Casual conversations between individuals with traumatic brain injury (TBI) and their friends

Introduction

Traumatic brain injury (TBI) is a major cause of disability, particularly for young adults[1-3] leading to pervasive, long-term communication impairments[5]. Casual conversation is the most frequent discourse type used by people with TBI[6], however it has rarely been investigated. This study therefore aimed to examine the casual conversations of people with severe TBI and their friends. It was hypothesised that the friendship relationship may be a facilitative context for discourse-level language following TBI due to the equal nature of the exchange between these communication partners. Three questions were addressed:

(1) Is there a difference between participants with TBI and matched controls in the rates of information giving, information requesting and communication repair and negotiation during casual conversation?
(2) Is there a difference between friends of participants with TBI and friends of matched controls in the rates of information giving, information requesting and communication repair and negotiation during casual conversation?
(3) Is there a difference between TBI friendship interactions and control friendship interactions in the rates of information giving, information requesting and communication repair and negotiation during casual conversation?

Method

Nine participants with severe TBI attended with a friend (Tables 1, 2) and were matched with a control group of nine participants without TBI (Table 3), who also attended with a friend (Table 4). Groups were matched by age, gender and education. Inclusion and exclusion criteria for clinical participants are listed under Table 1. There was no significant difference between length of friendship for the two groups (U: 38.500, z= -.177, p= 0.860), age (U: 34.500, z= -.532, p= 0.595) and gender (Fishers exact test: p=0.576). Education levels were equivalent for friends of both groups.

Participants and their friends conversed about a topic of interest while the researcher was out of the room for five minutes. Videotaped data was orthographically transcribed and separated into moves. A move is a unit of information, similar to a T-unit, comprising of an independent clause plus any attached or embedded subordinate clause[4,7]. Transcriptions were then analysed using exchange structure analysis (ESA)[8]. In ESA, there are two types of moves: synoptic and dynamic. Synoptic moves involve giving (denoted as K1) or requesting information (K2) and are the foundation of an exchange. Dynamic moves are embedded within an exchange to negotiate meaning and assist with repair (Appendix 1).

Data was collated in two sets: 1) moves per minute of speaking time and 2) a percentage measure of the total interaction. While the data was normally distributed, non-parametric statistics were performed due to fewer assumptions regarding the population data in small sample sizes[9]. Due to the preliminary nature of the study, the alpha significance level was set at $p < 0.05$ to minimise Type II errors [10,11]. Mean inter-rater reliability transcription agreement on 20% of randomly selected samples was 96.4%. Randomly selected samples (20%) selected for ESA reliability

analysis were analysed by the second author who was blind to group allocation. Mean inter-rater agreement was 88.3%. Intra-rater reliability completed 6 months post initial analysis on a further 20% of randomly selected samples was 87.8%.

Results

Descriptive statistics are reported for measures taken per minute of speaking time (Table 5), measures taken as a percentage of the total moves (Table 6) and for statistical comparisons across conditions (Table 7).

Comparisons between participants with TBI and matched controls
The first question investigated the difference between participants with TBI and matched controls in the rates of information giving (K1 moves), information requesting (K2 moves) and dynamic moves (DM moves). Neither data set (per minute of speaking time and percentage of total moves) yielded significant differences between participants with TBI and matched controls in the rates of K1 or K2 moves. While there were no significant differences in the use of dynamic moves as a percentage of the total moves, the control participants had a statistically significant higher rate of dynamic moves per minute of speaking time than participants with TBI ($z = -2.192$; $p < 0.05$) (Figure 1).

Comparisons between friends of participants with TBI and friends of matched controls
The second question examined comparisons between the friends of participants with TBI and friends of matched controls in terms of information giving (K1), information requesting (K2) and dynamic moves (DM). Friends of participants with TBI used significantly less K1 moves than the friends of the matched controls both as a measure per minute of speaking time ($z = -2.547$; $p < 0.05$) and as a percentage of the total moves ($z = -1.836$; $p < 0.05$). There were no significant differences between friends of control participants and friends of participants with TBI in the rates of K2 or dynamic moves (Figure 2).

