Communication skills of people with severe traumatic brain injury (TBI) can be improved by training everyday communication partners: Findings from a single-blind multi-centre clinical trial

Introduction

Communication problems following TBI can contribute to socially inappropriate behavior causing lost relationships and social isolation. Two treatments can improve the communication of people with TBI: (i) social skills training for the person with TBI alone (which we have termed the TBI SOLO condition) and (ii) training communication partners to deal with difficult communication behaviors (the JOINT condition). However, no research has concurrently compared these approaches. This paper reports data of a controlled group comparison study to determine which of these approaches is more effective compared with a control group. The paper asks two research questions:

1. Is any combination of treatment (TBI SOLO vs. JOINT) more efficacious than no training (CONTROL) alone?
2. Is the combined training for both the person with TBI and the everyday communication partner (JOINT) more effective than the individual treatment (TBI SOLO)?

Method

44 participants with severe TBI and their everyday communication partners (ECP) participated (Table 1). Inclusion and exclusion criteria are listed under Table 1. Based on ECP availability, participants were allocated to one of three groups: a TBI SOLO group (where only the person with TBI was trained), a JOINT group (both the ECP and the person with TBI were trained together), or a CONTROL delayed treatment condition (Figure 1). The TBI SOLO and JOINT groups received individual and group training in strategies to maximize communicative effectiveness using behavioral approaches including role-plays, cues to assist self-monitoring and positive reinforcement[1]. Treatment included concepts based on sociolinguistic theories of communication[2] and principles of Vygotskian learning theory[3,4] with a focus on everyday discourse. An outline of the treatment program can be found in Table 2.

Each participant in the TBI SOLO and JOINT groups received 3.5 hours of treatment/week for 10 weeks, including a 2.5 hour group session, and a one hour individual session. Group sessions included a review of home-based tasks using tape recorded samples of interactions taken throughout the previous week, introduction of new information and strategies, role plays, practice of strategies and feedback on use of techniques. A protocol was followed for individual sessions, including individualized goal setting, feedback on home-based tasks, problem-solving of issues raised by the participants, practice and troubleshooting. Steps to ensure treatment fidelity included the use of a treatment manual, participation in at least 80% of sessions and data collection on participants' attendance rates and completion of home-based tasks.

Outcome measures were collected at the initial assessment, at one to three weeks after the group intervention was complete and at six months after the intervention. Two discourse samples were collected on each occasion: (1) casual conversation (CC), in which the participants were asked to have a chat about any topic for a few minutes, and (2) purposeful conversation (PC), in which the

participants were asked to generate a list of situations they were expecting to face over the next few weeks in which communication was important to them.

The primary outcome measure, called the Adapted Measure of Participation in Conversation (MPC), evaluated the person with TBI's level of participation in conversation in terms of his/her ability to interact or socially connect with a partner (Interaction scale) and to respond to and/or initiate specific content (Transaction scale) before and after therapy[5,6]. Two trained raters who were blind to group allocation scored a 5-minute videotape of social interactions between the person with TBI and their significant other on a 9-point Likert scale, presented as a range of 0 to 4 with 0.5 levels for ease of scoring. The scale ranges from 0 (no participation) through 2 (adequate participation) to 4 (full participation in conversation). Psychometric data have been reported attesting to the robust nature of this measure[5,6]. Inter-rater reliability for the Adapted MPC scales was excellent with ICCs ranging from .84 to .97. Results were analyzed using repeated measures ANOVAs to examine the effect of group on the degree of change in MPC Interaction and Transaction scores pre and post treatment in purposeful and casual conversation conditions. Data was analyzed using intention to treat analysis.

Results

At baseline there were no statistically significant differences between the three groups on the prognostic variables of age, sex and education, severity of injury and on MPC ratings (Table 1). Mean scores for the three groups at pre- and post-test on the primary outcome variable are detailed in Table 3. Treatment effects were defined as a significant group (*JOINT* vs. *TBI SOLO* vs. *CONTROL*) x time (pre vs. post) interaction for repeated measures ANOVAs on the MPC (2 subscales). There was a significant treatment effect for conversational skill as measured by the MPC Interaction scale in both the casual conversation ($F(2, 38) = 3.78$, $p = 0.03$, $\eta_p^2 = 0.17$) and purposeful conversation ($F(2, 38) = 4.01$, $p = 0.03$, $\eta_p^2 = 0.17$) conditions, i.e. the *JOINT* group improved relative to the other two (Table 3, Figures 2 and 3). A significant treatment effect was also found on the MPC Transaction Scale in both the casual conversation ($F(2, 38) = 5.64$, $p = 0.007$, $\eta_p^2 = 0.23$) and the purposeful conversation ($F(2, 38) = 5.44$, $p = 0.008$, $\eta_p^2 = 0.22$) conditions (Table 3, Figures 2 and 3).

