

ASSOCIATIONS BETWEEN THERAPEUTIC WORKING ALLIANCE AND SOCIAL COGNITION IN NEURO-REHABILITATION

ASOCIACIONES ENTRE LA ALIANZA TERAPÉUTICA DE TRABAJO Y LA COGNICIÓN SOCIAL EN LA NEURO-REHABILITACIÓN

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The aim of this study was to investigate the impact of brain injury survivors' social cognition abilities on their working alliance with their therapist. Participants in this study were individuals who were enrolled in a vocational rehabilitation programme for acquired brain injury. Seventy-two individuals with complicated mild to severe acquired brain injury (49% TBI, 38% stroke, 14% other injury; mean age 44.9 years; 75% male) entered in the study between 1.5 and 31 years after their injury (Md=5 years). The therapeutic alliance was rated retrospectively at the time of study by the participants' primary therapists on the Working Alliance Inventory (WAI). Social cognition measures (Reading the Mind in the Eyes Test, Recognition of Faux Pas Test, The Awareness of Social Inference Test, TASIT; Social Situations Task, Bangor Gambling Task) were administered as well as a standard neuropsychological test battery and the Hospital Anxiety and Depression Scale. Multilevel analyses revealed that both the TASIT and the Social Situations Task, but neither the standard neuropsychological tests nor the HADS were significantly related to WAI ratings. These findings indicate the impact that difficulties with emotions recognition and social rule violations can have on the formation of a therapeutic alliance.

Keywords: Therapeutic working alliance; social cognition; emotion recognition; brain injury; rehabilitation

El objetivo de este estudio fue investigar el impacto de las habilidades de cognición social de los supervivientes de lesiones cerebrales en su alianza de trabajo con su terapeuta. Los participantes en este estudio fueron individuos que se inscribieron en un programa de rehabilitación profesional para la lesión cerebral adquirida. Setenta y dos individuos con lesión cerebral adquirida complicada de leve a grave (49% TBI, 38% accidente cerebrovascular, 14% otra lesión; media edad 44,9 años; 75% hombres) entraron en el estudio entre 1,5 y 31 años después de su lesión (MD=5 años). La alianza terapéutica fue calificada retrospectivamente por los terapeutas principales de los participantes con el Working Alliance Inventory (WAI). Se administraron medidas de cognición social (Reading the Mind in the Eyes Test, Recognition of Faux Pas Test, The Awareness of Social Inference Test, TASIT; Social Situations Task, Bangor Gambling Task), así como una batería de pruebas neuropsicológicas estándar y la escala de ansiedad y depresión hospitalaria (Hospital Anxiety and Depression Scale). Los análisis multinivel revelaron que tanto TASIT como Social Situations Task, estaban significativamente relacionados con las calificaciones de WAI. Estos resultados indican el impacto que las dificultades en el reconocimiento de las emociones y las violaciones de las reglas sociales pueden tener en la formación de una alianza terapéutica.

Palabras claves: alianza terapéutica de trabajo, cognición social, reconocimiento de emociones, lesión cerebral, rehabilitación

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A strong working alliance (also called therapeutic alliance) is commonly regarded an important aspect of successful therapeutic process in various clinical settings (Henry, Strupp, Horvath, & Greenberg, 1994). Its impact on therapy outcome has been confirmed in a large number of studies as well as in several meta-analyses (Fluckiger, Del Re, Wampold, Symonds, & Horvath, 2012; Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000). Following the definition of Bordin (1979), a strong working alliance is characterised by a strong emotional bond between client and therapist, agreement between client and therapist regarding the goals to be achieved during therapy, as well as effective work on certain tasks in order to achieve these goals.

In the context of brain injury rehabilitation, several studies have consistently demonstrated the importance of a good working alliance for a successful outcome (for a review, see Stagg, Douglas, & Iacono, 2017). Good working alliances with between individuals with acquired brain injury and rehabilitation professionals have been reported to be related to better participation outcomes in terms of work/school (Klonoff, Lamb, & Henderson, 2001; Prigatano et al., 1994; Schönberger, Humle, Zeeman, & Teasdale, 2006b; Sherer et al., 2007) and driving (Klonoff et al., 2010) outcomes as well as reduced emotional distress (Evans et al., 2008; Schönberger, Humle, & Teasdale, 2006b). The working alliance also affects other variables that are of importance for a successful rehabilitation (Schönberger, Humle, Zeeman, & Teasdale, 2006a), namely brain injury survivors' awareness as well as their engagement in the rehabilitation process (Schönberger, Humle, & Teasdale, 2006a; Schönberger, Humle, Zeeman, et al., 2006b).