Within group comparisons
The final question explored differences between participants with TBI and their friends in the rates of information giving (K1), information requesting (K2) and dynamic moves (DM). This was then compared to the rates of information giving (K1), information requesting (K2) and dynamic moves (DM) between control participants and their friends. Participants with TBI used significantly more K1 moves than their friends as a percentage of total moves ($z = -2.075$, $p < 0.05$), but there was no significant difference in the K1 moves per minute of speaking time. The rates of K2 moves and dynamic moves between the participants with TBI and their friends were not significant. All measures between the control participants and their friends were not significant (Figure 3).

Discussion

This study is the first to explore the casual conversations of people with severe TBI and their friends compared to a matched control group. While loss of social contacts is a significant burden on people with long-term TBI[12], studies investigating friendship interactions following TBI are uncommon[13,14]. The most striking result of this study was that people with TBI were able to

engage in typical and essential information giving and information requesting roles during casual conversation with friends when compared to matched controls.

We also found evidence of both facilitative and restrictive language behaviours in the interactions of people with TBI. For example, discussion of personally relevant[15] and highly familiar topics appeared to facilitate conversation, allowing participants with TBI to contribute personal opinions and to ask related questions in a similar manner to matched controls. Another factor that may have contributed to similar rates of information giving was the nature of question asking in casual conversation. In the conversations involving people with TBI, questions were predominantly concrete with the use of yes/no questions and tag questions. Tag questions may have been facilitative as they allowed participants to fulfil the obligatory role of responding to the question but also an opportunity to extend this information. Restrictive language behaviours such as the use of tangential language were also observed in the people with TBI. These findings have significant clinical implications for involving friends in the rehabilitative process. Specific suggestions for training friends include teaching question asking and repair strategies and encouraging use of joking/humour. Critically, involving friends in rehabilitation may contribute to positive communication outcomes for people with TBI and may assist with generalization of these skills to everyday conversation. Limitations included small sample size. It is anticipated that future research may validate these results with longer conversational samples and greater number of participants.

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Appendix 1. Example of exchange structure analysis from transcript of TBI participant P2 and his friend PF2

Ex.	Move		
20	66	K1	PF2: I think Tori Spelling has changed for the worse
	67	chall	P2: Yeah?
21	68	K1	PF2: I'm not crazy about that girl
	69	K2f	P2: No
	70	K1f	PF2: Mm
	71	K1f	PF2: Not at all
22	72	K1	P2: Wonder what happened to her father's money
	73	K2f	PF2: I know (laughs)
23	74	K1	PF2: that's true, yeah, yeah,
	75	K1	PF2: or her money now even
	76	K2f	P2: That's right, yeah
	77	K1f	PF2: Mm
24	78	K1	P2: I got three numbers in (um) Powerball last night
	79	check	PF2: Oh, did you?
25	80	K1	P2: play
	81	K1	P2: But I put $3
	82	K2f	PF2: 4 next time
26	83	K2	P2: Which is the last class division, is it?
27	84	K1	PF2: That's better than nothing, isn't it?

Ex. = exchange number; Move = move number; K1 = primary knower (giving information); K2 = secondary knower (requesting information); K2f = follow up move by person in the K2 role, K1f = follow up move by person in the K1 role, chall = dynamic challenging move; check = dynamic checking move.

Table 1. Demographics of participants with TBI (P)

ID Code	Gender	Age (Years)	Age at injury (Years)	Trauma Type	Level of Education
P1	M	38	22	MVA	TAFE
P2	M	41	21	Pedestrian	High school
P3	M	38	16	MVA	High school
P4	M	58	30	MVA	University
P5	M	30	20	MVA	High school
P6	M	32	26	Fall	Community Course
P7	M	35	29	MVA	TAFE
P8	M	31	24	Pedestrian	TAFE
P9	M	67	59	Fall	University

PTA = Post traumatic amnesia; MVA = Motor vehicle accident; TAFE = Technical and further education; SCATBI =Scales of Cognitive Abilities for Traumatic Brain Injury

Inclusion criteria were: 1) provision of consent to participate in the study, 2) the diagnosis of a severe TBI as indicated by the duration of their post-traumatic amnesia (PTA) being greater than 24 hours and/or loss of consciousness of greater than six hours, as documented in medical records, 3) not in a current state of post traumatic amnesia at the time of the study, as documented in medical records, 4) a time post TBI greater than four years, 5) a social communication disorder as assessed on the Pragmatic Protocol[17], 6) a cognitive communication disorder based on a severity score below 17 obtained in the Scales of Cognitive Abilities for Traumatic Brain Injury (SCATBI)[16,] 7) no presentation of aphasia, dysarthria, or sensory impairment (specifically hearing and vision) resulting from their TBI. This was judged by the study's recruiters who had thoroughly read through participants' medical records and screened their language and speech using standardised assessments to exclude aphasia and dysarthria, 8) adequate concentration and attention to complete research tasks and 9) a friend willing to participate in research tasks.

