

Subjective outcome of brain injury rehabilitation in relation to the therapeutic working alliance, client compliance and awareness

MICHAEL SCHÖNBERGER^{1,2}, FRANK HUMLE¹, & THOMAS W. TEASDALE²

¹Center for Rehabilitation of Brain Injury and ²Department of Psychology, University of Copenhagen, Copenhagen, Denmark

(Received 2 March 2006; accepted 3 October 2006)

Abstract

Objective: To investigate the relationship between working alliance, compliance, awareness and subjective outcome of brain injury rehabilitation. Subjects were 86 patients who were clients in an holistic neuropsychological outpatient rehabilitation programme. They had suffered a traumatic brain injury ($n=27$), a cerebrovascular accident ($n=49$) or some other neurological insult ($n=10$).

Measures: The therapeutic alliance, clients' awareness and their compliance were rated four times during the 14-week rehabilitation programme. The therapeutic alliance was rated by both clients and therapist using the Working Alliance Inventory (WAI), awareness and compliance were rated by the therapists. Clients completed the European Brain Injury Questionnaire (EBIQ) at programme start and end. Clients and therapists rated the overall success of their collaboration at programme end.

Results: Clients' experience of a good emotional bond between themselves and therapists in mid-therapy was predictive for the reduction of clients' report of depressive symptoms on the EBIQ depression sub-scale ($R=0.68$, $n=43$, $p<0.001$). Good compliance early in the programme was predictive of changes on the EBIQ. Improvement of awareness was related to the amplification of depressive symptoms ($r=-0.27$, $n=56$, $p<0.05$).

Conclusions: Brain injury rehabilitation should be seen as a dynamic process that develops between clients and therapists. Future research should further investigate the relationship between process and outcome and how the therapeutic process can be optimized.

Keywords: *Therapeutic working alliance, awareness, compliance, acquired brain injury, rehabilitation, subjective outcome, process research*

Introduction

The physical, psychological and social consequences of acquired brain injury are well documented [1, 2] and considerable effort has been made to develop rehabilitation programmes that fit the needs of such patients. The success of holistically-oriented post-acute neuropsychological outpatient rehabilitation has been documented in several studies [3–6]. However, treatment success varies between patients such that even a good programme does not have the same effect on all patients. This is partly due to what does and does not happen during therapy.

In psychotherapy research, there is now a strong focus on the analysis of the therapeutic process and the impact of elements of this process on outcome. The therapeutic working alliance, patient's awareness and compliance with the treatment regimen are regarded as important process elements.

In Bordin's [7] pantheoretical view, the working alliance 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. The importance of a functioning working alliance (also called the

therapeutic alliance) for a successful therapy has been documented across a wide variety of therapeutic settings [8–10]. Two meta-analyses have examined whether alliance measures taken in different phases of treatment would differ in their association with outcome, but the time point of alliance measurement did not have a significant effect [10, 11].

Within brain injury rehabilitation, only a few studies addressed the therapeutic alliance. In those studies conducted, a positive relationship between the alliance and outcome could consistently be found [6, 12–15]. However, the alliance measures employed in most of these studies did not explicitly address the emotional aspects of the therapeutic alliance and none of these studies addressed patients' perspective on the therapeutic alliance and on outcome. A recent publication based on the same sample that is included in the present study examined the development of and relationship between working alliance, patients' awareness and their compliance during the course of brain injury rehabilitation from both the patients' and the therapists' perspective [16]. Patients' experience of a good emotional bond with their primary therapist was related to positive awareness ratings given by the therapists. Awareness, in turn, was predictive of patients' compliance (see also Trahan et al. [17]). It can be argued that brain injured patients' experience of a good working alliance affects outcome by affecting patients' awareness and thereby their compliance, which was again found to be related to outcome in recent studies [13, 18]. It is, however, commonly assumed that awareness is not only important for good therapeutic outcome, but can also lead to emotional distress in some patients (for a review, see e.g. [19, 20]).

A good working alliance may also have a more direct impact on outcome, for example by providing a secure and accepting framework that can foster patients' process of accepting and adapting to the consequences of their brain injury [7, 21, 22].

The present study had the following goals and hypotheses:

- (1) *Goal:* Explorative analysis of the impact of brain injury related problems on clients' own and their therapists' experience of their working alliance.

Hypothesis: Communicative problems, e.g. could have a negative impact on the alliance.

- (2) *Goal:* Investigation of the impact of changes in clients' experience of brain injury related problems on the working alliance.

Hypotheses: A differential relationship was expected between the experience of problem reduction and working alliance. First, it was

hypothesized that if clients experienced a reduction of problems, this would lead to an experience of success in both clients and therapists, which again is thought to have a positive effect on the therapeutic alliance. Secondly, it was expected that in some clients the report of a reduction of problems would be a sign of a lack of awareness, which was expected to have a negative impact on the therapeutic alliance. This study expected especially ratings on the EBIQ cognitive scale to be influenced by clients' awareness. Subjective reduction of cognitive problems was therefore expected to be unrelated or even negatively related to the working alliance.

- (3) *Goal:* Examination of the impact of the working alliance between client and therapist on subjective outcome.

