be asked to solve eight new problems. The problems are again very short and will be about how to get on well with others. This part will take about 1 ½ hours and you can have a break at any time.

So, your involvement will include two visits to the centre, one lasting 2 hours and the other lasting 1 ½ hours. We can arrange times to try and suit you as much as possible.

Will my results be kept confidential?

Any information collected about you will be kept in a locked filing cabinet and will be strictly confidential. All information on computers relating to you will be identified by a number only, so you could not be recognised from it. If you are currently being seen by a brain injury service, and if you give us permission, we will pass the results of your tasks back to the team as it is information from tests might be helpful.

What will happen to the results of the research?

They will be used as part of the main researcher's Doctorate in Clinical Psychology, and will also be published in a scientific journal. You would not be identified in any report or publication. If you would like a copy of the final results, the researcher will send you one when they are complete.

What are the benefits to taking part?

We will be able to tell you if our strategy for helping people with brain injury solve social problems might help you in your day to day life. We would also inform the rehabilitation centres and they may be able to help you to use the strategy in your own day to day life.

If I do decide to take part what happens next?

If you would like to take part, please could you post the 'Return Form' in the freepost envelope provided.

Marie-Louise Holmes will then contact you to arrange a time to come along to the Community Treatment Centre in Glasgow to discuss the study further. If you still want to participate you will then sign the consent form and complete stage 1 of the study. You will then be asked to return to the centre for the second appointment on a different day.

You will be given a copy of this information sheet and if you decide to participate, a signed consent form to keep.

Thank you for taking the time to read this information. If there is anything you wish to ask please feel free to call the researcher, Ms Marie-Louise Holmes (Trainee Clinical Psychologist) on 07734739758 or Professor Jonathan Evans on 0141 211 3978.

If you decide to take part in the study and during the study are unhappy about any aspect of the study please inform Ms Holmes or Professor Evans. If you do not receive a satisfactory response from them you can contact Mr Brian Rae who is the Research and Development Manager for NHS Greater Glasgow and Clyde Health Board. His address is

Mr Brian Rae
R&D Directorate
NHS Greater Glasgow and Clyde
Gartnavel Royal Hospital
1055 Great Western Road
Glasgow
G12 0XH.

Appendix 7.3

Return Form

Title "Improving social problem solving in individuals with Traumatic Brain Injury - Evaluation of an autobiographical memory cueing procedure"

Name of Researcher: Ms Marie-Louise Holmes

Please sign below

I have read the Participant Information Sheet that you sent out and I would be interested in participating in the research / finding out more about the research.

Your Name _____

Signature _____

Date _____

Your telephone number _____
(or address if no phone)

Please post this form, email or telephone –

Marie-Louise Holmes
Trainee Clinical Psychologist, Principle Researcher
m.holmes.1@research.gla.ac.uk
Telephone - 07734739758

Professor Jonathan Evans
Professor of Applied Neuropsychology, Research Supervisor
Telephone - 0141 211 3978

University of Glasgow
Department of Psychological Medicine
Gartnavel Royal Hospital
Glasgow
G12 0XH

Appendix 7.4

Consent Form

Title "Improving social problem solving in individuals with Traumatic Brain Injury - Evaluation of an autobiographical memory cueing procedure"

Name of Researcher: Ms Marie-Louise Holmes

Please sign below -

- I confirm that I read and understand the Participant Information Sheet for the above study, and have had sufficient opportunity to ask questions.
- I understand that participation is voluntary and that I am free to withdraw at any time, without giving a reason, and that all information relating to my participation will be destroyed.
- I agree to take part in the above study.
- I agree to the researchers informing my GP of my participation
- I agree to my records being accessed by the research team only for the purpose of collecting information about my head injury and for any results of neuropsychological tests, that have been done previously.
- I agree to the results from this study being passed on to the relevant healthcare professionals currently treating me in relation to my brain injury.

Participant name _____

Signature _____

Date _____

Researcher name _____

Signature _____

Date _____

Appendix 7.5

Dear Dr

Re: _____

I am writing to inform you that the above patient has agreed to participate in a research study looking at whether individuals with Traumatic Brain injury can be taught to solve interpersonal problems more effectively, by being taught to use a memory prompting technique, in which they are asked to recall how they solved similar problems in the past.

