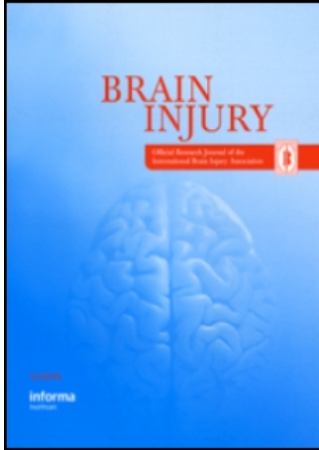


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The relationship between clients' cognitive functioning and the therapeutic working alliance in post-acute brain injury rehabilitation

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Abstract

Objective: To examine the impact of brain-injured patients' cognitive abilities on their working alliance (WA) with their therapist in post-acute rehabilitation.

Design: Cognitive tests were administered to brain-injured individuals at the beginning of post-acute, holistic brain-injury rehabilitation. Clients as well as their primary therapists rated their mutual WA at four time points throughout a 14-week rehabilitation programme. Subjects consisted of 86 clients as well as their primary therapists. Clients had suffered a traumatic brain injury ($n = 27$), a cerebrovascular accident ($n = 49$) or another neurological insult ($n = 10$).

Measures: (1) Neuropsychological tests of attention, memory and higher cognitive functions; (2) the Working Alliance Inventory, client and therapist short form.

Results: Overall, the relationships between cognitive tests and WA ratings were weak. The tests of attention, memory and higher cortical functions were differentially related to clients' and therapists' view of their mutual WA at the different stages of their collaborative work.

Discussion and conclusion: Clients' cognitive profile affects clients' and therapists' view of their WA in different ways. The weakness of the correlations between cognitive tests and WA ratings may indicate that a good WA is achievable also with clients with severe cognitive difficulties.

Keywords: Therapeutic working alliance, acquired brain injury, rehabilitation, cognitive functioning, neuropsychological tests, process research

Introduction

The importance of a good working alliance (WA; also called the therapeutic alliance) for a successful therapy has been documented across a wide variety of therapeutic settings [1–3]. In Bordin's [4] pantheoretical view, the WA is a combination of (a) the agreement between client and therapist on goals, (b) their agreement on how to achieve these goals (common work on tasks) and (c) the development of a personal bond between client and therapist. Within brain injury rehabilitation, only

a few studies have addressed the WA. In those studies conducted, a positive relationship between the WA, patients' awareness and compliance [5] and outcome [6–11] has been reported. It was earlier found [5] that the relationship between the clients' and the therapists' view of their WA converged over time. However, the relationship was only moderate even at the end of the 14-week rehabilitation programme [5]. In the authors' view, these results indicate that brain injury rehabilitation should be seen as a developing inter-personal process, on

which clients and therapists can have different perspectives.

It is a common clinical experience that the characteristics of the client's brain injury have an impact on the therapeutic process and that psychotherapeutic approaches have to be adjusted to the special needs of the brain-injured individual [12–14]. In Lewis' [15] words, the therapist has to function as an 'auxiliary cortex' for the brain-injured client. However, few empirical studies have addressed the relationship between patients' brain injury and the WA. One has earlier found frontal or right hemisphere brain injuries to be negatively related to therapists' (not clients') view of the WA at the beginning of the collaborative work, but not later on [5]. The question remains how the localization of the brain injury affects the therapeutic work. Judd and Wilson [16] examined therapists' experience of factors challenging the WA in their work with brain-injured patients. The therapists reported lack of insight, impaired memory, inflexible thinking, poor attention/concentration, language difficulties, disinhibited behaviour and emotional ability as all being challenging. The clients' perspective was not examined. In accordance with Kendall and Terry [17], it could be argued that cognitive impairments influence brain-injured patients' appraisal in broad terms. One would assume that this includes patients' appraisal of their relationship with their therapists. This assumption is supported by the findings of Davis and Lysaker [18]. Their sample consisted of 24 outpatient clients with schizophrenia spectrum disorders who participated in cognitive-behavioural therapy. After 3 months of therapy, the clients were administered a neuropsychological test battery and both clients and therapists completed the short form of the Working Alliance Inventory. The authors found poor performance on a test of verbal memory and learning potential to be significantly related to clients' report of a good WA, whereas better performance on visual spatial reasoning was significantly related to therapists' report of a good alliance. The authors conclude that clients' cognitive abilities may differentially affect therapists' and clients' perception of their WA. Therapists may prefer to work with clients who have good problem-solving resources, whereas clients who are struggling with greater deficits may have a greater need for a WA with their therapist because of more limited cognitive resources.

Despite these interesting findings, there is a lack of studies examining how a brain-injured individual's cognitive abilities affect his or her own, as well as the therapist's, view of their WA at the various stages of rehabilitation. Such studies could enhance one's understanding of brain-injured clients' and their therapists' view of the therapeutic process,

enable one to learn about potential challenges for the therapeutic process and thereby guide the supervision and education of therapists.