Hypotheses: Clients' experience of a good emotional bond was expected to be predictive for a reduction of depressive symptoms and good overall therapeutic success as experienced by themselves, especially if a good bond was achieved already early in therapy. It was hypothesized that a good emotional bond has a direct effect on the reduction of depressive symptoms that is not mediated by clients' compliance. Furthermore, one was interested in exploring how the therapists' experience of a good emotional bond is related to therapists' and clients' experience of success.

- (4) *Goal:* Investigation of the relationship between compliance and subjective outcome.

Hypotheses: Given the central role of the primary therapists for the clients' rehabilitation and community integration, the collaborative work of client and primary therapist has an impact on most aspects of the client's life. Therefore, good client compliance was expected in this collaboration to be positively related to most aspects of the clients' brain injury related everyday problems. This study hypothesized more subjective improvement, if patients complied already early in therapy; if they only complied towards the end or not at all, less could be achieved during rehabilitation.

- (5) *Goal:* Examination of the relationship between changes in clients' awareness and subjective outcome.

Hypothesis: It was assumed that while good awareness in itself is positively related to treatment outcome, it is especially an increase of awareness that can cause emotional distress in clients, especially in the more severely injured clients with limited rehabilitation potential.

and their respective primary therapists completed a questionnaire regarding their working alliance. Also at all four time points, the primary therapists rated their clients' awareness and compliance. In addition to these process ratings, the clients as well as their relatives rated clients' brain injury related problems at programme start and end and rated the overall success over their collaborative work at programme end.

For the measurement of the working alliance between the clients and their primary therapists, this study used the short form of the Working Alliance Inventory (WAI) [25]. The WAI, originally developed by Horvath and Greenberg [26], is based on Bordin's pantheoretical definition of the working alliance. The client/therapist short forms of the WAI comprise 12 items, each four measuring the goal, task and bond aspects of the working alliance. All 12 items together assess one general, second-order alliance dimension [25]. The WAI short forms are standard measures in therapy process research, but were, to the authors' knowledge, not used in a brain-injury rehabilitation setting before. This study evaluated the item content to be appropriate for the setting. The WAI items were rated separately and independently by the clients 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 clients' ratings (and the reverse). However, clients were assisted in completing the questionnaires by research or administrative staff or trainees if necessary (mostly in cases of aphasic problems). For the computation of the WAI sub-scales and total scale, item polarization was reversed if appropriate and mean scores were computed. One also computed WAI scores averaged over all time points and WAI scores showing pre- to post-changes by subtracting the pre-scores from the post-scores.

For the measurement of clients' awareness, a 4-items scale was used derived from Fleming et al. [27], measuring (1) clients' awareness of their problems and strengths, (2) clients' awareness of the implications of their brain injury for their social life, (3) clients' awareness of the implications of their brain injury for their working life and (4) clients' ability to set realistic goals. The items were rated by clients' primary therapists on a 7-point Likert scale ranging from 1 = 'not at all' to 7 = 'a lot'. For the computation of the awareness scale, all four items were averaged.

For the measurement of clients' compliance, a scale was developed comprising five items, namely (1) client participating actively in the individual

sessions with his/her primary therapist, (2) client participating actively in the therapeutic community, (3) client engagement, (4) client acceptance of programme elements and objectives and (5) client following the therapist's advice. The first three items were derived from Prigatano et al. [6], the latter two items from Ezrachi et al. [28]. Four of the items were rated on a 7-point scale from 1 = 'not at all' to 7 = 'a lot'. Only clients' engagement was rated on a 5-point scale from 1 = 'active and independent, spontaneous input' to 5 = 'poor or no activity'. For further computations, the latter item was reversed and transformed into a 7-point scale. For the computation of the compliance scale, all five items were averaged. For a detailed description of the WAI, compliance and awareness scales in the present sample, see Schönberger et al. [16].

In addition to the process ratings, this study measured the clients' brain injury related problems at programme start and end using the client version of the European Brain Injury Questionnaire (EBIQ) [29]. The EBIQ is comprised of 62 items, covering a wide range of brain-injury related everyday problems, as well as three questions regarding the relatives. Clients completed the 'self' version in which they were asked to indicate how much they had experienced any of the problems in question within the last month. Their responses were recorded on a three-point scale: 'not at all' (1), 'a little' (2) or 'a lot' (3). From the EBIQ, eight sub-scales are calculated corresponding to complaints categorized as somatization, cognition, motivation, impulsivity, depression, social isolation, physical symptoms and communication. An additional 'core' scale summaries complaints globally. Details of the EBIQ can be found elsewhere [29, 30]. In this study, re-test-reliabilities for the scales varied between $r=0.47-0.66$ (median $r=0.63$; all p -values <0.001).

As a measure of therapeutic success, pre- to post programme changes were computed in clients' ratings on the nine EBIQ scales by subtracting the post-programme ratings from the pre-programme ratings.

Additionally, together with the process ratings on time point 4 (programme end), clients and therapists rated the overall success of their collaborative work at programme end on a 5-point scale from 1 = 'not at all' to 5 = 'a lot'.

It should be noted that not all clients and therapists completed all questionnaires at all time points. Whenever average scores were computed over time for the process variables, valid scores were required of the clients at least three out of the four time points. Otherwise, a missing value was coded. For inferential statistics, parametric procedures

were used with α set to 0.05 (2-tailed). A missing value analysis regarding the process measures in the present sample is described in Schönberger et al. [16].