Outside of the rehabilitation setting, it is acknowledged that social relationships of all kinds are widely strained by the enduring impact of acquired brain injury. These include romantic relationships (Gervasio & Kreutzer, 1997; Godwin, Kreutzer, Arango-Lasprilla, & Lehan, 2011), relationships with parents (Anderson et al., 2009), siblings and child relatives of adult brain injury survivors (Daisley & Webster, 2009; Niemela et al., 2014). Furthermore, difficulties in friendships (Salas, Casassus, Rowlands, Pimm, & Flanagan, 2016) and wider community relationships are evident, with social isolation for survivors being an increasingly likely outcome as time progresses post-injury (Elsass & Kinsella, 1987). Loss of work roles, demotion and unemployment post-injury have been linked to difficulties in relationships with work colleagues (Yeates et al., 2016). Cognitive, behavioural, and mood

changes post-injury have been shown to have a negative influence on family relationships (Ponsford & Schönberger, 2010; Schönberger, Ponsford, Olver, & Ponsford, 2010).

If social relationship breakdown is so widespread and pervasive post-injury, then relationships with clinicians in the rehabilitation settings are unlikely to be immune to the same influences and processes. In particular, therapeutic working alliances with clinicians in those brain injury services who support survivors over long periods of time are likely to be most compromised by the same injury-related challenges that impact on the long-term personal relationships described above. Lewis (1999) has described challenging relationship dynamics between survivors and clinicians, including powerful emotional responses from clinicians themselves. Yeates and colleagues (2008) presented two case studies of psychotherapy with brain injury survivors with executive difficulties, to show how the management of the therapeutic relationship was central to clinical progress.

Few researchers have investigated direct influences of survivor variables on therapeutic working alliance with clinicians in neuro-rehabilitation. In a qualitative study by Judd & Wilson (2005), therapists reported that the formation of a working alliance in brain injury rehabilitation is often complicated by survivors' cognitive deficits, such as slowed information processing speed or forgetting therapeutic commitments. One quantitative study could only partly confirm these findings. In their longitudinal study, measures of attention, memory as well as executive functioning were related to the working alliance between clients and therapists (Schönberger, Humle, & Teasdale, 2007). However, the associations were weak. The authors suggest that the latter was due to the fact that the therapists were trained in dealing with their clients' cognitive profile. Moreover, the study was limited to measures of participants' attentional, memory and executive functioning. Rowlands, Coetzer and Turnbull (2020) found survivor working and episodic memory to be predictors of engagement in a group psychoeducation programme. However no other cognitive functioning variable predicted therapeutic working alliance or engagement. Predictors of working alliance identified in this study were survivor years of education and levels of depressive symptomatology at the time of data collection. Zelencich and colleagues (2020) found time post-injury (but no other survivor demographic or cognitive variable) to be predictive of engagement in a cognitive-behavioural therapy intervention within neuro-rehabilitation.

Recent research has indeed highlighted the particular influence of survivor social cognition difficulties on social relationships of different kinds, such as romantic relationships (Blonder, Pettigrew, & Kryscio, 2012), community integration (Struchen, Pappadis, Sander, Burrows, & Myszka, 2011) and relationships with work colleagues (G. N. Yeates et al., 2016). Social cognition refers to abilities directly related to socially-interactive processes between people, and includes a range of diverse functions mediated by distributed neuro-anatomical networks (Frith & Wolpert, 2004). Functions of this kind that are shown to be commonly impaired in survivors of acquired brain injury include mentalising/theory of mind (Channon & Crawford, 2000), sarcasm detection (Channon, Pellijeff, & Rule, 2005) and other forms of social inference (McDonald, Flanagan, Rollins, & Kinch, 2003), emotion recognition (Hornak et al., 2003), social judgment, social decision-making and problem-solving (Blair & Cipolotti, 2000), and interoceptive-based decision-making (Bechara, Damasio, Damasio, & Anderson, 1994). These deficits have been demonstrated in the major subgroups of acquired brain injury, such as traumatic brain injury, stroke, hypoxia, infection and post-tumour resection (for a review, see G.N. Yeates, 2013).