In the present study, the authors wanted to examine:

- (1) the relationship between clients' (a) attentional, (b) memory and (c) higher cognitive functions and their view of their WA with their therapist at the different stages of the rehabilitation process, and
- (2) the relationship between clients' (a) attentional, (b) memory and (c) higher cognitive functions and their therapists' view of their WA at the different stages of the rehabilitation process.

Given the lack of existing research on this topic, the study has an explorative character.

Method

Study design

Subjects included in the present study comprised patients who underwent a post-acute neuropsychological rehabilitation programme at the Center for Rehabilitation of Brain Injury (CRBI) at the University of Copenhagen, as well as their primary therapists. The study has a prospective design. Clients' cognitive functions were measured right at the beginning or before the start of the rehabilitation programme. Clients' and their primary therapists' views of their WA were measured 2, 6, 10 and 14 weeks into the programme, the last measurement being at programme end.

Subjects

The CRBI rehabilitation programme accepts adult patients with acquired brain injury. The programme involves attendance at the centre for 4 days a week for ~14 weeks with subsequent follow-up according to individual requirements. The patients included in this study commenced the programme in groups of 15–20, twice yearly. Of the 104 patients who attended the programme between February 2002 and December 2004, 86 participated in the study. The dropouts were due to administrative difficulties. Table I shows basic demographic and medical characteristics of the patients included in the present study. Older patients are rarely referred to the rehabilitation centre and, within this sample, the oldest patient was 60 years old at the time of injury. Forty-two per cent of the participants had 9 years of compulsory primary and secondary school education. The majority of the remaining participants had an upper secondary education (11–12 years). There was considerable variation in the duration

Table I. Patients' demographic and medical characteristics.

	Percentiles (%)			<i>M</i>	<i>SD</i>	<i>n</i>	%
	25	50	75				
Age at injury (years)	34.8	46.5	53.0	43.5	12.0		
Duration of hospitalization (days)	25.0	51.5	124.0	81.5	87.3		
Age at programme entry (years)	38.0	47.2	53.9	44.9	11.5		
Time between injury and admission to the programme (years)	0.64	0.90	1.30	1.22	1.08		
Sex	Male					55	64
	Female					31	36
Years of education	Compulsory education (9 years)					35	42
	Voluntary 10th year					4	5
	Upper secondary education (11–12 years)					44	53
Type of injury	Traumatic brain injury					27	31.4
	Cerebrovascular accident					49	57.0
	Other					10	11.6
Injury localization	Bifrontal, right frontal or right hemisphere					34	40
	Other					52	60

of hospitalization (defined as a combination of acute trauma care and inpatient rehabilitation). Median duration was 51.5 days. The time between injury and programme entry was comparatively short: 55% of patients entered the programme within 1 year after their injury and 93% within 2.5 years (mean = 1.22, *SD* = 1.08). One case was treated as an outlier and not included in the analyses since the injury in this case had occurred over 14 years earlier. The proportions of males and females were approximately equal in all diagnostic groups. Included within the 'other'-injury type category are patients with brain tumours, anoxia following cardiac arrest and with infections, e.g. meningitis.

The authors collected information about the localization of the patients' brain injuries from their medical records. For the purpose of this study, patients were divided into two groups. Those with a bifrontal, right frontal or other right hemisphere cortical injury were compared with patients with other or diffuse injury localization. Forty per cent of the patients fell into the former group, 60% into the latter. Type of injury was not related to injury localization.

Intervention

The programme involves elements of cognitive, physical and social training and it is intentionally multi-dimensional. The centre's professional staff include neuropsychologists, physiotherapists, speech pathologists, an occupational therapist and a special education teacher. Each patient is allocated a primary therapist who has the role of a case manager and who guides the patient and their relatives through the process of rehabilitation,

coordinates interventions, works on the patient's social integration and work re-entry and provides individual psychological counselling and psychotherapeutic sessions with a frequency of 1–2 sessions per week. Typically, the primary therapist is a neuropsychologist. The therapists work closely together and employ a holistic and phenomenological approach in their work. Further details of the programme are presented elsewhere [19, 20].

Measures

As a measure of WA, the client and therapist short form of the Working Alliance Inventory (WAI [21]) was administered as part of a process questionnaire (see [5]). The WAI, originally developed by Horvath and Greenberg [22], is based on Bordin's pantheoretical definition of the WA. The client/therapist short forms of the WAI comprise 12 items, with four each measuring the goal, task and bond aspects of the WA. All 12 items together assess one general, second-order alliance dimension [21]. Its pantheoretical foundation makes the WAI a broadly applicable and widely used measure in process research. The WAI items were rated separately and independently by the patients and their respective primary therapists on a 7-point Likert scale ranging from 1 = 'not at all' to 7 = 'a lot'. Prior to the completion of the questionnaires, both the clients and therapists were informed that their ratings would be treated as confidential, so that the therapists would not get knowledge of patients' ratings (and vice versa). However, patients were assisted in completing the questionnaires by research or administrative staff or trainees if necessary (mostly in the case of

aphasic problems). For the computation of the WAI sub-scales and total scale, item polarization was reversed where appropriate and mean scores were computed. WAI scores averaged over all time points were also computed for those clients who had valid scores on at least three out of the four time points. For a detailed description of the WAI scales and their psychometric properties in the present sample, see Schönberger et al. [5].