Table 2. Variables for participants with TBI (P)

ID Code	Time post injury (Years)	PTA (Weeks)	SCATBI[16]
P1	16	24	9
P2	20	16	12
P3	22	40	8
P4	28	12	12
P5	>10	20	10
P6	6	> 24	10
P7	5.5	2 days	12
P8	7	> 20	9
P9	8	9	8

PTA= Post traumatic amnesia; > = Greater than; SCATBI = Scales of Cognitive Abilities for Traumatic Brain Injury[16]

Table 3. Demographics of control participants (C)

ID Code	Gender	Age (Years)	Education
C1	F	38	TAFE
C2	F	38	TAFE
C3	M	36	TAFE
C4	M	57	University
C5	M	28	High School
C6	M	22	TAFE & University
C7	F	36	TAFE
C8	M	36	TAFE
C9	M	67	University

TAFE = Technical and further education

Table 4. Demographics and relationship length and type of the friends of participants with TBI (PF) and friends of control participants (CF)

Friends of participants with TBI (PF)						Friends of control participants (CF)					
ID Code	**Gender**	**Age**	**Education**	**Length of friendship (years)**	**Participants description of relationship to person with TBI**	**ID Code**	**Gender**	**Age**	**Education**	**Length of friendship (years)**	**Participants description of relationship to control participant**
PF1	F	34	High School, TAFE	0.50	Girlfriend Best friends	CF1	M	34	University	3	Neighbours Good mates
PF2	F	41	University	41	Close Friends	CF2	M	38	TAFE, University	10	Good friends
PF3	M	46	University	5	Professional and personal friends	CF3	M	35	High School, TAFE	20	Close friends
PF4	M	62	University	9	Good friends	CF4	F	45	High School, TAFE, University	3.5	Good friends
PF5	M	45	High School	6	Carer Friend Neighbour	CF5	M	49	High School, University	10	Good friends
PF6	M	33	High School	25	Best friends	CF6	M	36	High School, University	4	Close mates
PF7	F	35	High School, TAFE	0.04	Girlfriend	CF7	M	33	High School, University	4	Same wavelength
PF8	M	34	High School, TAFE	20	Best mates	CF8	M	67	High School, University	27	Good friends
PF9	M	68	High School, University	31	Close friends	CF9	M	29	High School, University	35	Strong male friends

Table 5. Descriptive statistics for per minute of speaking time measure

Move Type	Measure	TBI	Control	Friend of TBI	Friend of control
K1	Mean	7.03	9.92	5.27	9.82
	SD	2.25	4.05	2.13	3.57
	Min	4.57	2.05	2.14	5.77
	Max	10.79	16.17	8.27	16.25
K2	Mean	1.37	0.96	1.31	0.86
	SD	2.14	1.10	0.65	1.04
	Min	0.13	0.00	0.43	0.00
	Max	6.98	3.25	2.33	3.23
DM	Mean	1.50	3.25	2.48	2.81
	SD	1.01	1.38	1.72	1.96
	Min	0.38	1.50	0.39	0.00
	Max	3.09	5.29	5.81	5.25

K1 = Information giving move; K2 = Information receiving/requesting move; DM = Dynamic move – Communication repair or negotiation; SD = Standard Deviation; Min = Minimum score; Max = Maximum score.

Table 6. Descriptive statistics for percentage of total moves measure

Move Type	Measure	TBI	Control	Friend of TBI	Friend of control
K1	Mean	28.51	27.23	19.01	28.16
	SD	9.25	11.73	6.22	12.68
	Min	16.00	8.70	10.60	13.50
	Max	44.40	48.60	28.80	56.50
K2	Mean	5.06	2.43	4.81	2.18
	SD	7.33	2.96	2.19	2.50
	Min	0.70	0.00	2.10	0.00
	Max	24.00	8.80	8.00	7.60
DM	Mean	5.44	9.08	9.61	7.03
	SD	3.99	3.97	6.37	4.38
	Min	1.60	5.30	3.80	0.00
	Max	13.40	17.40	21.10	12.40

K1 = Information giving move; K2 = Information receiving/requesting move; DM = Dynamic move – Communication repair or negotiation; SD = Standard Deviation; Min = Minimum score; Max = Maximum score.