Post hoc testing (without Bonferroni adjustment due to the preliminary nature of the study) revealed no significant differences between the TBI SOLO and CTRL groups on the four measures. The JOINT group had greater gains compared to the CTRL group for both conversation types for Interaction (CC: p=0.011, PC: p=0.027) and Transaction scores (CC: p=0.003, PC: p=0.008). The JOINT group also made increased gains compared to the TBI SOLO group for Transaction scores in both conditions (CC: p=0.021, PC: p=0.013) and the Interaction score in the PC condition (p=0.027).

Discussion

Training communication partners was more efficacious in improving the everyday interactions of people with TBI than training the person with TBI alone. Significantly, training the person with TBI alone did not have a measurable effect on the MPC scores post training. The training program which included ECPs was successful due to the substantially increased amount of practice completed by the JOINT group at home, and the increased engagement of the ECP with the acknowledgement that they could make a significant contribution to the way their relative with TBI communicated. The principles espoused by Ylvisaker et al. (1998), including the importance of communication being a collaborative and elaborative process, and Kagan et al.'s (2004) concept

of training the ECP to reveal competence in the disabled speaker were also critical to the success of the training program. Most ECPs were wives and mothers, who had changed their communication styles following their husband's or son's injury, and which, in some cases, were detrimental to successful everyday interactions. Sensitively targeting the behaviors of the ECP such as their use of test questions and speaking on behalf of the person with TBI led to a significant change in everyday interactions.

Limitations included the small sample size and the statistical constraints which arise from a three arm clinical trial. Nonetheless, this study represents an important step forward in investigating interventions for social communication impairment following TBI. It is the first three arm trial to examine the treatment efficacy of training familiar communication partners of people with a TBI compared to traditional treatment and, importantly, to a control group. This study provides a new evidence based treatment approach for speech pathologists aiming to improve the social communication skills of those with a severe TBI.

Format preference: Platform Presentation

References

1. Helffenstein, D. A. and Wechsler, F.S. (1982). The use of Interpersonal Process Recall (IPR) in the remediation of interpersonal and communication skill deficits in the newly brain-injured. Clinical Neuropsychology *4*: 139-143.
2. Eggins, S. and Slade, D. (1997). Analysing Casual Conversation. London: Cassell.
3. Ylvisaker, M., Sellars, C. & Edelman, L. (1998). Rehabilitation after traumatic brain injury in preschoolers. Traumatic brain injury rehabilitation. Children and adolescents. M. Ylvisaker. Newton, MA, Butterworth-Heinemann**:** 303-329.
4. Ylvisaker, M., Jacobs, H. E. & Feeney, T. (2003). Positive supports for people who experience behavioral and cognitive disability after brain injury: a review. Journal of Head Trauma Rehabilitation, 18, 7-32.
5. Kagan, A., Winckel, J., Black, S., Duchan, J. F., Simmons-Mackie, N., & Square, P. (2004). A set of observational measures for rating support and participation in conversation between adults with aphasia and their conversation partners. Topics in Stroke Rehabilitation*, 11*(1), 67-83.
6. Togher, L., McDonald, S., Tate, R., Power E. & Rietdijk, R. (in press). Measuring the social interactions of people with traumatic brain injury and their communication partners: the adapted Kagan scales, Aphasiology.

Table 1. Demographic characteristics, severity levels, and primary outcome measures at baseline for all participants (mean, ± SD (range)).