This study employed three tests as *measures of attentional functions*: (1) the d2 Test of concentration [23] is a letter cancellation task in which subjects are presented with a paper sheet containing lines of different letters with a varying number of dashes above and below. Subjects are asked to cancel all d's with two dashes. Administration time is 4 minutes and 40 seconds. The total number of processed letters are scored (TS score) as well as the percentage of errors ($F\%$) and the difference between the highest and the lowest number of processed letters per line (spread); (2) the Trail Making Test A & B [24]; and (3) the Digit-Symbol test from the Wechsler Adult Intelligence Scale, revised (WAIS-R [25]).

This study used three tests as *measures of memory functions*: (1) In the present study, the number of series repeated correctly in the same order and in the reversed order, respectively were scored separately; (2) the Danish version of the 10-word list test by Luria [26] was administered, in which subjects are asked to repeat a series of 10 words until all 10 words are remembered. The words are presented maximally 10 times. After 1 hour, subjects are asked to recall the 10 words again. In this test, the number of words recalled in the first trial is scored as well as the number of trials until all 10 words are recalled and the number of words recalled after 1 hour; (3) a sentence repetition task taken from the Neurosensory Center Comprehensive Examination for Aphasia (NCCEA [27]) was used. In this test, the subject is asked to immediately repeat 22 sentences. The number of error-free sentences was scored.

For the *measurement of higher cognitive functions*, this study used eight tests: (1) Raven's advanced progressive matrices set 1 [28] or a parallel version of equal difficulty, constructed from Raven's standard matrices and developed at the CRBI; (2) a computerized version of the Wisconsin Card Sorting Test (WCST) following the initial procedure described by Berg [29] and Grant and Berg [30], in which subjects are asked to assign a set of 128 cards to a second set of four cards based on shifting assignment rules. The number of correct assignments is scored; (3) word fluency tasks: The subjects were asked to name as many words as possible in several categories (things on street,

animal names, words starting with S, words starting with D, shift between words starting with S and D). Sixty seconds were given for each category. The number of words in each category was scored. From the WAIS-R, the following tests were administered: (4) Information; (5) Picture Completion; (6) Picture Arrangement; (7) Block Design; and (8) Similarities.

In this study, the tester was the same person as the therapist in only 12% of the cases.

Statistical procedures

For inferential statistics, this study used non-parametric procedures with α set to 0.05 (2-tailed). The relationship between clients' demographic and injury data and their cognitive test results at programme start were examined using Mann-Whitney U-tests, Kruskal-Wallis tests and Spearman's correlations. The neuropsychological tests and the WA ratings were compared using Spearman's correlations. Analyses were performed using SPSS 13.0. A missing value analysis regarding the WA ratings in the present sample is described in Schönberger et al. [5].

Results

Description of cognitive test results

Table II shows the sample's cognitive test results. It should be mentioned that the d2, TMT and Digit-Symbol test results of four subjects were removed from the analysis because of dyslexia or motoric problems. Within the limitations of only partially available large-scale representative Danish norms, the group as a whole appears to perform at markedly below normal levels across the spectrum of cognitive tests employed here.

The role of demographic and injury variables

This study examined the relationship between clients' demographic and injury data with their cognitive test results at programme start. Women performed better than men on the Digit-Symbol test and needed fewer trials to remember all words on the Luria 10 words test. By contrast, men performed better on the WAIS-R Information and Block Design test and on the Raven test. While younger clients performed better on the d2 Test (speed), the Digit-Symbol test and the TMT A and B, the Raven test, the Block Design test and close-to significantly better on the animal-word fluency task ($p=0.06$), older clients scored higher on the Information test. Clients with higher level of education performed better on the WAIS-R Information test and

Table II. Cognitive test descriptive.