Taking part in this study should not affect the day to day treatment of your patient in any way. I have included the participant information sheet which outlines the main aspects of the study, and the requirements of those who agree to participate.

Please feel free to contact me for further information or if you anticipate any problems.

Yours sincerely,

Marie-Louise Holmes
Trainee Clinical Psychologist, Primary Researcher

Professor Jonathan Evans
Professor of Applied Neuropsychology, Research Supervisor

University of Glasgow
Department of Psychological Medicine
Gartnavel Royal Hospital
Glasgow
G12 0XH

Appendix 9.1

SET A – Group 1 & 2

Below are 8 problems for you to solve.

- There are no right or wrong answers.
- Say exactly what you would do so that each of the problems ends well.
- Try to give as much detail as you can.
- Please speak clearly into the tape recorder when giving your answer.

Problem 1

You have an argument with your partner and they leave you.

The story ends with you both getting along well.

Problem 2

Your close friend is upset with you because you borrowed a special item and lost it.

The story ends with you both getting along well.

Problem 3

A parent fails to treat you with respect.

The story ends with you and your parent respecting each other.

Problem 4

You are having trouble getting along with someone at work.

The story ends with you getting along well with this person.

Problem 5

You have started to feel overweight and unattractive despite people telling you that you are not.

The story ends with you being happy with your appearance.

Problem 6

Your much loved family pet has died and you feel very sad.

The story ends with you not feeling so sad anymore.

Problem 7

You used to be a happy person but since moving to a new neighbourhood you have become withdrawn and cry a lot.

The story ends with you being happy again.

Problem 8

You used to have hobbies and do things that were fun, but you don't do these things now and feel bored.

The story ends with you not feeling bored any more.

Appendix 9.2

Group 1 – Extra Practice

The research that we are doing is investigating if people can solve problems more effectively if they have extra practice at solving problems.

Below are four practice problems for you to solve.

- There are no right or wrong answers.
- Say exactly what you would do so that each of the problems ends well.
- Try to give as much detail as you can.
- Please speak clearly into the tape recorder when giving your answer.

Practice 1. You get lost on the way to an important meeting.

The story ends with you finding your way there.

Practice 2. Your child is upset with you because you had to work and missed their birthday party.

The story ends with your child being happy with you.

Practice 3. You have hurt your friends feelings by talking about them behind their back.

The story ends with you and your friend getting along well.

Practice 4. You realise that you have become very unfit and your doctor has said you need to take better care of your health.

The story ends with your doctor being pleased with your improvements.

Appendix 9.3

SET B – Group 1 Extra Practice

Below are 8 problems for you to solve.

- There are no right or wrong answers.
- Say exactly what you would do so that each of the problems ends well.
- Try to give as much detail as you can.
- Please speak clearly into the tape recorder when giving your answer.

Problem 1

Your partner is disappointed with you because you broke a promise.

The story ends that you are happy together.

Problem 2

You notice that your friends are avoiding you.

The story ends with you and your friends getting along well.

Problem 3

You are not getting along with your brother / sister because they are not doing enough to take care of your elderly parents.

The story ends with you getting along well.

Problem 4

You are having trouble with a neighbour who is very noisy and this disturbs your sleep.

The story ends with you getting along well with your neighbour.

Problem 5

You realise that you are drinking too much alcohol and this is causing you problems.

The story ends with you controlling your drinking well.

Problem 6

A relative that you were close to has died and you feel very sad.

The story ends with you feeling not so sad any more.

Problem 7

You have recently ended a long term relationship and feel quite lonely.

The story ends with you not feeling lonely any more.

Problem 8

You feel bored and you would like to start working or find a new job.

The story ends with you doing a job that you enjoy.

Appendix 9.4

Group 2 – Teaching Session

Research has indicated that people are able to solve problems more effectively if they are able to remember specific examples of when they solved a similar problem in the past.

In this next task we are going to practice remembering how you solved a similar problem in the past, in order to try and help you solve the rest of the problems on your own.

Example 1. **You get lost on the way to an important meeting.**

The story ends with you finding your way there.