Given the impact of social cognition impairments on social relationships, it could be argued that survivor abilities in social cognition are more likely to be strongly associated with clinician ratings of therapeutic working alliance, than other domains of cognition explored in the few aforementioned studies of Therapeutic Working Alliance in neuro-rehabilitation (none of which have measured survivor social cognition to our knowledge). If this was demonstrated to be the case, such findings would highlight survivor social cognition difficulties as not only clinically-significant foci for rehabilitation, but also a central consideration to the optimisation of the rehabilitation process itself. That is, the management of social cognition difficulties and improved communication/social interactions between clinicians and survivors may improve their therapeutic working alliance. This in turn may ultimately improve rehabilitation outcome.

STUDY AIMS AND HYPOTHESES

The aim of the current study was to investigate relationships between the therapeutic working alliance in brain injury rehabilitation and key social cognition abilities (emotion recognition, mentalising, social inference, social judgment-making and emotion-based decision-making).

Based on the existing literature on the impact of social cognition on social relationships as well as the authors' clinical experience, we hypothesized low levels of social cognition skills to have a negative impact on the working alliances between participants and their primary therapist. We also examined whether the strength of the working alliance was specifically related to social cognition skills, or whether it was also associated with other neuropsychological functions. Regarding this latter study aim, based on previous results discussed above, only weak or no associations were expected between working alliance and other neuropsychological functions.

METHODS

Design and participants

This is one of a series of studies investigating survivor social cognition as predictors of differing interpersonal relationships (the *Social Cognition, So What?* research programme, also see Yeates et al., 2016). Participants in this study were working-age individuals (16 years +) who were enrolled in three UK community and vocational rehabilitation programmes for acquired brain injury (traumatic brain injury, ischaemic and haemorrhagic stroke, infections, hypoxia, post-tumour resection). These services were the Community Head Injury Service, Aylesbury, and Momentum Skills in Birmingham and Newcastle. To be eligible for these services, all participants were not presenting with gross behavioural difficulties (e.g., aggression, extreme socially- and sexually-disinhibited behaviour), although many did exhibit subtle interpersonal difficulties, all were independent in activities of daily living, and any communication difficulties were amenable to compensatory support to permit the participation within the rehabilitation programmes. For the purpose of this study, an additional exclusion criterion was a reading difficulty that would impede the comprehension of the written content in the neuropsychological tests and questionnaires.

Participants' emotion recognition skills as well as their understanding of social situations were assessed at the beginning of their rehabilitation. Their working alliance with their primary therapist was rated retrospectively by the respective therapist at the time of conduct of this study. By profession, the therapists were clinical neuropsychologists, occupational therapists/occupational therapist technicians, vocational consultants, psychology assistants or nurses, all of whom had worked with participants for a minimum of six

months, up to 5 years, often alongside other staff members within an interdisciplinary service structure. Raters were aware that the study was investigating the influence of survivor neuropsychological functioning on the therapeutic working relationship, but not aware of which domains of cognition were of particular interest to the investigators.

Seventy-two individuals with acquired brain injury entered the study, the majority of them men. Participants' demographic and injury-related characteristics are displayed in Table 1. Their age followed a symmetric, unimodal distribution with a wide range (19-68 years). Individuals had sustained their injury between one and a half and 31 years earlier, with half the sample being within the first five years post-injury and 75% within eight years post-injury. Most of the participants had had either a traumatic brain injury (TBI) or a stroke, while the remaining injuries included hypoxia, infection, brain tumour as well as other injuries. Information regarding injury severity was not consistently available for all participants (34 records of duration of post-traumatic amnesia (PTA), 24 records of GCS). The existing data is in agreement with the clinical picture, namely a wide range of injury severity from complicated mild (persisting difficulties over one year, with significant co-morbid executive dysfunction) to very severe. Eligibility for the three participating clinical services was based on a complicated mild to severe brain injury where this could be assessed, although specific GCS and PTA scores were not available for all participants, nor applicable to non-TBI forms of acquired brain injury. Twenty-four percent of the sample self-reported in a demographics questionnaire that they had experienced depression, anxiety or another form of mental health problem prior to their injury. This study received full ethical approval from the local NHS ethics committee (NRES Oxfordshire REC B) and research and governance body (Buckinghamshire Healthcare NHS Trust R&D committee).