Tests	n	M	SD	Min	Max	Percentiles(%)			
						25	50	75	
<i>Attention tests</i>									
D2 Total Sum score	80	324.7	98.2	116	571	262.0	326.0	373.8	
D2 error %	79	6.8	7.8	0.0	48.2	2.3	5.4	8.7	
D2 spread	71	125	4.5	4	25	9	12	15	
WAIS-R* Digit-Symbol	80	38.7	12.3	10	73	32.0	37.0	45.0	
TMT A (seconds)	78	50.4	28.4	16.0	195.0	33.0	44.0	58.5	
TMT B (seconds)	79	132.5	66.0	35.0	312.0	75.0	121.0	175.0	
<i>Memory tests</i>									
WAIS-R*	Digit Span forward	82	5.9	2.1	2	13	4.0	6.0	7.0
	Digit Span backward	82	5.0	1.7	2	10	4.0	5.0	6.0
	Luria 10 words	Nr. of trials until all words are learned	66	7.1	2.8	2	10	4.0	7.5
Sentence repetition (nr. error-free sentences)	Nr. of recalled words 1. trial	68	5.5	1.3	2	8	5.0	5.5	6.0
	Nr. of recalled words after 1 hour	67	7.0	2.5	1	10	6.0	8.0	9.0
		75	16.2	3.7	3	22	14.0	17.0	19.0
<i>Tests of higher cortical functions</i>									
WCST Number of series started	68	6.6	2.7	2	11	4.0	7.0	9.0	
Raven number correct	76	7.1	2.7	0	12	5.0	7.5	9.0	
WAIS-R*	Information	71	19.9	4.7	6	28	17.0	21.0	23.0
	Block Design	78	29.1	11.2	7	49	20.0	29.5	38.0
	Picture Completion	45	14.1	3.2	6	19	11.8	15.0	16.5
	Picture Arrangement	75	11.1	4.9	1	19	8.0	12.0	15.0
	Similarities	79	18.4	4.9	8	28	15.0	18.0	23.0
Word fluency	Things on street (nr. of words)	64	13.8	5.1	2	28	10.0	13.0	17.0
	Animals (nr. of words)	64	16.3	5.9	4	31	12.0	16.0	19.8
	D-words (nr. of words)	62	8.4	4.7	0	22	5.0	8.5	11.3
	S-words (nr. of words)	62	10.9	5.3	0	24	7.8	10.0	14.0
	D-S words (nr. of words)	60	9.6	4.2	0	20	7.0	9.0	12.0

*For the WAIS-R tests, raw scores are shown.

Similarities test. In accordance with their younger age, clients with TBI performed better than clients with CVA on the d2 Test (speed), the TMT A and B and the animal-word fluency task, but poorer on the Information test. Clients with a bifrontal or right hemisphere injury localization had a higher error percentage in the d2 Test and performed poorer on the Block Design, the Picture Arrangement test and the Raven matrices than clients with other injury localizations. However, the bifrontal or right hemisphere injury group performed better on the sentence repetition and word fluency tests. Longer hospitalization was related to lower performance speed in the d2 and TMT B. Long time intervals between injury and start of rehabilitation at the CRBI were related to low scores on WAIS-R Information, sentence completion test, WCST and word fluency (animals).

The authors have reported the relationship between clients' demographic and injury data and their WA with their primary therapist in the present sample earlier [5]. In brief, clients' and therapists' alliance ratings were related to patients' age, while frontal or right-hemisphere injuries were related to poor alliance ratings given by the therapists at

programme start and to poor ratings of patients' awareness.

Regarding question 1a: The relationship between clients' attentional functions and their view of their WA with their therapist at the different stages of the rehabilitation process. As can be seen in Table III, clients with a low error percentage on the d2 tended to be more positive in their ratings of their WA with their primary therapist on all scales and time points. However, this finding was only statistically significant for the WAI client goal scale after 2 programme weeks (measurement time point 1). Also, good performance on the Digit-Symbol test was related to positive ratings on nearly all WAI client scales at all time points. Again, the finding was statistically significant only for the WAI client task scale after 6 programme weeks (time point 2) and for the WAI client bond scale at programme end (time point 4).

Regarding question 1b: The relationship between clients' memory functions and their view of their WA with their therapist at the different stages of the rehabilitation

Table III. Relationship between tests of attentional performance and the working alliance. Spearman's correlations are shown.

Working Alliance Inventory			Test			
Rater	Time point	Scale	D2 TS	D2 F%	D2 SP	WAIS-R Digit-Symbol
Client	T_1	Task	0.07	-0.14	-0.05	0.10
		Bond	0.07	-0.07	-0.03	-0.01
		Goal	0.00	-0.33*	-0.09	0.08
		Total	0.03	-0.25	-0.07	0.05
	T_2	Task	0.16	-0.14	0.12	0.31*
		Bond	0.04	-0.15	-0.05	0.14
		Goal	-0.07	-0.12	0.03	-0.00
		Total	0.07	-0.19	0.11	0.19
	T_3	Task	-0.02	-0.18	-0.03	0.04
		Bond	-0.03	-0.05	-0.03	0.07
		Goal	-0.03	-0.25	-0.10	0.06
		Total	-0.04	-0.20	-0.08	0.06
	T_4	Task	0.14	-0.15	0.15	0.17
		Bond	0.23	-0.11	-0.01	0.26*
		Goal	-0.02	-0.17	0.02	0.04
		Total	0.12	-0.16	0.04	0.17
	Mean T_1 - T_4	Task	0.07	-0.21	0.05	0.13
		Bond	0.10	-0.17	-0.02	0.14
		Goal	-0.10	-0.24	-0.04	0.01
		Total	-0.02	-0.24	-0.01	0.06
Therapist	T_1	Task	-0.11	-0.22	-0.13	0.01
		Bond	-0.26*	-0.25	-0.30*	-0.11
		Goal	-0.05	-0.13	-0.20	-0.01
		Total	-0.13	-0.22	-0.22	-0.01
	T_2	Task	0.04	-0.15	-0.17	0.03
		Bond	-0.04	-0.18	-0.24	0.09
		Goal	0.01	-0.21	-0.11	-0.03
		Total	0.05	-0.23*	-0.19	0.07
	T_3	Task	0.03	-0.17	-0.04	0.20
		Bond	0.06	-0.14	-0.19	0.18
		Goal	0.12	-0.18	-0.08	0.14
		Total	0.01	-0.20	-0.11	0.23
	T_4	Task	0.02	-0.18	-0.11	0.13
		Bond	-0.06	-0.13	-0.16	0.12
		Goal	0.06	-0.13	-0.09	0.16
		Total	-0.01	-0.20	-0.13	0.16
	Mean T_1 - T_4	Task	-0.09	-0.21	-0.14	0.07
		Bond	-0.11	-0.20	-0.27	0.05
		Goal	0.00	-0.17	-0.15	0.07
		Total	-0.06	-0.22	-0.19	0.09