Results

Description of outcome measures

The mean overall success ratings were $M=3.77$ ($SD=0.77$) and $M=4.50$ ($SD=0.61$) for the therapists and clients, respectively, with most clients giving scores of 4 or 5. The correlation between the success ratings was weak but approached significance ($r=0.28$, $n=50$, $p=0.05$). Clients' ratings of brain-injury related problems at programme start and end, as well as changes from pre- to post-programme, are shown in Table II. As can be seen, the clients reported significantly fewer problems at programme end on all sub-scales.

The role of demographic and injury data

The relationship between demographic and injury data and working alliance, compliance and awareness in the present sample is reported in Schönberger et al. [16]. In brief, clients' and therapists' alliance ratings were related to clients' age, while injury localization was related to therapists' alliance ratings at programme start and clients' awareness.

This study compared clients' EBIQ ratings at programme start as well as improvements in these from pre- to post-programme with clients' sex, age at programme start, chronicity, length of hospitalization and type and localization of injury. The EBIQ was related to clients' age in two different ways. First, older clients reported more problems on the

'physical scale' ($r=0.23$, $p<0.05$), which covers a variety of symptoms from loss of sexual interest to problems with household chores, than younger clients did. Secondly, younger clients reported a greater reduction of communication problems ($r=0.4$, $p=0.01$) from pre- to post-programme than older clients did. Clients with longer chronicity reported more problems on the EBIQ impulsivity, depression, isolation, communication and core scale at programme start ($r=0.23, 0.27, 0.28, 0.30$ and 0.26 , respectively; all p -values < 0.05) and a greater reduction of isolation during the programme ($r=0.29$, $p<0.05$). Clients with a longer hospitalization reported fewer cognitive and motivational problems at programme start ($r=-0.24$ and -0.24 , respectively; $p<0.05$) and reported less reduction of cognitive problems ($r=-0.25$, $p<0.05$). Clients with an 'other' type of injury showed a greater reduction of cognitive problems.

With regard to overall success ratings, it was found that clients with an 'other' type of injury experienced more success than other clients ($F(2, 50)=3.47$, $p<0.05$). None of the outcome measures was associated with injury localization.

Reg. goal 1: Exploratory analysis of the impact of brain injury related problems on clients' own and their therapists' experience of their working alliance

First, zero-order correlations were computed between the EBIQ sub-scales and the client and therapist WAI scales at programme start. None of the EBIQ sub-scales was significantly related to clients' WAI ratings. Of the therapists' WAI ratings at programme start, the task scale showed to be related to clients' report of somatic problems on the EBIQ somatic sub-scale ($r=0.28$, $n=60$, $p>0.05$). Clients' report of problems with communication (EBIQ communication sub-scale) was correlated

Table II. European Brain Injury Questionnaire (EBIQ) descriptives.

Time point	Statistic	EBIQ scales								
		Somatic	Cognitive	Motivation	Impulsivity	Depression	Isolation	Physical	Communication	Core
Pre prog.	<i>n</i>	76	75	75	75	75	75	75	76	75
	<i>M</i>	1.81	1.81	1.59	1.60	1.67	1.64	1.63	1.70	1.70
	<i>SD</i>	0.36	0.42	0.43	0.37	0.45	0.41	0.40	0.47	0.34
Post prog.	<i>n</i>	71	71	71	71	71	71	71	71	71
	<i>M</i>	1.60	1.66	1.46	1.45	1.44	1.52	1.51	1.50	1.51
	<i>SD</i>	0.35	0.37	0.349	0.33	0.36	0.41	0.35	0.39	0.28
Diff.	<i>n</i>	68	68	68	68	68	68	68	68	68
Pre-post	<i>M</i> [#]	0.21***	0.16***	0.14***	0.15***	0.24***	0.14**	0.12**	0.17***	0.20***
	<i>SD</i>	0.33	0.33	0.32	0.33	0.36	0.42	0.32	0.38	0.27
<i>t</i> -test**	<i>P</i>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001

[#]Positive differences show reduction of subjective problems from pre- to post-programme.

***Pre-post difference is significantly different from 0 at the 0.001 level (2-tailed one-sample *t*-tests).

**Pre-post difference is significantly different from 0 at the 0.01 level (2-tailed one-sample *t*-tests).

with the WAI therapist goal and total scale ($r=0.31$ and $r=0.26$, respectively; $n=61$, $p<0.05$). However, clients' report of problems may be a sign of awareness. Awareness, in turn, has been shown to be related to the therapeutic alliance [16]. Therefore and secondly, the relationship was controlled between experience of problems and the therapeutic alliance for the influence of clients' awareness. All of the bivariate relationships between subjective problems and the working alliance disappeared when the therapists' ratings of clients' awareness of problems and strength at programme start were included in regression analyses together with the single EBIQ scales as independent variables and the single WAI scales as criteria. In other words, the relationship between subjective problems and therapeutic alliance disappeared when the relationship was controlled for clients' awareness.