Measures

Primary Outcome Measure: Working Alliance Inventory (WAI)

The WAI (Horvath & Greenberg, 1989) has been developed for and has been frequently used in the context of psychotherapy research. It is based on Bordin's (1979) theory of working alliance and comprises three subscales: The Bond subscale assesses the strength of emotional bond between client and therapist. The Goal scale measures the extent of clients' and therapists' agreement regarding the goals to be achieved during therapy. The Task scale assesses

how effectively client and therapist work on certain tasks in order to achieve their goals. Each subscale comprises 12 items, rated on a seven-point Likert scale ranging from one ("Never") to seven ("Always"). Item scores are added up in order to compute subscale scores, as well as a Total score. In the current study, the WAI therapist version was administered to the participants' primary therapist. In the context of brain injury rehabilitation, the WAI scales have been shown to have good internal consistency (for WAI Total Therapist scale: Cronbach's $\alpha=.86$, retest reliability $r=.75$; (Schönberger, Humle, & Teasdale, 2006a).

Survivor Mood: Survivor emotional functioning was assessed using a self-report questionnaires of anxiety and depression (Hospital Anxiety & Depression Scale, HADS; Zigmond & Snaith, 1983) that has been validated for the brain injury population (Schönberger & Ponsford, 2010; Whelan-Goodinson, Ponsford, & Schönberger, 2009).

Tests of social cognition: Measures included tests of mentalising/theory of mind, the ability to infer the intentions and perspectives of others. These measures were based on two types of stimuli, static visual stimuli and story vignettes. In the Reading the Mind in the Eyes Test (Baron-Cohen et al., 2001), participants are required to identify the correct mental state (e.g., despondent) from a selection of four to match to a photograph of a human face restricted to the eye area. Scores range from 0-36.

The Recognition of Faux Pas Test (Baron-Cohen et al., 1999) involves twenty written vignettes of social interactions, ten of which involve the occurrence of an unintentional faux pas that potentially offends a character. Each vignette has four questions that test mentalising abilities, with answers either being scored as incorrect (=0) or correct (=1; total score range 0-40). In addition, one control question assesses working memory and comprehension (score range 0-20). In our study, the standard total score out of 40 for the 10 faux pas stories was used.

Mentalising has been identified as an essential component of wider forms of social inference, such as the detection of differing forms of sarcasm, sincerity and deceit. These abilities were tested using the video social scenario stimuli in parts 2 and 3 from The Awareness of Social Inference Test (TASIT; McDonald et al., 2003). In response to yes/no questions, correct scores range from 0-20 for detection of expressions of Sincerity, Deceit and Sarcasm.

Additional social cognition abilities tested included video-based assessment of emotion recognition,

Table 1: Participants' demographic and injury-related characteristics

		N (%)
Sex	Male	54 (75)
	Female	18 (25)
Injury type	Traumatic brain injury	35 (49)
	Stroke	27 (38)
	Other	10 (14)
Pre-injury mental health issues	None	48 (76)
	Anxiety/depression	11 (17)
	Other	4 (6)
		Mean (SD), Median, Range
Age (years)		44.9 (11.0), 45, 19-68
Time since injury (years)		6.9 (6.5), 5, 1.5-31.3

operationalising the six basic emotions (happiness, surprise, sadness, anger, anxiety, disgust/revulsion, plus neutral expressions) and also yielding total scores for positive versus negative emotion recognition (Emotion Evaluation Test, Part 1 of the TASIT; McDonald et al., 2003). Emotion-matching scores range from 0-4 for each emotion (happiness, surprise, neutral, anger, anxiety, sadness, disgust).

In addition we used a vignette-based task of social judgement-making, assessing participants' detection of social norms violations and also discriminating the degree of violation, such as distinguishing an instance of taking 12 items into a 10 items or less checkout queue versus someone touching a stranger's baby (Social Situations Task; Dewey, 1991).