*Spearman's correlation is significant at the 0.05 level (2-tailed).

process. Good performance on all three of the employed memory tests was related to comparatively negative ratings of their WA with their primary therapist as experienced by the patients after 2 programme weeks (time point 1; see Table IV): A good Digit Span (forward) was related to the WAI client task, bond and total scale at t_1 . Clients who needed few trials in order to be able to repeat all 10 words in the Luria 10 words test rated the goal agreement and overall WA with their primary therapist (WAI client goal and total scale t_1 , respectively) as being comparatively poor. Clients who could repeat many words on the sentence repetition test rated the efficacy of their collaborative work with their therapist (WAI task scale) as being

comparatively low. Memory test results were not related to clients' experience of the WA later in therapy.

Regarding question 1c: The relationship between clients' higher cognitive functions and their view of their WA with their therapist at the different stages of the rehabilitation process. Clients' scores on the tests of higher cognitive functions employed in this study were not related to clients' ratings of their WA with their primary therapist.

Regarding question 2a: The relationship between clients' attentional functions and their therapists' view

Table IV. Relationship between tests of memory and the working alliance. Spearman's correlations are shown.

Working Alliance Inventory			Test			
			WAIS-R	Luria 10 words	Luria 10 words	Sentence repetition
Rater	Time point	Scale	Digit span forward	nr. of trials until all words are learned	nr. of words 1. trial	nr. of error-free sentences
Client	T_1	Task	-0.30*	0.10	0.06	-0.30*
		Bond	-0.27*	0.08	-0.04	0.03
		Goal	-0.20	0.35*	0.04	-0.14
		Total	-0.27*	0.29*	0.00	-0.15
	T_2	Task	-0.05	0.00	0.11	0.02
		Bond	-0.07	-0.01	-0.02	0.10
		Goal	-0.18	0.12	-0.08	-0.14
		Total	-0.14	0.06	-0.03	-0.02
	T_3	Task	-0.09	-0.11	0.02	-0.17
		Bond	-0.14	0.04	-0.04	-0.01
		Goal	0.05	0.12	0.08	0.04
		Total	-0.05	0.04	0.05	-0.04
	T_4	Task	0.03	-0.09	0.11	-0.09
		Bond	0.07	0.03	0.08	0.11
		Goal	-0.01	0.11	0.02	-0.12
		Total	0.02	0.06	0.03	-0.06
	Mean T_1 - T_4	Task	-0.10	0.02	0.12	-0.14
		Bond	-0.09	0.09	0.01	0.09
		Goal	-0.05	0.21	0.03	-0.04
		Total	-0.08	0.18	0.05	-0.02
Therapist	T_1	Task	0.07	-0.06	0.20	-0.05
		Bond	0.15	0.01	0.21	0.08
		Goal	0.01	0.16	0.23	-0.21
		Total	0.07	0.05	0.24	-0.11
	T_2	Task	-0.01	-0.13	0.14	0.01
		Bond	0.17	-0.06	0.23	0.17
		Goal	-0.02	0.21	0.20	-0.03
		Total	0.05	0.03	0.22	0.02
	T_3	Task	0.14	-0.02	0.27	-0.03
		Bond	0.17	0.03	0.25	0.15
		Goal	0.16	0.21	0.26	0.02
		Total	0.17	0.09	0.28*	0.02
	T_4	Task	0.06	-0.03	0.26*	0.05
		Bond	0.07	-0.02	0.25*	0.23
		Goal	0.07	0.17	0.29*	0.07
		Total	0.08	0.09	0.32**	0.13
	Mean T_1 - T_4	Task	0.14	-0.11	0.32*	0.01
		Bond	0.18	-0.03	0.28	0.15
		Goal	0.09	0.14	0.30*	-0.05
		Total	0.16	0.03	0.34*	0.00

*Spearman's correlation is significant at the 0.05 level (2-tailed).