Table 7. Statistical comparisons across all conditions

Comparison	**TBI & Ctrl[#]**		**TBI Friend & Ctrl Friend**		**TBI & TBI Friend**		**Ctrl & Ctrl Friend**	
Analysis	**PMST**	**%Total**	**PMST**	**%Total**	**PMST**	**%Total**	**PMST**	**%Total**
K1	z = -1.718 (*p* = 0.086)	z = -0.059 (*p* = 0.953)	U=10.00 z = -2.693 (*p* = 0.007*) Ctrl > TBI	U=13.50 z = -2.388 (*p* = 0.017*) Ctrl > TBI	U= 22.50 z = -1.590 (*p* = 0.112)	U= 17.00 z = -2.075 (*p* = 0.038*) TBI >friend	U=37.50 z = -0.265 (*p* = 0.791)	U=40.00 z = -0.440 (*p* = 965)
K2	z = -0.533 (*p* = 0.594)	z = -0.889 (*p* = 0.374)	U= 22.00 z = -1.634 (*p* = 0.102)	U=22.00 z = -1.634 (*p* = 0.102)	U= 23.50 z = -1.502 (*p* = 0.133)	U= 24.50 z = -1.414 (*p* = 0.157)	U=38.00 z = -0.223 (*p* = 0.823)	U=38.00 z = -0.223 (*p* = 823)
DM	z = -2.192 (*p* = 0.028*) Ctrl > TBI	z = -1.599 (*p* = 0.110)	U=37.00 z = -0.309 (*p* = 0.757)	U=36.00 z = -0.397 (*p* = 0.691)	U= 27.00 z = -1.192 (*p* =0.233)	U=22.00 z = -1.635 (*p* = 0.102)	U=34.50 z = -0.530 (*p* =0.596)	U=32.00 z = -0.751 (*p* = 0.453)

Wilcoxon signed ranks tests was conducted for TBI and Control group and z and p values reported. The Mann Whitney U test of independent samples was performed for the remainder of the group comparisons and U, Z and p statistics are reported.

TBI = Participant with traumatic brain injury; Ctrl = Control participant; > = greater than; < = Less than; [ ] = Significant findings (* = $p < 0.05$, ** = $p<0.01$); ns = Not significant ($p > 0.05$); PMST = Measure per minute of speaking time; %Total = Measure as percentage of total moves; K1 = Information giving move; K2 = Information receiving/requesting move; DM = Dynamic move – communication repair or negotiation.

(a) (b)