The final social cognition test was a gamble task paradigm of emotion-based decision-making (Bangor Gambling Task; Bowman & Turnbull, 2004). The score was based on the number of good choices minus number of bad choices, ranging from -100 to +100. This was based on the assumption in the gambling task literature that disadvantageous performance on these tasks is commensurate with difficulties in making decisions in ambiguous social situations that require a weighing up of short-term versus long-term gains for self and others (Damasio, 1994).

In addition, other domains of cognition were measured using the following neuropsychological tests: As

tests of executive functioning, the Delis-Kaplan Executive Function Syndrome Test (D-KEFS; Delis, Kaplan, & Kramer, 1991)- Letter Fluency Scaled Score, the Hayling Sentence Completing Test and the Brixton Spatial Anticipation Test (Total Sten Scores; Burgess & Shallice, 1997), as well as the Zoo Map and Six Elements subtests of the Behavioural Assessment of the Dysexecutive Syndrome (BADS, raw scores; Wilson, Emslie, Evans, Alderman, & Burgess, 1996) were employed. Participants' visual selective attention, attentional switching and sustained attention was assessed with the following respective subtests of the Test of Everyday Attention (TEA; I. Robertson, Nimmo-Smith, Ward, & Ridgeway, 1994): Map Search II, Visual Elevator Timing and Lottery. Both working memory and episodic recall were measured with the Wechsler Memory Scale III (WMS; Wechsler, 1997) Working Memory Index and Modified Delayed Recall Index.

Statistical analysis

Descriptive statistics were computed for all variables of interest. For all further analyses, participants' type of brain injury was recoded into three categories (TBI vs. stroke vs. other injury types). Similarly, the occurrence of pre-injury mental health issues was recoded into three categories (none vs. anxiety or depression vs. other mental health

issues). Bivariate relationships between demographic, injury-related variables as well as survivors' mood on the one hand and WAI scales on the other were examined with analyses of variance (ANOVA) as well as Pearson's correlations. In order to examine the relationship between working alliance and neuropsychological tests, multilevel regression analyses were performed, with clients nested in therapists. This procedure takes into account that in this study, therapists had more than one of the participants as their client, and therapists differ from each other with respect to the way they form working alliances. In other words, individual clients' data could not be treated as independent information, and this is taken into account by the multilevel regression analyses employed. For the prediction of each WAI scale (Task, Bond, Goal, Total) from one of the neuropsychological tests, a series of multilevel regression analysis was computed, controlling for demographic and injury-related variables significantly related to the WAI scales. The level of significance was set to .05. All analyses were performed with IBM® SPSS® Statistics Version 22 (IBM_Corp., 2013).

RESULTS

Measurement descriptives

Descriptive information for the WAI scales as well as all neuropsychological tests are displayed in Table 2. Scores on all WAI scales were similar, ranging from 5.1 (WAI Goal) to 5.3 (WAI Task). Most working alliance ratings were either neutral or positive, with a lowest score of 2.4 on the WAI Goal scale (on a scale ranging from one to seven). The survivor means and standard deviations on the neuropsychological tests indicate a performance significantly below the published means for healthy controls on the Recognition of Faux Pas Test, Reading the Mind in the Eyes Test, disgust recognition from TASIT Part 1, Bangor Gambling Task, Key Search and Zoo Map subtests from the BADS, Hayling Sentence Completion Test, Brixton Spatial Anticipation Test, and both Map Search and Visual Elevator subtests from the TEA. Individual survivor scores varied on either side of clinical cut-offs for every measure. As such, the sample can be collectively described as demonstrating difficulties in mentalising, recognition of disgust, emotion-based decision-making, various aspects of executive functioning, visual selective attention and attentional switching. In contrast the sample as a whole does not demonstrate difficulties in the recognition of all the other primary emotions,

social inference, initiation of novel verbal responses, sustained attention, working memory and episodic recall.