**Spearman's correlation is significant at the 0.01 level (2-tailed).

of their WA at the different stages of the rehabilitation process. Therapists to clients who performed slowly on the d2 Test (TS score) rated the emotional bond with these clients after 2 programme weeks (WAI therapist bond scale time point 1) as positive (see Table III). The therapists also rated all aspects of the WA (and especially the WAI total scale) with those clients as being more positive who performed accurately on the d2 (low error percentage). This was true at all time points, but statistically significant only for the WAI total scale after 6 programme weeks (measurement

time point 2; see Table III). Finally, therapists rated all aspects of their WA (and especially the emotional bond) with clients who showed a high stability in their d2 performance (low d2 spread score) as being positive. However, this relationship was only statistically significant for the WAI therapist bond scale at time point 1.

Regarding question 2b: The relationship between clients' memory functions and their therapists' view of their WA at the different stages of the rehabilitation process.

The therapists rated as positive the WA (all WAI therapist scales, all time points) with those clients who could repeat many words in the first trial of the Luria 10 word test. This finding was statistically significant for the WAI therapist total scale after 10 programme weeks (measurement time point 3), for all WAI therapist scales at programme end (time point 4) and for the WAI therapist task, goal and total scale averaged over all time points (see Table IV).

Regarding question 2c: The relationship between clients' higher cognitive functions and their therapists' view of their WA at the different stages of the rehabilitation process. Good performance on the word fluency test 'things on street' was related to good WA ratings given by the therapists (all WAI therapist scales and time points). This finding was statistically significant for the WAI therapist task, bond and total scale after 6 programme weeks (time point 2; $r = 0.26, 0.31$ and 0.29 , respectively, $n = 60, p < 0.05$) and for the WAI therapist bond scale averaged across all time points ($r = 0.32, n = 46, p < 0.05$). Therapists to clients who scored high on the WAIS-R Information test rated the emotional bond with these clients on all time points positively. This finding was statistically significant at the end of the programme (WAI therapist bond scale time point 4; $r = 0.27, n = 69, p < 0.05$) and for the WAI bond ratings averaged across all time points ($r = 0.30, n = 55, p < 0.05$). The other tests of higher cognitive functions were not related to therapists' WA ratings.

Discussion

Methodological considerations

The results should be viewed in the light of the following methodological considerations. First, with the broad categorization used here only an approximate investigation of the relationship between injury localization and the process of rehabilitation could be conducted. Future studies addressing the relationship between brain injury and the therapeutic process should employ more detailed measures of injury localization. Problems with the use of the length of clients' hospitalization as a measure of severity of injury are described elsewhere [31–33].

It is necessary also to consider the validity of the cognitive tests employed in the current study. The majority of these are standard measures. However, it could be argued that a more detailed examination of the clients' attentional and memory functions would have been desirable. Furthermore, it is a common clinical experience that problems with higher cognitive functions which are observable during testing are frequently not measured by the

tests themselves. Such problems may in many instances only be visible in open, everyday life-related problem-solving tests which provide only little structure. It is a limitation of the current study that more ecologically valid tests were not employed.

Finally, the statistical problem of alpha inflation should be considered. With alpha corrections for multiple testing, the low correlations found between cognitive tests and ratings of the WA would not be individually statistically significant. However, most of these correlations were consistently positive or negative on all time points of measurement, which indicates a systematic trend rather than chance findings.

Regarding the role of demographic and injury data

The negative relationship between chronicity and cognitive test performance in the current study resembles prior findings that long time intervals between the time of injury and the rehabilitation start were associated with clients' as well as their relatives' experience of higher levels of brain injury related problems in everyday life [11, 34].

Regarding question 1a: The relationship between clients' attentional functions and their view of their WA with their therapist at the different stages of the rehabilitation process. The results could be interpreted such that attention problems can have a negative impact on clients' experience of their WA with their primary therapist. Attention problems may influence the intensity and speed of the collaborative therapeutic work and thereby influence the WA. However, the correlations found were rather weak. Furthermore, it should be carefully considered what the attention test results actually represent. A percentage in the d2 Test can be a sign of an uncritical approach to the task. In other words, a high error percentage in this test does not necessarily imply concentration problems, but can also show the tested individual's misjudgement of his or her own resources, the task's demands and importance or both. It could further be argued that such an approach to the d2 Test can reflect a patient's general attitude towards rehabilitation. If a client does not see a need for rehabilitation, the importance of the offered programme may be disregarded. Consequently, the client will not engage in the collaborative work with the primary therapist and ultimately not experience a strong WA. In the light of this discussion, it is interesting that the WAI scale to which a high d2 error percentage tended to be most strongly related to was the WAI client goal scale (however, the correlation was still weak). It could be argued that those clients who misjudge their cognitive abilities are less likely to agree with their primary therapist on what should be achieved

in their collaborative work. It has been described elsewhere that a lack of awareness is related to a poor WA in the present sample [5].