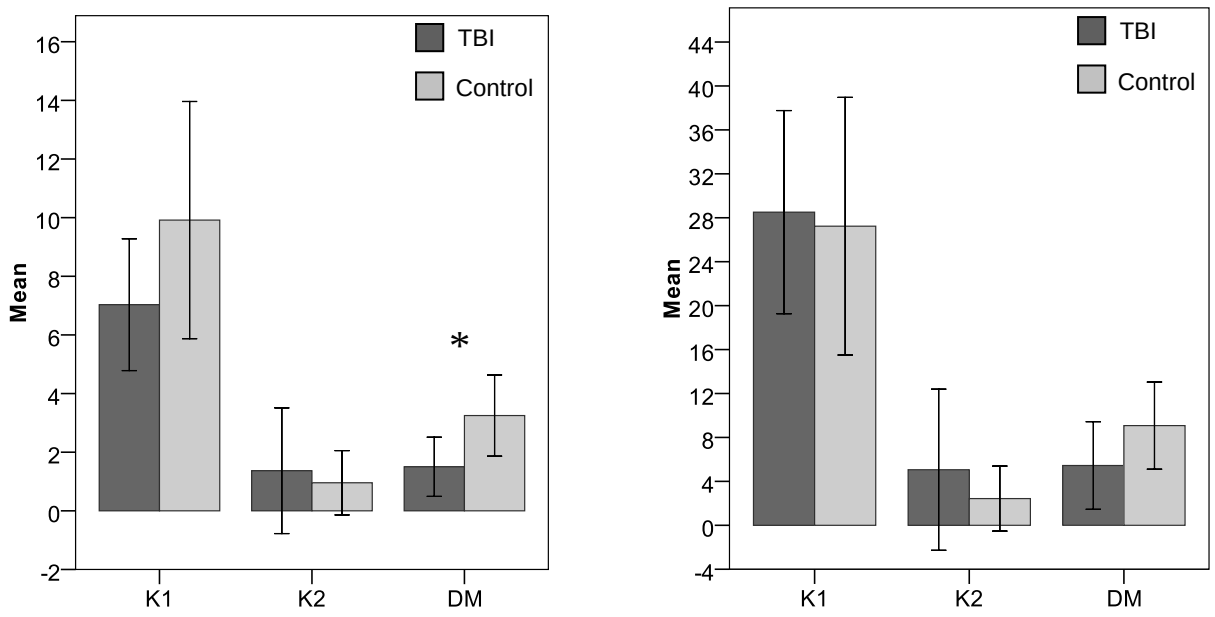

Figure 1. (a) Mean scores of participants with TBI and control based on per minute of speaking time measure. (b) Mean scores of participants with TBI and controls based on percentage of total moves measures. Error bars represent + or – 1 standard deviation. K1 = Information giving move; K2 = Information receiving/requesting move; DM = Dynamic move – Communication repair or negotiation

* = Statistically significant ($p < 0.05$)

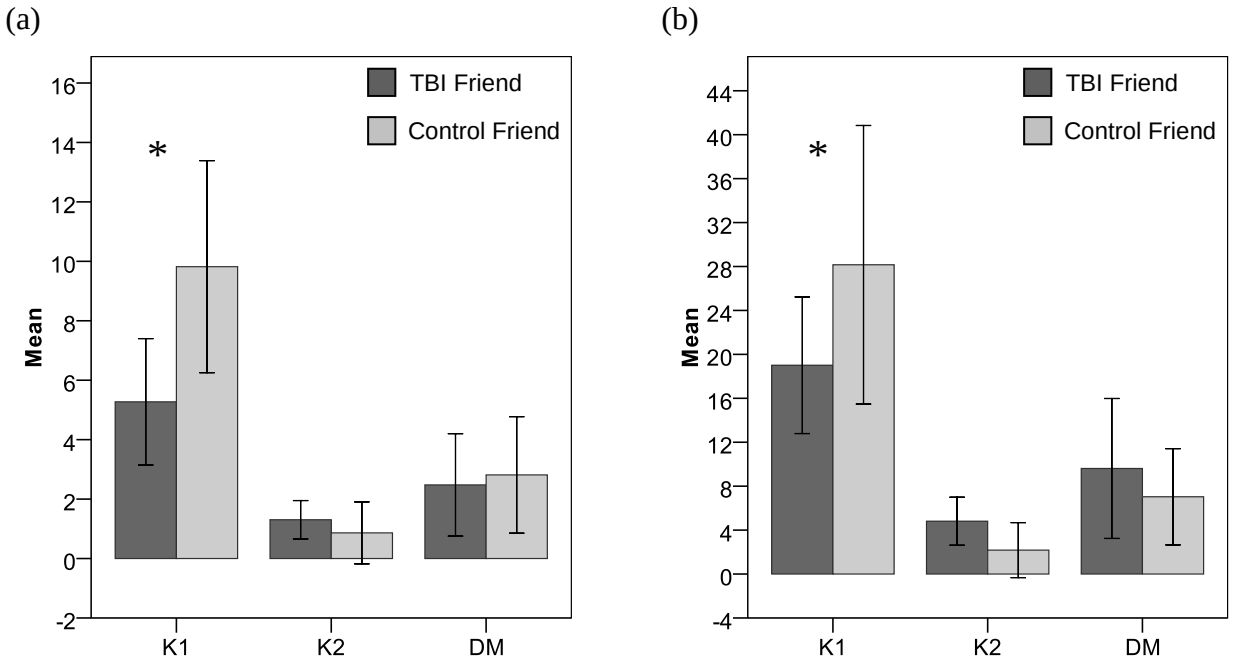

Figure 2. (a) Mean scores of friends of participants with TBI and friends of control participants based on per minute of speaking time measure. (b) Mean scores of friends of participants with TBI and friends of control participants based on percentage of total moves measures. Error bars represent + or – 1 standard deviation. K1 = Information giving move; K2 = Information receiving/requesting move; DM = Dynamic move – Communication repair or negotiation

* = Statistically significant ($p < 0.05$)