Reg. goal 2: Investigation of the impact of changes in clients' experience of brain injury related problems on the working alliance

This study compared changes on the EBIQ scales with the WAI ratings at programme completion. It found no significant correlations between EBIQ changes and clients' WAI ratings. However, three EBIQ scales were related to therapists' WAI ratings at t4: Reduction of somatic problems was related to the WAI goal scale ($r=0.28$, $n=65$, $p<0.05$). Improvements in the area of social interactions and personal independence (EBIQ Consequences-scale) were related to all WAI scales (task scale: $r=0.29$,

$p<0.05$; bond scale: $r=0.31$, $p<0.05$; goal scale: $r=0.39$, $p<0.01$; total scale: $r=0.38$, $p<0.01$; all $n=65$). Reductions of communicative problems were related to the WAI goal scale ($r=0.29$, $n=65$, $p<0.05$). Improvements on the EBIQ cognitive scale were not related to the WAI, but—against prediction and as the only EBIQ scale—showed a positive relation to therapists' rating of clients' awareness at programme start ($r=0.28$, $n=56$, $p<0.05$). However, changes in the experience of cognitive problems were unrelated to awareness ratings given at time points 2–4. In other words, good awareness predicted the reduction of cognitive problems rather than that a decline in the experience of cognitive problems was a sign of reduced awareness. A post-hoc analysis revealed that especially the awareness of problems and strength (awareness scale item 1) at programme start was predictive of the reduction of cognitive problems ($r=0.4$, $n=57$, $p<0.01$).

Reg. goal 3: Examination of the impact of the working alliance between client and therapist on subjective outcome

This study computed correlations between clients' WAI bond ratings and changes on the EBIQ depression scale (Table III). Only WAI bond at t3 was associated with a reduction of depressive symptoms ($r=0.33$, $n=53$, $p<0.05$).

Clients' WAI bond ratings were then entered from all four time points as predictors in a

Table III. The emotional bond between client and therapist in relation to subjective changes.

		EBIQ depression scale		Overall success ratings			
		WAI scale		Time point			
		Pre-post		Client		Therapist	
		<i>n</i>	<i>R</i>	<i>n</i>	<i>R</i>	<i>n</i>	<i>R</i>
WAI bond scale client	t1	53	0.03	47	0.19	59	0.09
	t2	56	0.10	49	0.44**	62	0.28*
	t3	53	0.33*	46	0.29*	56	0.16
	t4	57	0.15	53	0.59***	61	0.36**
	Mean t1–t4	54	0.18	49	0.41**	58	0.26*
	All time points as predictors	43	0.68***	40	0.63**	47	0.49*
WAI bond scale therapist	t1	58	0.04	49	0.10	64	0.63***
	t2	64	0.07	52	0.14	75	0.71***
	t3	58	0.03	48	0.32*	67	0.76***
	t4	65	0.09	52	0.25	80	0.73***
	Mean t1–t4	57	0.00	49	0.23	64	0.78***
	All time points as predictors	55	0.11	48	0.41	62	0.79***

***Correlation is significant at the 0.001 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

regression analysis, with EBIQ depression scale changes as the dependent variable. As can be seen in Table III, the amount of variance explained by the regression was higher than could be expected from the single predictors' correlations with the dependent variable ($R=0.68$, $p < 0.001$). The regression equation was as follows (standardized regression coefficients are shown):

$$\begin{aligned} \text{EBIQ depr. Change} = & -0.71 * \text{WAI client bond t1} \\ & + 0.88 * \text{WAI client bond t2} + 1.1 * \text{WAI} \\ & \text{client bond t3} - 1.1 * \text{WAI client bond t4} \end{aligned}$$

In other words, the emotional bond ratings at t1 and t4, despite not showing significant zero-order correlations with the dependent variable, were negatively related to the reduction of depression symptoms, while the positive relationship between emotional bond at t3 and the dependent variable got stronger as compared to the zero-order correlation. Bivariate and multivariate descriptive analyses showed that this effect was not due to outliers or skewed distributions. The above equation fits well to the description of a classical suppression relationship given in Cohen and Cohen ([31], pp. 87–89). The negative regression coefficients of the WAI bond client scales at t1 and t4 in the absence of zero-order correlations with the dependent variable show that these predictors are suppressor variables. In other words, they suppress variance in the predictors WAI bond client t2 and WAI bond client t3 that is not explained by these predictors' relation to the dependent variable (the zero-order correlations of the emotional bond scales at t2/t3 with the bond scales at t1/t4 are between $r=0.62$ and $r=0.84$, all $p < 0.001$). Thereby, the relationship between WAI bond client at t2 and t3 and EBIQ depression changes gets strengthened. The result should be interpreted as follows: while clients' experience of a good emotional bond with their therapist at programme start and end is unrelated (not negatively related) to changes in depressive symptoms, clients' experience of a good emotional bond with their therapist mid-therapy (t2 and t3) is positively related to a reduction of depressive symptoms from pre- to post-programme.

To examine if the relation between clients' WAI bond scales and the reduction of depressive symptoms was mediated by their compliance, as a first step the correlations between therapists' compliance ratings were computed at the four time points and changes on the EBIQ depression scale. No significant association was found. A further examination of compliance as a mediator variable was therefore not necessary.