Group	JOINT (n=14)	TBISOLO (n=15)	CTRL (n=15)	F	df	p
Demographic variables						
Gender (M:F)	11:3	14:1	13:2	1.35*	2	0.49
Age (years)	30.29 ± 13.98 (18-62)	39.67 ± 10.70 (18-55)	38.07 ± 15.06 (19-68)	2.02	2,41	0.15
Education (years)	12.00 ± 2.25 (7-15)	12.80 ± 3.67 (8-20)	12.73 ± 3.17 (8-18)	0.29	2,41	0.75
TPO (years)	8.04 ± 5.10 (1-21)	8.13 ± 8.32 (1-25)	9.71 ± 6.70 (2-23)	0.82	2,41	0.45
PTA (days)	87.77 ± 56.93 (7-180)	96.43 ± 61.23 (20-180)	66.64 ± 65.51 (6-182)	0.87	2,38	0.43
ECP Gender (M:F)	4:10	2:13	3:12	1.08*	2	0.59
ECP Age (years)	50.29 ± 11.26 (24-64)	49.00 ± 15.72 (17-77)	49.67 ±19.42 (21-79)	0.02	2,41	0.78
ECP Education (years)	13.14 ± 3.06 (10-19)	12.93 ± 2.74 (9-18)	12.40 ± 2.29 (10-16)	0.29	2,41	0.75
Cognitive communication severity						
SCATBI	97.00± 14.21(80-129)	103.20±13.21(82-127)	102.67±14.36(85-129)	0.87	2,41	0.43
Primary outcome measures						
MPC Interaction CC	2.18±0.61(1.00-3.5)	2.27±0.65(1.00-3.5)	2.37±0.79(0.5-3.5)	0.27	2,41	0.76
MPC Transaction CC	2.07±0.62(1.00-3.0)	2.30±0.70(1.00-3.5)	2.27±0.59(1.00-3.0)	0.53	2,41	0.59
MPC Interaction PC	1.89±0.53(1.00-2.5)	2.13±0.58(1.00-3.0)	2.17±0.62(1.00-3.0)	0.96	2,41	0.39
MPC Transaction PC	1.96±0.63(1.00-3.0)	2.10±0.63(1.00-3.0)	2.30±0.62(1.00-3.0)	1.05	2,41	0.36

* Chi square statistic used for dichotomous variables

Inclusion criteria were: (1) a moderate-severe TBI at least 9 months previously defined as a score on the Glasgow Coma Scale (GCS) of 9-12 (moderate) 8 or less (severe) and/or a period of Post Traumatic Amnesia (PTA) of 1-24 hours (moderate) more than 24 hours (severe), (2) significant social skills deficits, (3) be of at least average premorbid intelligence and (4) have a regular communication partner with whom they interact on a daily basis. Exclusion criteria included: (a) drug and alcohol addiction or active psychosis, (b) aphasia, (c) a non-English speaking background (d) severe amnesia, and (e) severe dysarthria. Caregivers interacted with the person with TBI on a regular basis, had not sustained a brain injury or had a known psychiatric history.

Table 2. Group training program overview

Session	Session title	Description
1	**Introduction**	Introductory session where the purpose of training, group guidelines and home practice expectations are established and members introduced to each other and clinicians.
2	**Brain Injury and Communication**	An educational component on TBI and communication including how cognitive, physical and behavioural symptoms that may impact on communication using video case studies
3	**Effective communication 1**	Explores the forms and purposes of communication, different contexts and communication structures used in each context, different roles in communication and how communication role affects outcomes of interactions.
4	**Effective communication 2**	Extends Session 3 and examines general communication facilitation strategies, and explores barriers and facilitators to good communication in everyday life.
5	**Collaboration (titled 'Starting and Participating in Conversations' for the TBI SOLO group)**	Focuses on techniques that help conversations to be a collaborative, more equal and organized process. For the JOINT group, it also helps communicative partners provide structure and support to the person with TBI for their conversations.
6	**Elaboration (titled 'Extending Conversations' for the TBI SOLO group)**	Focuses on the concept of keeping conversations going' by exploring techniques that help to organise and link topics, with use of both questions and comments. For the JOINT group, this session assists communication partners to scaffold conversations for the person with TBI without taking over the conversation.
7	**Asking Questions**	Explores the use of appropriate and helpful questions to start and keep conversations going. For the communication partners in the JOINT group, this session also suggests how to avoid negative, or 'testing' questions and instead focus on a positive questioning style.
8 - 10	**Improving Skill and Confidence**	Revises the information and practises each technique learnt in previous sessions with actual conversations. Session 10 also celebrates group member's achievements and outcomes with a group lunch.

Each group session contains session handouts, a mix of role plays, information content, conversational practice and each pair is encouraged to play recorded home practice tapes to discuss with the other group members. A morning tea break each week allows people to socialise with and get support from other group members.

Table 3: Scores at pre and post treatment on primary outcome variables for the 3 groups: TBI SOLO Group, JOINT group where everyday communication partners were also trained and the CONTROL delayed treatment group as well as F values for multivariate treatment effects (time by group interactions), degrees of freedom (d.f.), probability level (p) and and effect sizes (η_p^2).