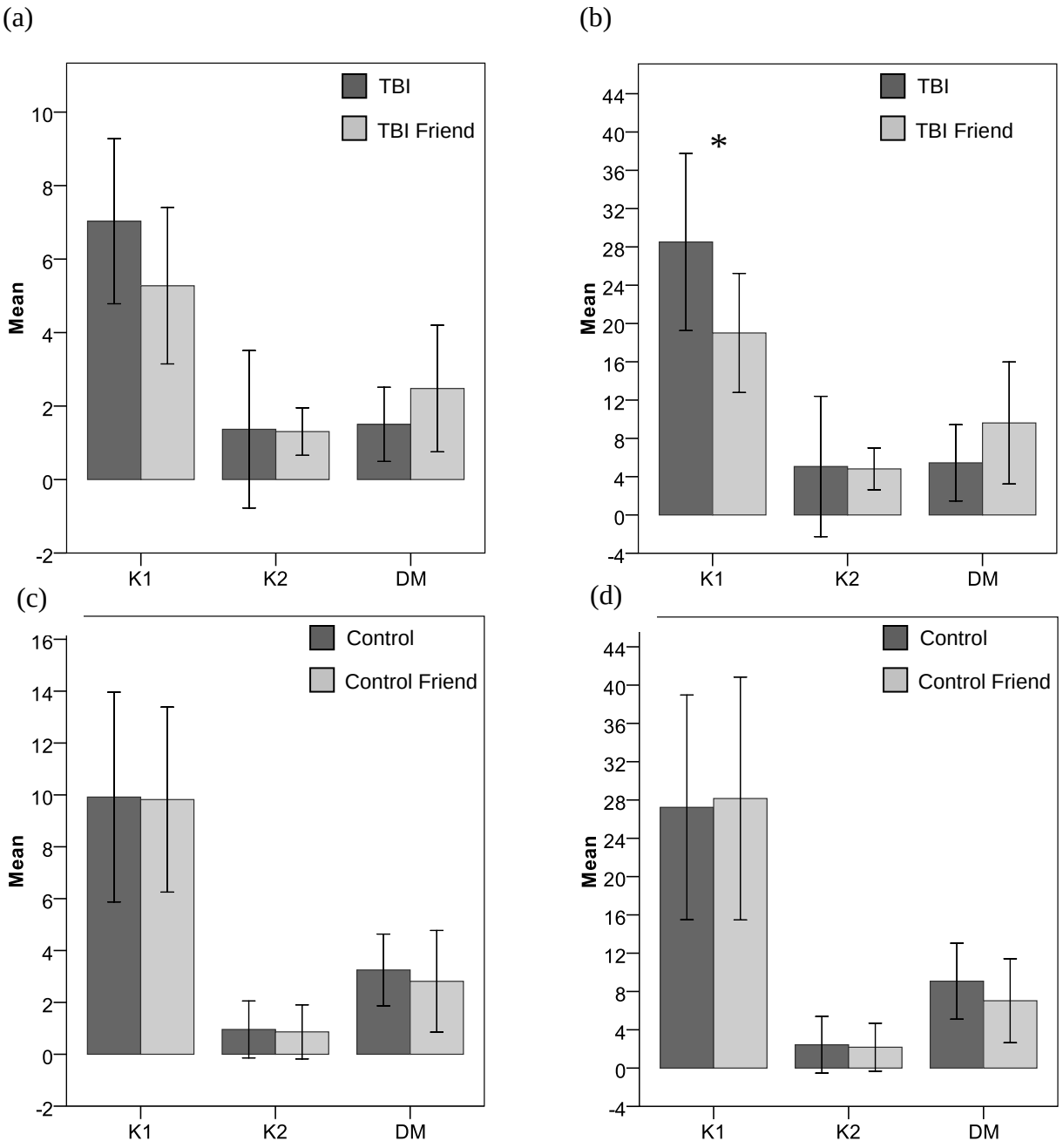

Figure 3. (a) Mean scores of participants with TBI and their friends based on per minute of speaking time measure. (b) Mean scores of participants with TBI and their friends based on percentage of total moves measures. (c) Mean scores of control participants and their friends based on per minute of speaking time measure. (d) Mean scores of control participants and their friends based on percentage of total moves measures. Error bars represent + or – 1 standard deviation. K1 = Information giving move; K2 = Information receiving/requesting move; DM = Dynamic move – Communication repair or negotiation
* = Statistically significant ($p < 0.05$)