Next, the relationship between clients' WAI bond scales and clients' overall success ratings

was examined. Apart from WAI bond at t1, all WAI bond client scales, also the mean over all time points, were correlated with clients' success ratings (see Table III). The WAI bond client scales were then entered from all four time points simultaneously in a regression analysis with clients' overall success ratings as the dependent variable. The overall result was significant ($R=0.63$, $n=40$, $p < 0.01$; see Table III). However, only clients' WAI bond ratings at programme end (t4) added significantly to the prediction of clients' overall success ratings, while the other regression coefficients were not significant. A very similar picture was found when relating clients' WAI bond ratings to therapists' overall success ratings (see Table III). When all four WAI bond client ratings were entered into the regression analysis, only WAI bond client t4 added significantly to the prediction of therapists' overall success ratings.

Finally, the association between therapists' WAI bond ratings and the outcome measures was examined (see Table III). The WAI therapist bond scales were not related to changes of depressive symptoms. While only therapists' WAI bond ratings at t3 were related to clients' overall success ratings, all of the therapists' WAI bond ratings were strongly related to therapists' own overall success ratings. However, when all therapists' WAI bond ratings were entered as predictors into a regression analysis, again only WAI bond at t4 added significantly to the prediction of therapists' overall success ratings.

Reg. goal 4: Investigation of the relationship between compliance and subjective outcome

Bivariate correlations were computed between the compliance ratings on the four time points and the outcome measures. Improvements on the EBIQ cognitive scale were related to compliance ratings at t1 ($r=0.33$, $n=45$, $p < 0.05$). Improvements on the EBIQ consequences scale were related to compliance ratings at t1 ($r=0.36$, $n=45$, $p < 0.05$) and to the compliance ratings averaged above all time points ($r=0.31$, $n=46$, $p < 0.05$). One then computed a series of regression analyses. Therapists' compliance ratings were entered as the dependent variable, while all nine EBIQ scales were simultaneously entered as predictors. Again, only compliance rated early in therapy and the compliance scores averaged over all time points were related to changes on the EBIQ scales (see Table IV). Finally, correlations were computed between the compliance ratings and clients' and therapists' overall success ratings. Compliance ratings on all time points predicted the therapists' overall success ratings. However, compliance was not related to clients' overall success ratings (Table IV).

Table IV. Regression analysis: the relationship between compliance and subjective success.[#]

Compliance scale: time point	All EBIQ		Overall success ratings			
	Scales pre-post		Client		Therapist	
	<i>n</i>	<i>R</i>	<i>n</i>	<i>R</i>	<i>n</i>	<i>R</i>
t1	45	0.65*	40	0.16	49	0.67***
t2	51	0.40	41	0.03	59	0.61***
t3	43	0.51	36	0.21	49	0.75***
t4	65	0.31	52	0.11	80	0.65***
Mean t1-t4	46	0.60*	41	0.15	50	0.76***

[#]The compliance scales were entered into the regression analysis as the dependent variable one at a time, the EBIQ scales were entered as the independent variables.

***Correlation is significant at the 0.001 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Reg. goal 5: Examination of the relationship between changes in clients' awareness and subjective outcome

The associations between pre-post changes in awareness and pre-post changes on the EBIQ depression scale were examined and a correlation found between pre-post changes in awareness and pre-post changes on the EBIQ depression scale of $r = -0.27$ ($n = 56$, $p < 0.05$), so that improved awareness lead to increased depression. To examine whether this relationship was moderated by severity of injury, the clients were divided into four groups of equal size on the basis of the length of their hospitalization. Longer hospitalization was not related to a closer association between changes in awareness and changes of depressive symptoms. This was true both for the total awareness scale and the single awareness items (awareness of problems and strength, social and work-related consequences and ability to set realistic goals).

Discussion

Methodological considerations

It is clear that, from the limited information concerning injury localization available in this study, only approximate indications could be obtained of how the localization of an injury can affect the process of rehabilitation. Future studies addressing the relationship between brain injury and the therapeutic process would need to employ more detailed measures of injury localization. Potential problems with the use of the length of clients' hospitalization as a measure of severity of injury are described elsewhere [32–34].

With regard to process measures, this study has not examined the validity and the inter-rater reliability of the awareness- and the compliance-measures developed. Some uncertainty arises

therefore as to what these instruments actually do measure.

With regard to the outcome measures in the present study, only the EBIQ depression scale and clients' global success ratings were used. A future study on the relationship between process and outcome should include a wider range of outcome measures, the choice of measures based on a model of the therapeutic process. For example, a good emotional bond between client and therapist may lead to a feeling of being accepted in the clients, fostering clients' own acceptance of their changed identity and life circumstances. This, in turn, might reduce depressive symptoms and clients' success ratings. Therefore, in a future study on the impact of the therapeutic alliance, it would be interesting to include a measure of clients' acceptance of their injury and its consequences.

Finally, it is recognized that this sample was relatively small and that regression coefficients vary between samples drawn from the same population. The following discussion should be seen in the light of these methodological limitations.