CC = Casual conversation; PC = Purposeful conversation

MPC		***Pre- Treatment***			***Post-treatment***			***Treatment effect (Gp x Time)***			
		JOINT	**TBI SOLO**	**Control**	**JOINT**	**TBI SOLO**	**Control**	***F***	**d.f.**	***p***	***Eta²***
Interaction CC	Mean SD	2.18 0.61	2.27 0.65	2.37 0.79	2.77 0.56	2.50 0.48	2.39 0.66	3.78	2, 38	0.032	0.166
Transaction CC	Mean SD	2.07 0.62	2.30 0.70	2.27 0.59	2.65 0.38	2.32 0.54	2.25 0.67	5.64	2, 38	0.007	0.229
Interaction PC	Mean SD	1.89 0.53	2.13 0.58	2.17 0.62	2.58 0.34	2.29 0.80	2.29 0.51	4.01	2, 38	0.026	0.174
Transaction PC	Mean SD	1.96 0.63	2.10 0.63	2.30 0.62	2.58 0.28	2.11 0.74	2.21 0.47	5.44	2, 38	0.008	0.223

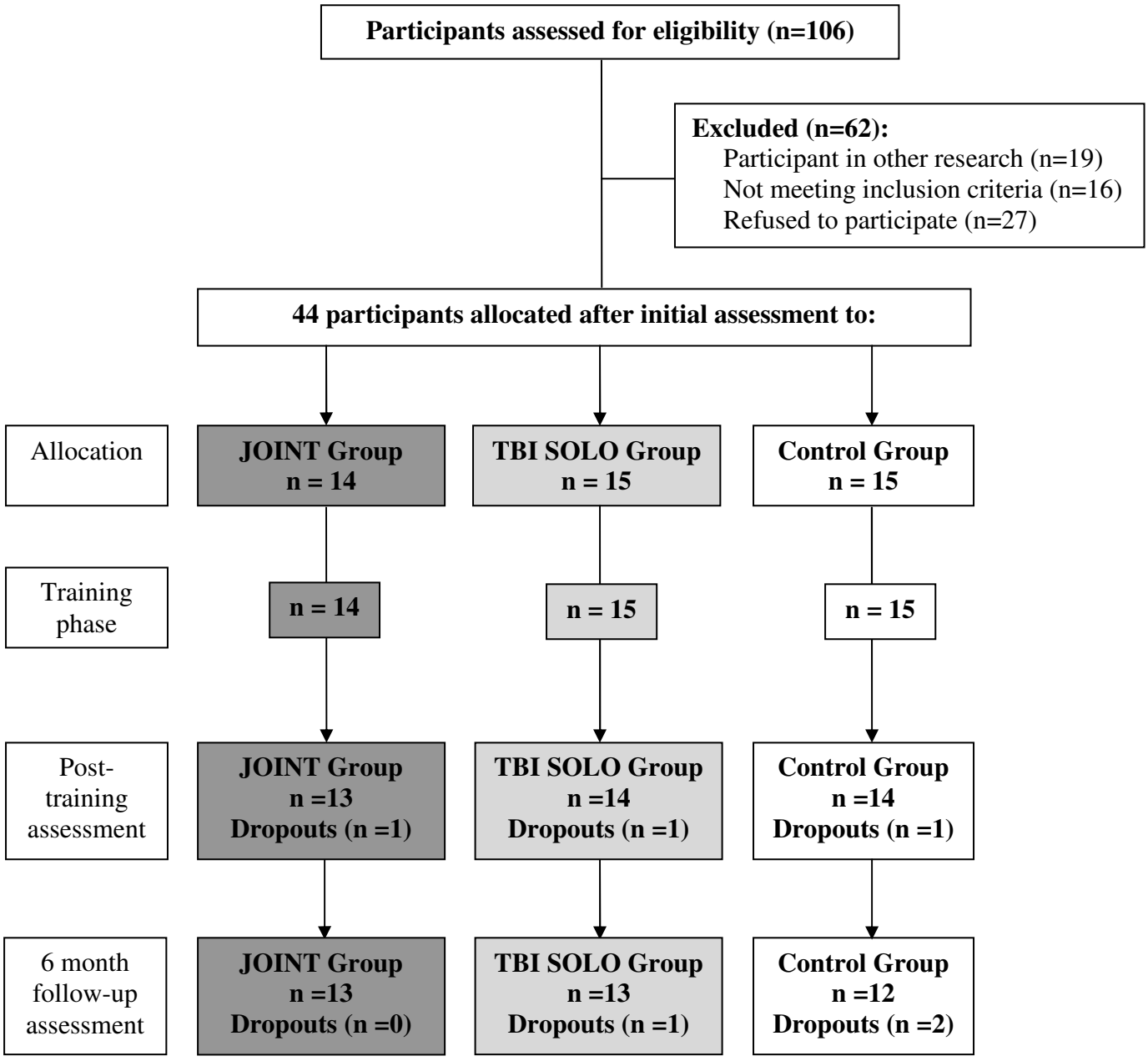

Figure 1. Allocation and flow diagram for the three groups

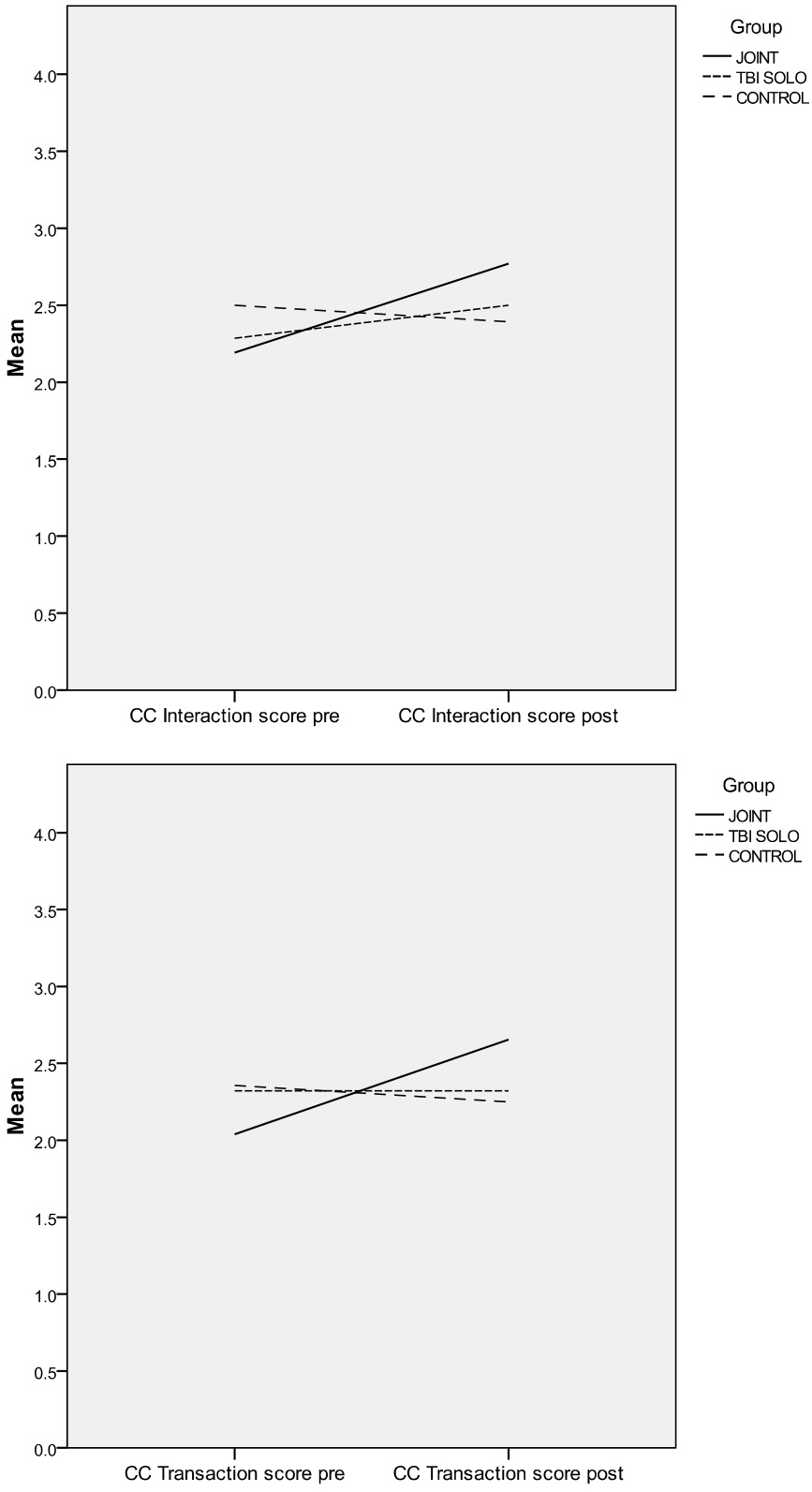

Figure 2. MPC Interaction and Transaction scores pre and post treatment in the Casual Conversation (CC) condition