Regarding question 1b: The relationship between clients' memory functions and their view of their WA with their therapist at the different stages of the rehabilitation process. The findings are consistent with those of Davis and Lysaker [18], namely that poor performance on a test of verbal memory and learning potential was significantly related to positive WA ratings given by clients with schizophrenia spectrum disorders. The authors find it interesting that the same relationship between memory functions and the WA now could be shown in both a sample of individuals with a psychiatric diagnosis which underwent cognitive-behavioural therapy and a sample of brain-injured individuals who participated in a holistic, interdisciplinary rehabilitation programme. It should, however, be noted that the participants in Davis and Lysaker's study had completed the WAI after 3 months of therapy, while the relationships between memory functions and clients' WA ratings in this study could only be found early in rehabilitation, after 2 programme weeks. This difference in the findings of the two studies may be explained by a point that Davis and Lysaker make in their article, namely that it may take a longer time to build up a therapeutic relationship with persons with schizophrenia than with other client groups. However, the question remains of why poor verbal memory and learning abilities are positively related to clients' WA ratings. Davis and Lysaker propose that either clients with more serious cognitive difficulties are in greater need of a strong alliance with their therapist or that such clients tend to make more socially benevolent appraisals of the WA. An alternative explanation may be that clients with a good verbal working memory capacity and good learning skills have higher expectations towards the collaborative work with their primary therapist and are, therefore, more likely to be critical about the focus and effectiveness of the therapeutic work. The fact that verbal memory and learning functions only are related to clients' experience of the WA at programme start may then indicate that the therapists in this sample became familiar with their clients' wishes and expectancies during the first programme weeks and adjusted their approach accordingly and that the clients learned which kind of support and outcome realistically could be expected in the given therapeutic setting.

Regarding question 1c: The relationship between clients' higher cognitive functions and their view of their WA with their therapist at the different stages of the

rehabilitation process. The fact that tests of higher cognitive functions were not related to clients' view of their WA with their primary therapist again resembles the results of Davis and Lysaker [18]. The question arises why an uncritical working style, indicated by a high d2 error percentage, is related to poor WA ratings given by the clients, while formal tests of higher cognitive functioning are not. With regard to tests of executive functioning, this may partly be due to a validity problem. The therapists report that, for a number of patients, tests like the WCST are poor at measuring dysexecutive behaviour as it occurs during therapeutic work. An alternative explanation would be that problems with higher cognitive functions, such as general level of intelligence and executive functioning, are not experienced as being problematic by the clients themselves, but only by the therapists.

Regarding question 2a: The relationship between clients' attentional functions and their therapists' view of their WA at the different stages of the rehabilitation process. A high d2 error percentage was the only cognitive test result that was negatively related to both clients' and therapists' experience of their WA. This finding and the negative relationship found between unstable d2 Test performance (high d2 spread) and therapists' experience of a poor WA are in agreement with Judd and Wilson's [16] finding that therapists found it challenging to work with brain-injured clients with concentration problems. As mentioned above, a high d2 error percentage may also be interpreted as an uncritical approach to the task on the client's behalf. Such an approach may be a consequence of a lack of awareness. It is a common clinical experience that unawareness can be challenging for therapeutic work (as is also reported by Judd and Wilson [16]), and this may be reflected in the relationship between a high d2 error percentage and negative WA ratings. It is, however, more questionable why a slow performance on the d2 Test (TS score) was related to therapists' experience of a good emotional relationship to their clients at programme start in this study. This finding is not observed at the later measurement time points and WAI scales and may be a chance finding. Furthermore, the question could be raised why the d2 Test, but not the Digit-Symbol test, was related to therapists' WA ratings. One speculative answer would be that this is so because the d2 is the better measure of uncritical working style. It would be interesting to repeat this study by employing more differentiated and theory-based measures of attentional functions.

Regarding question 2b: The relationship between clients' memory functions and their therapists' view of their WA at the different stages of the rehabilitation process. The number of words recalled in the first trial of the Luria 10 words test can be interpreted as a measure of clients' auditory span and their ability to learn spontaneously. The fact that clients' digit span and the therapists' WA ratings were not related in the present study could indicate that it is mainly the spontaneous learning component of the Luria 10 words test that is related to therapists' alliance ratings. The authors found it interesting that clients' performance on the latter measure tended to be more strongly related to therapists' experience of the WA towards the end of therapy than early in therapy. It could be that a poor capacity to immediately acquire new information, such as the content of the conversations with the primary therapist, is increasingly experienced as problematic by the therapist as the collaborative work with the client develops over time.

In summary, the present study could partly replicate and partly differentiate the finding of Judd and Wilson [16] that clients' memory problems are experienced as a challenge by the therapists. However, this finding is contradictory to the findings of Davis and Lysaker [18], who did not find clients' learning potential to be related to therapists' alliance ratings. Davis and Lysaker measured WA at only one time point. The question remains whether clients' learning potential would have had an impact if Davis and Lysaker had measured the therapeutic alliance at other stages of the therapeutic process.

Regarding question 2c: The relationship between clients' higher cognitive functions and their therapists' view of their WA at the different stages of the rehabilitation process. As reported above, performance on the WAIS-R Information sub-test is influenced by the subject's educational level. Furthermore, the Information sub-test is among the strongest indicators of full-scale IQ. Therefore, it could be argued that the therapists in this sample experienced the strongest emotional relationship (WAI bond scale) with clients who were well-educated and intelligent. It should be noted that the same was not true for therapists' experience of the agreement on goals with the clients (WAI goal scale) and their ratings of the effectiveness of the therapeutic work (WAI task scale). It should also be noted that the primary therapists in this sample all had an academic education. The question arises whether therapists find it easier to build up a good emotional relationship to persons who are similar to themselves (see also the controversial discussion of client-therapist similarity in the psychotherapy literature [35]).