Reg. goal 1: Exploratory analysis of the impact of brain injury related problems on clients' own and their therapists' experience of their working alliance

In this study, clients' experience of brain injury related problems only had a significant impact on the therapeutic alliance if this experience was a sign of (un-)awareness. This implies that a good working alliance can be created with both clients who experience many problems and clients who experience comparatively few problems, as long as they are aware of the consequences of their brain injury. It would be interesting to see if this is also true if brain injury related problems are measured by means of functional tests: on the basis of clinical experience, one would expect tests of executive functions

and impulsivity (and also measures of emotional regulation) to be related to the therapeutic alliance, as clients scoring low on such tests frequently are experienced as being more difficult to work with. However, the finding that a good working alliance can be achieved also in clients experiencing serious brain injury related problems is in line with a previous finding that clients' brain injury only has an impact on the therapeutic alliance at programme start [16]. Other factors seem to be important for a good working alliance later in therapy. Previous results based on the sample included in the current study indicate for example a link between clients' awareness and the therapeutic alliance. An interaction between awareness and the therapeutic alliance is likely. On the one hand, a good alliance can form a framework within which the client can confront him- or herself with his/her problems. On the other hand, clients' awareness can have an impact on the therapeutic alliance if they are unwilling to address their problems. Interventions aiming at clients' awareness are therefore likely to have an impact on the therapeutic alliance. If, for instance, the therapist is confronting the client with his/her problems, this may lead to a more realistic appraisal of his/her situation by the client and thereby make the therapeutic work more effective. However, confronting the client with his/her problems may also cause a catastrophic reaction or defensive behaviour to avoid such a reaction. If either of these should happen, the confrontation may put a heavy burden on the therapeutic alliance. One, therefore, argues that (1) a 'good enough' working alliance should be the basis for interventions on clients' awareness, (2) problems that the client is unaware of should be addressed in a dialogue and in a very practical manner, so that hypotheses about the client's competencies are tested in collaborative work and at a pace that is manageable for the client and (3) a long-term goal is set that gives the client a perspective in life. Whether the long-term goal is realistic or whether it needs to be adjusted should be tested step-by-step during therapy.

Reg. goal 2: Investigation of the impact of changes in clients' experience of brain injury related problems on the working alliance

The findings that clients' experience of a reduction of subjective problems did not have a positive impact on their view of their therapeutic alliance did not support the hypothesis. It was found, however, interesting that the therapist's experience of a good working alliance was influenced by the client's experience of success. This finding is interpreted as follows: When the therapist could sense that the client experienced success, then the therapist felt

satisfaction with the collaborative work and rated the working alliance as being positive. It was found surprising that one could not find this link between the experience of success and a positive view on the working alliance from the clients' perspective. The result is however consistent with a previous finding that clients and therapists in the present sample seem to have different views of their alliance [16]. The present finding indicates that these different views of the alliance are influenced by different factors. An important direction for future research will be to investigate which factors these are (e.g. the role of therapist's attitude towards the client) and how they can be influenced to be able to provide evidence-based guidelines for interventions addressing the positive development of the working alliance.

The finding that clients' experience of a reduction of cognitive problems from pre- to post- programme did not influence the working alliance was in line with the hypothesis that such a reduction in some clients would be a sign of a lack of awareness rather than a real therapeutic gain. One would not expect a lack of awareness to be associated with a good working alliance.

However, one would expect that the experience of a reduction of cognitive problems in many clients is the consequence of real therapeutic success. Furthermore, clinical experience tells that such a therapeutic success is easier to gain if the clients are aware of their problems. The finding that good awareness at programme was associated with a reduction of cognitive problems over time fits well to this clinical experience and underlines once again the importance of clients' awareness for the process of rehabilitation. Future studies should examine in more detail how clients' awareness influences their rating of cognitive problems and changes in this experience.

Reg. goal 3: Examination of the impact of the working alliance between client and therapist on subjective outcome

The finding that the emotional bond between client and therapist in mid-therapy is predictive for changes in clients' mood is understandable: it is in this phase of therapy that difficult topics are addressed and worked through. This may be much easier if a good-enough working alliance could be created that allows clients to open up and confront themselves with difficult topics. A good emotional bond may also provide the foundation that allows the therapist to confront the client with the consequences of the brain injury for his or her future life and may also help the client to accept these consequences. The finding that the

relationship between emotional bond and emotional changes was a direct one, not mediated by clients' compliance, is consistent with this assumption.

The finding that the emotional bond early in therapy is unrelated to improvement of depressive symptoms could mean that it is not important how the alliance starts out as long as it develops in a positive direction. This is encouraging, because it means that there is time for the therapeutic alliance to develop. It does not have to be perfect from day 1. On the other hand, the finding that also the working alliance at programme end is unrelated to changes of depressive symptoms shows again the importance of a good working alliance in the middle phase of therapy. The amount of time available is usually limited in rehabilitation and, if a good alliance only becomes established towards the end of therapy, less can be achieved, at least in terms of emotional changes pre- to post-programme. However, it was found that both clients' and therapists' overall success ratings at programme end were related to their emotional bond at programme end. It would be interesting to investigate how success ratings develop through the process of rehabilitation in a possible interaction with the working alliance. At this point, all one can say is that an experience of overall success is related to one's experience of a good emotional bond. This leads to the question of whether one should consider a good working alliance as a positive outcome of brain injury rehabilitation in itself. The clients at the CRBI frequently report that the positive social contacts they had experienced during their rehabilitation were amongst their most important experiences. In this instance, as elsewhere, one possibly should listen to and learn from the clients. Brain injury rehabilitation is not only about retraining, compensation and adaptation. It is also always a process unfolding between people and this inter-personal process has an intrinsic value. There are many good reasons to give this process time and resources to unfold.