Memory of a time when I got lost before -

I was starting a new job.
It was 1st October 2006.
It was a wet day.
I had a map but forgot to take it with me
I had to go home and get it
I then phoned to say that I was going to be late
I still got lost and had to go into a garage to ask for directions.
I didn't get there until lunch time.
Everyone thought it was quite funny

So how would I solve this problem –

If possible go home and get my map or directions.....if I had forgotten them. Or I would try to get to a shop and by a map if I was too far away from home to go back. Or I might also try to remember where I was supposed to be going but I might not remember correctly.

If I thought I was going to be really late then I would phone and say that I was going to be late so they knew I was still coming. When on the phone to them I would also try to clarify directions with the person on the phone.

If I still could not find my way there I would stop and ask for directions until I got there.

Example 2. **Your child is upset with you because you had to work and missed their birthday party.**

The story ends with your child being happy with you.

Memory of a time when I missed a birthday party before –

It was my friends birthday on Jan 11th and she was having a party in a restaurant.
I had said I would go after work and meet everyone there.
But I got held up at work and left late.
By the time I got home it was too late to go to her party.

The next day I phoned her to explain what had happened.
I said there had been a problem at work and I could not leave on time.
I made sure she knew that I was very sorry.
I took her birthday present round to her house that night.
I also organised another night out for her the next weekend.
I invited our three closest friends and we went to a new restaurant that she had said she wanted to try.

So how would I solve this problem –

I would try to explain to my child that I there was a problem at work and I couldn't leave.
But children often don't understand these things.
What I said to them would depend on how old they were.
I would make sure that I spent lots of time getting them to tell me everything that happened at their party, so that they knew I was interested in them and what they did.
I would organise another activity for them to do with me and their friends if they wanted.
I would try to find something really special that they had always wanted to do, and explain to them that they were now having two birthday 'parties'.

Example 3. **You have hurt your friends feelings by talking about them behind their back.**

The story ends with you and your friend getting along well.

Example 4. **You realise that you have become very unfit and your doctor has said you need to take better care of your health.**

The story ends with your doctor being pleased with your improvements.

Appendix 9.5

Cue Card -

Try to think of a specific time and place where you solved a similar problem in the past.

Appendix 9.6

SET B – Group 2

Below are 8 problems for you to solve.

- There are no right or wrong answers.
- Try to remember a time when you solved a similar problem in the past.
- Say exactly what you would do so that each of the problems ends well.
- Try to give as much detail as you can.
- Please speak clearly into the tape recorder when giving your answer.

Problem 1

Your partner is disappointed with you because you broke a promise.

The story ends that you are happy together.

Problem 2

You notice that your friends are avoiding you.

The story ends with you and your friends getting along well.

Problem 3

You are not getting along with your brother / sister because they are not doing enough to take care of your elderly parents.

The story ends with you getting along well.

Problem 4

You are having trouble with a neighbour who is very noisy and this disturbs your sleep.

The story ends with you getting along well with your neighbour.

Problem 5

You realise that you are drinking too much alcohol and this is causing you problems.

The story ends with you controlling your drinking well.

Problem 6

A relative that you were close to has died and you feel very sad.

The story ends with you feeling not so sad any more.

Problem 7

You have recently ended a long term relationship and feel quite lonely.

The story ends with you not feeling lonely any more.

Problem 8

You feel bored and you would like to start working or find a new job.

The story ends with you doing a job that you enjoy.

Appendix 10

Vignette Scoring criteria

The EDT problems are scored on the following dimensions: number of relevant steps (2) Effectiveness and (3) number of specific memories

Number of relevant steps:

The number of relevant steps is scored for each discrete step that is ***useful*** in solving the problem. Hence steps would not be counted if they did not contribute to the solution of the problem. The score for each problem consists of the total number of relevant steps and a typical problem solution would contain more than one relevant step.

Example for relevant steps

Problem: How would you plan a birthday party?
Solution:

I would pick a date and then decide where the party was going to take place, at home or at a restaurant or somewhere more exotic. I really hate planning parties. I would organize the guest list and then buy invitations. I would send out the invitations. If the party were taking place at home, I would plan the activities for the party as well as the food menu. I would shop for the food and party accessories before the party took place, at least a few days in advance. I would think about a present for the birthday person. If the party were taking place outside the home, I would contact the outside organization and set up the party. I would pay a deposit to secure a place. I would phone the organization a few days before the party was scheduled to take place and make sure that everything was organized..