Apart from one fluency task, the remaining tests of higher cognitive functions employed in the current study were not related to therapists' WA ratings. A first explanation would be that such functions do not have an impact on the WA. An alternative explanation would be that the tests of higher cognitive functions, especially tests of executive functioning, are not valid (see above). A third explanation which resembles the therapists' experience, would be that cognitive problems such as dysexecutive behaviour, reduced level of general intelligence or poor perceptual organization can be a therapeutic challenge (in accordance with therapists' experiences as reported by Judd and Wilson [16]), but one that can be handled in most instances, resulting in a lack of correlations between tests of executive functions and WA ratings. The kind of neuropsychological problems experienced as being most threatening for the collaborative work by the therapists is apathy and lack of initiative, qualities which are likely to influence word fluency results negatively. It is, therefore, interesting to see that the word fluency-'things on street' task, which is likely to be influenced by clients' level of initiative, productivity and creativity, was related to therapists' WA ratings. It should, however, be noted that performance on the word fluency tasks can be influenced by speech and language problems. This is indicated by the fact that clients with a bifrontal or right-hemisphere injury performed better on this test than other clients. An alternative explanation for the relationship between the things on street-word fluency task and therapists' experience of the WA may, therefore, be that therapists experience speech and language problems as a therapeutic challenge. However, performance on the sentence repetition test may also be influenced by speech and language problems. In the current sample, clients with a bifrontal or right-hemisphere injury performed better on the sentence repetition test than other clients. However, the sentence repetition test was not related to therapists' WA ratings and poor performance on this test was even positively related to patients' own experience of the WA, as discussed above. The role of speech and language problems in the formation of a WA remains, therefore, an important, but open question.

Conclusion

The first major finding of the present study was that brain-injured individuals' performance on cognitive tests tends to be differentially related to their own and their therapists' perspective of their WA. For therapists, it may be interesting to see that their clients' perspective on their WA not only can

differ from their own perspective [5], but also can be influenced by different factors, and that poor performance on cognitive tests actually can be positively related to clients' experience of the WA. The authors find it striking that, in this study, only one test score was related to both clients' and therapists' experience of their WA—the error percentage score of the d2 Test. This test score is also a good example of the diversity of factors which can influence a test result, thereby yielding a whole range of possible interpretations. In clinical practice, of course, test results should be interpreted together with each other and with all other information available about the client. Additionally, qualitative observations during testing may give important information about the clients' approach to and appraisal of the test as well as his or her own resources.

The second major finding of the present study was that the correlations between the cognitive tests and the WA ratings were weak. As discussed above, this could be interpreted in three different ways: (1) the significance of clients' cognitive functions for the collaborative work between client and primary therapist is only very limited; (2) the measures employed are not valid; or (3) clients' cognitive functions are a significant challenge for the therapeutic work, but one that clients and therapists can handle if the clients are motivated for therapeutic work and if the therapists are trained in dealing with clients' cognitive deficits. In other words, a good WA can be established with clients with all levels of cognitive difficulties. Although it is recognized that the validity of some of the cognitive measures employed in the current study can be questioned, one inclines towards the third interpretation, because (1) motivation for rehabilitation is a selection criterion for the CRBI programme and (2) the therapists who participated in the present study were either trained neuropsychologists or psychologists under neuropsychological training. Amongst the strategies that the therapists employ in order to deal with clients' cognitive problems are: (1) providing a clear structure and framework for the therapeutic work, (2) providing expertise about the consequences of a brain injury, (3) proceeding in small steps at an appropriate pace and level of abstraction, providing and encouraging memory aids such as repetitions and written protocols whenever needed and (4) making use of the cognitive test results in a respectful dialogue with the client about his or her experience of cognitive difficulties. It may be helpful to interpret clients' performance on the cognitive test material not only as a consequence of the individual's cognitive difficulties and resources, but also as a reaction to the therapist's attitude and behaviour. In other words, it is assumed that the

client interacts not only with the test material, but also with the test administrator. According to Christensen and Caetano [36], the diagnostic process and treatment are intrinsically related. If the tester is identical with the therapist, the first steps towards a good WA may already be taken during cognitive testing.

Further research should investigate ways of using A testing session as a starting point for a therapeutic dialogue and the build-up of a good WA. It should also be examined which role other client characteristics, such as clients' expectations towards rehabilitation, speech and language problems, pre-morbid personality/coping style and social behaviour play in the formation of a good WA. It would also be relevant to re-examine the relationship between clients' higher cognitive functions and the WA by using problem-solving tests which examine clients' behaviour in more unstructured, real-life situations. Finally, it should be examined which therapist characteristics are important for forming a good WA and how client and therapist characteristics interact in the formation of a good WA. In doing so, one may learn from the methods used in and results of psychotherapy research.

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