Relationship between participants' demographic and injury related characteristics, mood and working alliance

Of the demographic and injury related variables, women had significantly higher WAI Task, Goal and Total scores than men (ANOVAs; all $p < .05$). Participants who had had a stroke had higher scores (between 5.3 on WAI Goal and 5.5 on WAI Task) on all WAI scales than individuals who had sustained a TBI (score of 5.1 on WAI Goal scale and 5.2 on all other WAI scales) and individuals who had had another kind of injury (scores between 4.3 on the WAI Goal scale and 4.6 on the WAI Task scale; ANOVAs, all $p < .05$). Participants who reported anxiety or depression prior to their injury had significant lower scores on the WAI Bond scale (average score 4.6) as compared to individuals who reported another form of pre-injury mental health issue (average score 5.5) or no prior mental illness (average score 5.3) (ANOVA; $p < .05$). Survivors' mood at the time of rehabilitation was not significantly related to WAI ratings (Pearson's correlations; all $p > .05$).

Relationship between working alliance and neuropsychological test results

A series of multilevel regression analysis was computed predicting each WAI scale (Task, Bond, Goal, Total) from one of the neuropsychological tests, controlling for participants' gender, type of injury as well as the occurrence of pre-injury mental health issues. The TASIT Part 1 (emotion evaluation) Total score was significantly related the WAI Task, Goal and Total scales. The TASIT Part 1 Total Negative Emotions score was significantly related to the WAI Task and Total scales and close-to-significantly ($p < .1$) related to the WAI Goal scale. The TASIT Part 3 Sarcasm score was close-to-significantly related to the WAI Task, Goal and Total scales. The Social Situations Task Appropriateness score was significantly related to the WAI Task and Goal scales (See Table 3). None of the tests of executive functions, attention or working memory was significantly related to the WAI scales.

DISCUSSION

This study has produced empirical evidence to support the hypothesised relationship between some, but not all aspects of survivor social cognition abilities and clinicians' ratings of therapeutic working alliance. Survivor difficulties

Table 2: Descriptive statistics for questionnaire and neuropsychological tests

Scale/test	Sample Mean (SD)	Range	Norm Mean (SD)
WAI Task	5.3 (.9)	3.0-7.0	
WAI Bond	5.2 (.8)	2.8-6.6	
WAI Goal	5.1 (1.0)	2.4-7.0	
WAI Total	5.2 (.8)	3.0-6.7	
Faux Pas Questions (/40)	27.2 (6.8)	8-39	35.5 (3.0)
Faux Pas Control (/10)	9.8 (.6)	7-10	
Mind in the Eyes (/40)	23.7 (4.6)	12-33	26.2 (3.6)
TASIT Part 1 Total Positive Emotions	9.0 (2.1)	1-16	
TASIT Part 1 Total Negative Emotions	12.3 (2.8)	4-19	
TASIT Part 1 Total	21.3 (4.1)	9-35	24.9 (2.11)
TASIT Part 2 Sincere	15.4 (4.0)	4-20	16.5 (3.3)
TASIT Part 2 Sarcasm (simple & paradoxical)	34 (36)	13-40	
TASIT Part 2 Total	49.5 (6.6)	29-58	54.1 (4.3)
TASIT Part 3 Lie	25.9 (3.9)	13-32	27.8 (2.9)
TASIT Part 3 Sarcasm (Enriched)	23.8 (4.7)	12-37	27.9 (3.2)
TASIT Part 3 Total	50.0 (7.0)	33-66	55.6 (3.0)
Bangor Gamble Task - No. Good Choices - Bad Choices	-4.2 (27.1)	-78-56	13.2 (22.4)
Social Situations Task Normative Score (/12)	9.8 (1.5)	6-12	9.3 (1.3)
Social Situations Task Violation Score (/12)	9.5 (2.0)	5-12	9.9 (1.4)
Social Situations Task Appropriateness Score (/36)	16.6 (5.8)	5-31	19.6 (6.4)
Letter Fluency Scaled Score (D-KEFS)	8.8 (3.7)	1-18	
BADS Zoo Map	10.6 (5.0)	-6-16	
BADS Six Elements	4.7 (1.5)	1-6	
Hayling Total Sten Score	5.0 (1.4)	1-7	6.1 (1.6)
Brixton Total Sten Score	5.7 (2.2)	1-10	6.1 (1.6)
TEA Map Search II	5.5 (4.0)	0-16	
TEA Visual Elevator Timing	6.7 (5.0)	0-19	10.0 (3.0)
TEA Lottery	8.3 (3.8)	0-13	
WMS III Working Memory Index	98.2 (15.2)	63-127	100 (15)
WMS III Modified Delayed Recall Index	10.4 (3.2)	3.5-17	

¹ WAI= Working Alliance Inventory, therapist version; Faux Pas = Recognition of Faux Pas Test; Mind in the Eyes = Reading the Mind in the Eyes Test; TASIT = The Awareness of Social Inference Test; D-KEFS = Delis-Kaplan Executive Function System; BADS = Behavioural Assessment of Dysexecutive Syndrome; Hayling = Hayling Sentence Completion Test; Brixton - Brixton Spatial Anticipation Test; TEA = Test of Everyday Attention; WMS III = Wechsler Memory Scale, Third Edition.