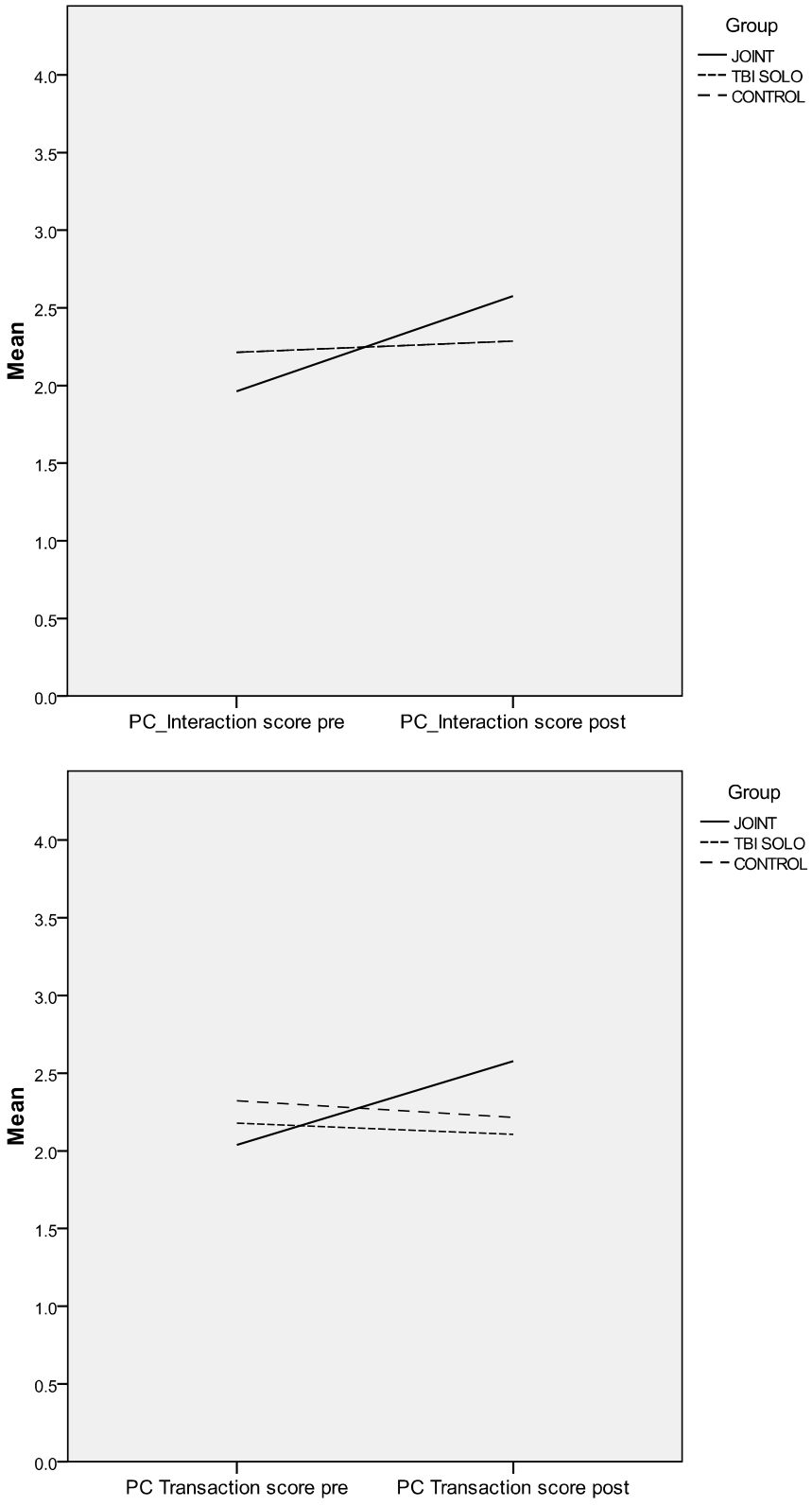

Figure 3. MPC Interaction and Transaction scores pre and post treatment in the Purposeful Conversation (PC) condition