Reg. goal 4: Investigation of the relationship between compliance and subjective outcome

The finding that early-therapy compliance and the average amount of compliance are predictive of subjective improvement is in agreement with the hypothesis and with the philosophy of the CRBI. Compliance as defined in the present study is more than the willingness to follow the therapist's advice. It is also clients' active engagement in rehabilitation. The CRBI's philosophy is that, in order to achieve a good outcome, it is important for the clients to engage themselves throughout rehabilitation and to take responsibility for their own treatment. One is here not talking about mood changes as one did in

relation to the emotional bond between client and therapist. The compliance ratings were mostly related to cognitive improvement and changes in social interactions and personal independence. In the post-acute phase, such improvements are much more likely to happen if the client is willing to take responsibility and to practice, both within and outside the rehabilitation programme. As could be shown in a prior study based on the same sample [16], clients' active engagement is linked to the quality of the therapeutic alliance and clients' awareness. Again, it is argued that it is important to set long-term goals which motivate the clients and thereby foster their engagement.

Reg. goal 5: Examination of the relationship between changes in clients' awareness and subjective outcome

The finding that an increase of awareness leads to an increase of depressive symptoms shows the ambivalent role awareness has for clients: On the one hand, clinical experience and research findings show that awareness is necessary to obtain treatment success. On the other hand, it can be an emotional strain for the clients to become aware of the consequences of their brain injury. These findings indicate that this can both be the case for clients with more and less severe brain injuries. However, the present sample has a restricted range in this respect, because very mildly and very severely injured patients were not included.

For the consideration of how to resolve the dilemma of awareness being both necessary in rehabilitation and an emotional burden, it might again be helpful to see brain injury rehabilitation as a developing inter-personal process. The process of becoming aware of one's injury and its consequences may be easier in the framework of a trusting and continuous client-practitioner relationship in which the client feels safe and can accept guidance by the therapist while learning to understand the brain injury and its consequences.

Conclusion

In this study, working alliance, awareness and compliance all had an impact on clients' and therapists' experience of therapeutic success. The relationships between process and outcome were influenced by the time point of measurement of the process variables. The findings therefore indicate that brain injury rehabilitation should not be seen as a purely technical process with the aim of training the clients as much as possible, but rather as a process which develops between clients and therapists. The results also suggest that the development of a good working alliance is important.

It seems to be of significance that not only the therapist, but especially the client experiences a good therapeutic alliance.

As could be seen in a prior study, clients and therapists seem to have a different view of their alliance [16], that is therapists cannot necessarily tell the clients' experience of the quality of their working alliance from their own view of it. Therefore, in order to understand the client's experience of a good working alliance, it is argued that the therapist needs to enter the client's phenomenological field or, in other words, to try to see the therapeutic situation from the clients' perspective. Doing so implies also that the therapist tries to understand not only specific cognitive, physical or other functions of the client, but the person as a whole in his or her environment. This study is thus arguing for a holistic rehabilitation setting with a phenomenological approach.

However, one is aware of the methodological limitations of the study. Further research, employing more detailed measures of injury localization and severity and of clients' compliance, awareness and emotional status would be desirable. Future studies should also investigate in more detail which interventions are suitable to foster the working alliance, clients' awareness and their compliance in different phases of treatment. It should also be examined how clients' cognitive status, both clients' and therapists' personality as well as the therapists' attitude towards the clients influences the therapeutic process. Such studies would profit from incorporating a broader spectrum of measures relevant for the therapeutic process and outcome, such as clients' self-efficacy and outcome expectancies and measures of acceptance, adaptation and coping behaviour.

Acknowledgement

This work was in part supported by grants to the first author from the German Academic Exchange Service (DAAD) and the Danish Centre for International Cooperation and Mobility in Education and Training fellowship (CIRIUS).