Scoring of example:

Read through the entire solution before identifying the relevant steps
The relevant steps are marked with numbers in brackets

(1)I would pick a date and then(2) decide where the party was going to take place, at home or(3) at a restaurant or (4)somewhere more exotic. I really hate planning parties. (5)I would organize the guest list and (6)then buy invitations. (7) I would send out the invitations. If the party were taking place at home, (8)I would plan the activities for the party as well as (9)the food menu. I would shop for the(10) food and(11) party accessories before the party took place, at least a few days in advance.(12) I would think about a present for the birthday person and (13)then buy it. If the party were taking place outside the home, (14)I would contact the outside organization and (15)set up the party.(16) I would pay a deposit to secure a place.(17) I would phone the organization a few days before the party was scheduled to take place and(18) make sure that everything was organized..

Note that no score was given to the statement 'I hate planning parties'

Effectiveness

There is considerable variability in how participants' responses are scored on this dimension that ranges from 1 not at all effective to 7 extremely effective.
A problem-solving strategy is effective if the it describes either all or nearly all the major steps needed to actively reach a successful solution to the problem in a logical sequence. A key feature of extremely effective solutions is that several alternatives are listed in solving the problem. An ineffective problem, in contrast, does not describe a logical sequence of steps for actively solving the problem. In this case only a few or no steps are listed and the sequence of steps is random. Often passive solutions are posed (e.g.: I would ask my neighbour how to do it.)

Rating of 1 meant there was a failure to answer the question.

Rating of 2 implied there may have been some attempt to answer the question.

Rating of 3 implied that less than half of the points were relevant to the answer but other points were missing.

Rating of 4 implied that about half the points in the answer were relevant but the other half were missing.

Rating of 5 implied that over half of all points were relevant to the answer but something may have been missing.

Rating of 6 implied that nearly all points were relevant to the answer but something may still have been missing.

Rating of 7 meant that this was a well-developed answer that seemed to contain all the essential points needed.

Example for an extremely effective 7 point solution:

Problem: How would you organize a move to a new place to live?

I would decide the criteria that I was looking for in my move. Therefore I would consider numerous factors such as proximity to work, quality of schools for my children, the type of housing that I was seeking such as whether I wanted a new home or an older one, my budget, and availability of public transport. I would then rank order these factors. I would contact several estate agents. I f I were seeking to rent a place, I would view the particulars of the house and seek advice from friends if possible. I would view the place in questions with my family and then discuss the relative merits of each place. Once I found a place that met my needs, I would arrange a moving date with the estate agent and provide a deposit. I would then decide if I was going to move myself or employ an outside agency to help with the move. If I were buying a new place, I would again view enough laces until I found a place that I was happy with. I would contact several building societies and banks and make sure that I could secure a mortgage. I would also find a solicitor who would present my offer and execute the sale if my offer were accepted. If my offer were accepted,
I would arrange a moving date. Again I would decide if I would move on my own or employ a firm. I would contact the electricity and gas companies to make sure that I would have power before I moved in.

Example of an extremely ineffective solution (1 rating) is:

I really don't know. Someone else has always organized moves for me. I would just ask a friend to do it for me.

An example of a slightly more effective solution to the same problem is:

I think that I would try to make the move as easy as possible by just paying a moving company to do the whole thing. Make sure that I contacted an estate agent.

This last solution was given a 3 out of 7.

Rating of the specificity of memory

Often in producing solutions to problems, the participant will describe a memory or even several memories of past experiences. A specific memory refers to a memory for an event that occurred at a particular time and place and lasting less than one day. For example, attending my best friends birthday party last Friday evening would be one example. Protocols were scored on this dimension only if memory for this type of event was recalled. Memories for collections of events like I always go out with friends on Friday evenings are not included.

Problem: How would you plan a weekend away?

I would think about why I wanted to get away. If I wanted to do something in particular like viewing a special play or visiting an old friend. I would plan my trip in advance if possible so that I could organize my travel in the most economical fashion. I would also work out where I would be staying and all the things I wanted to do while away. If I didn't know much about the place where I was going I would read a book or look up information on-line. For example, a few weeks ago I decided that I wanted to go to New York for the weekend in order to attend a friend's birthday party. I looked on line for cheap flights and managed to find one.

In this case three specific events were produced. (1) I decided to go to New York.
(2.) I looked on line for cheap flights (3) I found a cheap flight