Table 3: Significant relationships between neuropsychological test results and therapists' retrospective working alliance ratings

NP test	WAI task	WAI bond	WAI goal	WAI total
TASIT Part 1 Total negative emotions	.06*	n.s.	n.s.	n.s.
TASIT Part 1 Total	.05**	n.s.	.07*	.04*
TASIT Part 2 Sarcasm	.03*	n.s.	.05**	.03*
Social situation appropriateness score	.03*	n.s.	.04*	n.s.

Each table cell represents a multilevel analysis (survivors nested in therapists) predicting a WAI scale from one of the neuropsychological tests, controlling for gender, injury type and the presence of mental health issues prior to the brain injury

¹WAI= Working Alliance Inventory, therapist version

* = $p < .05$; **= $p < .01$

in emotion recognition and the discrimination of differing degrees of social rule violations are related to clinicians' perceptions of poorer therapeutic relationships with those survivors. Survivor social inference abilities, operationalised as sarcasm detection, was also associated with working alliance ratings. Of note, and in agreement with our hypothesis, none of the tests of executive functioning was related to the strength of the working alliance.

This data can be used to add to previous findings indicating the varied negative social impact of survivor social cognition difficulties (Blonder et al., 2012; Struchen et al., 2011; Yeates et al., 2016), extending the list of outcomes to include marital relationships, community integration and now therapeutic working alliance with clinicians. This of course supports the face value assumption that difficulties in social cognition will exert a particular influence on social relationships as opposed to personal and functional outcomes.

However, there is something particularly significant about survivor relationships with clinicians being adversely affected alongside romantic partners, relatives, friends and work colleagues. It is the brain injury clinician that the survivor (or their significant other) turns to in order to seek assistance in managing the impact of breakdown in the other forms of social relationship. Most approaches to rehabilitation assume a collaborative relationship between survivors and clinicians, and previous research has shown that a good therapeutic working alliance is related to both rehabilitation outcome (Klonoff et al., 2010; Schönberger, Humle, & Teasdale, 2006b; Schönberger, Humle, Zeeman, et al., 2006b; Sherer et al., 2007) and survivors' awareness of their difficulties and engagement in rehabilitation (Schönberger, Humle, & Teasdale, 2006a; Schönberger,

Humle, Zeeman, et al., 2006b), in turn also related to rehabilitation outcome (K. Robertson & Schmitter-Edgecombe, 2015; Schönberger, Humle, Zeeman, et al., 2006a, 2006b). So if the therapeutic relationship with clinicians is in itself compromised and challenged by social cognition difficulties, this relationship may become one more unfortunate negative interpersonal outcome and thus leave the survivor with no support at all to manage the other social crises.

Difficulties in the relationship between survivors and clinicians have been explored by previous authors. Lewis (Lewis, 1999) cautions against the wildly oscillating and complicated relationship patterns between traumatic brain injury survivors and therapists, often marked by intense affect. Lewis uses the psychoanalytical conception of transference and counter-transference, the enactment of wider relationship patterns, thoughts and feelings in the relationship between client and therapist, including the therapists' own responses to clients. Lewis outlines how in response to either a survivor's idealisation or denigration of the therapist, the clinician can experience pride or uneasiness in the case of the former, or anger and submission in the case of the latter.. These are complex feelings and interactional patterns, yet are rarely explored within services that operate under the assumption of an unproblematic collaborative relationship with survivors.