References

1. Masson F, Maurette P, Salmi LR, Dartigues JF, Vecsey J, Destailhats JM, Erny P. Prevalence of impairments 5 years after a head injury, and their relationship with disabilities and outcome. *Brain Injury* 1996;10:487-497.
2. Thomsen IV. Review: Late psychosocial outcome in severe blunt head trauma. *Brain Injury* 1987;1:131-143.
3. Malec JF, Basford JS. Postacute brain injury rehabilitation. *Archives of Physical Medicine and Rehabilitation* 1996;77:198-207.
4. Ben-Yishay Y, Silver SM, Piaetsky E, Rattock J. Relationship between employability and vocational outcome after intensive holistic cognitive rehabilitation. *Journal of Head Trauma Rehabilitation* 1987;2:33-43.
5. Christensen A-L, Pinner EM, Pedersen PM, Teasdale TW, Trexler LE. Psychosocial outcome following individualized neuropsychological rehabilitation of brain-damage. *Acta Neurologica Scandinavica* 1992;85:32-38.
6. Prigatano GP, Klonoff PS, O'Brien KP, Altman IM, Amin K, Chiapello D. Productivity after neuropsychologically oriented milieu rehabilitation. *Journal of Head Trauma Rehabilitation* 1994;9:91-102.
7. Bordin ES. The generalizability of the psychoanalytic concept of the working alliance. *Psychotherapy: Theory, Research and Practice* 1979;16:252-260.
8. Lambert MJ, Barley DE. Research summary on the therapeutic relationship and psychotherapy outcome. In: Norcross JC, editor. *Psychotherapy relationships that work: Therapist contributions and responsiveness to patients*. New York: Oxford University Press; 2002. pp 17-32.
9. Constantino MJ, Castonguay LG, Schut AJ. The working alliance: A flagship for the 'scientist-practitioner' model in psychotherapy. In: Tryon GS, editor. *Counseling Based on Process Research: Applying What We Know*. Boston, MA: Allyn & Bacon; 2002. pp 81-131.
10. Horvath AO, Symonds BD. Relation between working alliance and outcome in psychotherapy—a metaanalysis. *Journal of Counseling Psychology* 1991;38:139-149.
11. Martin DJ, Garske JP, Davis MK. Relation of the therapeutic alliance with outcome and other variables: A meta-analytic review. *Journal of Consulting and Clinical Psychology* 2000;68:438-450.
12. Klonoff PS, Lamb DG, Henderson SW. Outcomes from milieu-based neurorehabilitation at up to 11 years post-discharge. *Brain Injury* 2001;15:413-428.
13. Schönberger M, Humle F, Zeeman P, Teasdale TW. Working alliance and patient compliance in brain injury rehabilitation and their relation to psychosocial outcome. *Neuropsychological Rehabilitation* 2005;16:298-314.
14. Bieman-Copland S, Dywan J. Achieving rehabilitative gains in anosognosia after TBI. *Brain and Cognition* 2000;44:1-5.
15. Klonoff PS, Lamb DG, Henderson SW, Shepherd J. Outcome assessment after milieu-oriented rehabilitation: New considerations. *Archives of Physical Medicine and Rehabilitation* 1998;79:684-690.
16. Schönberger M, Humle F, Teasdale TW. The development of the therapeutic working alliance, patients' awareness and their compliance during the process of brain injury rehabilitation. *Brain Injury* 2005;20:445-454.
17. Trahan E, Pepin M, Hopps S. Impaired awareness of deficits and treatment adherence among people with traumatic brain injury or spinal cord injury. *Journal of Head Trauma Rehabilitation* 2006;21:226-235.
18. Schönberger M, Humle F, Zeeman P, Teasdale TW. Patient compliance in brain injury rehabilitation in relation to awareness and cognitive and physical improvement. *Neuropsychological Rehabilitation* 2005;16:561-578.
19. Fleming J, Strong J. Self-awareness of deficits following acquired brain injury: Considerations for rehabilitation. *British Journal of Occupational Therapy* 1995;98:55-60.
20. Fleming JM, Ownsworth T. A review of awareness interventions in brain injury rehabilitation. *Neuropsychological Rehabilitation* 2006;16:474-500.
21. Rogers CR. 'Client-centered' psychotherapy. *Scientific-American* 1952;187:66-74.

22. Henry WP, Strupp HH. The therapeutic alliance as interpersonal process. In: Horvath AO, Greenberg LS, editors. *The working alliance: Theory, research and practice*. New York: Wiley; 1994. pp 51–84.
23. Caetano C, Christensen A-L. The CRBI at the University of Copenhagen: A participant-therapist perspective. In: Uzzell BP, Christensen AL, editors. *International handbook of neuropsychological rehabilitation*. Dordrecht: Kluwer; 2000. pp 259–271.
24. Christensen A-L, Caetano C. Neuropsychological rehabilitation in the interdisciplinary team: The post-acute stage. In: Stuss DT, Winour G, Robertson IH, editors. *Cognitive neurorehabilitation: A comprehensive approach*. New York: Cambridge University Press; 1999. pp 188–200.
25. Tracey TJ, Kokotovic AM. Factor structure of the working alliance inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology* 1989;1: 207–210.
26. Horvath AO, Greenberg LS. Development and validation of the working alliance inventory. *Journal of Counseling Psychology* 1989;36:223–233.
27. Fleming JM, Strong J, Ashton R. Self-awareness of deficits in adults with traumatic brain injury: How best to measure? *Brain Injury* 1996;10:1–15.
28. Ezrachi O, Ben-Yishay Y, Kay T, Diller L, Rattok J. Predicting employment in traumatic brain injury following neuropsychological rehabilitation. *Journal of Head Trauma Rehabilitation* 1991;6:71–84.
29. Teasdale TW, Christensen A-L, Willmes K, Deloche G, Braga L, Stachowiak F, Vendrell JM, CastroCaldas A, Laaksonen RK, Leclercq M. Subjective experience in brain-injured patients and their close relatives: A European brain injury questionnaire study. *Brain Injury* 1997;11: 543–563.
30. Svendsen HA, Teasdale TW, Pinner M. Subjective experience in patients with brain injury and their close relatives before and after a rehabilitation programme. *Neuropsychological Rehabilitation* 2004;14:495–515.
31. Cohen J, Cohen P. *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum; 1975.
32. Tennant A, Macdermott N, Neary D. The long-term outcome of head-injury—implications for service planning. *Brain Injury* 1995;9:595–605.
33. Jennett B. Assessment of severity of head-injury. *Journal of Neurology Neurosurgery and Psychiatry* 1976;39:647–655.
34. Jennett B. Epidemiology of head injury. *Journal of Neurology Neurosurgery and Psychiatry* 1996;60:362–369.