The difficulties in emotion recognition and social inference abilities, as well as the degree of social rule violation detection highlighted here as related to clinicians' ratings of working alliance could be conceptualised as leading survivors to misinterpret the expressions and communications of the therapist (e.g., positive or neutral expression being misperceived as negative, critical and aversive; misinterpreting

sincere communications to be sarcastic or deceitful), or social boundaries and respectful behaviour transgressed without realising the impact of such on the therapist (and then struggling to register the clinician's emotional reaction to these transgressions). The presence of such difficulties may result in repairs of ruptures in the working alliance being unlikely, especially if the clinician is not supported to think about and manage such issues. Klonoff (2015) has highlighted how clinicians need to be supported in supervision to manage negative feelings such as disappointment in response to the enduring nature of survivor difficulties, and then minimise the 'toxicity' of such responses to the therapeutic relationship. In a review of social cognition rehabilitation interventions, Yeates (2014) has suggested that individual psychodynamic interventions such as mentalization-based therapy (Bateman & Fonagy, 2012) offer potential in supporting the impact of survivor social cognition difficulties on their significant others, through active use of the relationship with the therapist, including sharing the therapist's own emotional responses to the survivor's interpersonal challenges. This and other psychodynamic therapies would simultaneously support clinicians' own wellbeing through the vocabulary and focus it provides on interpersonal events and social cognition processes in the therapy room. Yeates (2014) cautions that at the current level of social cognition rehabilitation development, social skills, emotion recognition and mentalisation training/strategies lack the efficacy and responsiveness to have an effective impact on non-scripted, complex, evolving social interactions. Therapeutic interactions with clinicians would be of this kind.

Of note, in this study, low levels of social cognition were not associated with therapists' ratings of the emotional bond with their clients. The WAI Therapist Bond scale assesses the therapists' respect for, appreciation and acceptance of the patient as well as the therapist's empathy, congruence and commitment and a sense of mutual trust. Negative feelings that might arise from social interaction difficulties such as frustration or anger are not covered by the WAI. Only one question refers to the therapist feeling uncomfortable with the client. It could therefore be argued that the negative emotional consequences that social cognition difficulties can have for one or all parts of a social interaction are not properly covered by the WAI Bond scale.

Beyond the dyad of the survivor and therapist, Klonoff (2015) has also highlighted how complex dynamics within

a team of clinicians can be a key dimension of the everyday work of neuro-rehabilitation. It would be important to conceptualise and manage the impact of survivor social cognition difficulties on multiple clinicians working with them and any escalating responses within the entire team that may not be conducive to the wellbeing of either survivors or clinicians. Several authors have described how neuropsychological consequences of acquired brain injury can be addressed within the framework of a therapeutic milieu approach to neuro-rehabilitation (Caetano, Christensen, Uzzell, & Christensen, 2000; Christensen, Caetano, Stuss, Winour, & Robertson, 1999; Daniels-Zide, Ben-Yishay, Uzzell, & Christensen, 2000; Prigatano et al., 1994). Cognitive rehabilitation is here extended beyond the individual client-therapist dyad, and even beyond group settings, to a holistic approach within which all staff interactions with the client can be used to support survivors in becoming aware of and dealing with their social cognition difficulties.

A number of study limitations are evident. This study has a retrospective design, which means that the therapists' working alliance ratings might have been influenced by their knowledge of participants' neuropsychological test results. A further methodological limitation of this study is the limited sample size, resulting in limited statistical power. Although social cognition impairments are common sequelae of the main subtypes of acquired brain injury, the identification of pre-injury mental health difficulties by 24% of the sample may be an influence on the social cognition profiles of participants in this study, even if exacerbated by the injuries themselves (and consequently the therapeutic working alliance with clinicians). Finally, the actual duration of therapeutic relationship between each informant and survivor was not quantified on an individual basis, complicated in part by the inter-disciplinary structure of the clinical services involved in the study.

Therapeutic relationship duration may be a significant moderating variable, and should be investigated in future studies. The unique predictors of working alliance situated within differing rehabilitation therapist interventions should also be demarcated in future studies (e.g., the provision of a psychoeducation group in the Rowlands, Coetzer & Turnbull (2020) study, versus an exploratory psychotherapy intervention within a rehabilitation programme). In addition, future research on the relationship between social cognition and the therapeutic alliance should employ

prospective research designs and larger samples. Further research should also investigate the effectiveness of the therapeutic concepts mentioned above in dealing with and amending social cognition difficulties in the context of brain injury rehabilitation.

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