Social Information Processing in Adolescents: Data from Normally Developing Adolescents and Preliminary Data from Their Peers with Traumatic Brain Injury

Objective: To assess aspects of social information processing in naturalistic conversations, using online videotape tasks. Design and Participants: The tasks were administered to 60 normally developing (ND) subjects ages 13 to 21, and 10 adolescents with traumatic brain injury (TBI). Setting: University. Main Outcome Measure: Task accuracy scores and measures of reliability and validity. Results and Conclusions: ND group scores were generally high, without significant differences by race, sex or age. TBI group scores were significantly lower than ND group scores for both emotion recognition and detection of conversation skills. The results are discussed in light of the evaluation of pragmatic competence in adolescents with TBI. Key words: adolescent brain injury, communication, pragmatic competence

INTRODUCTION

Social skills may be defined as specific abilities that enable an individual to perform competently on social tasks. These skills include the ability to empathize or understand another person's feelings, discriminate and make inferences about social cues, and predict and evaluate consequences for social behavior. Social skills are necessary but not sufficient for social success, which is a complex function of skills, behaviors,

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and other factors such as attractiveness and athleticism. Nevertheless, competent social interaction is fundamental to the development of friendships and to positive evaluations by others, and there is considerable evidence that social skill impairments are associated with poor social outcomes. A large body of literature has revealed correlations between social abilities and peer acceptance, popularity, participation in important social activities of daily living, self-esteem, and self-concept. Thus, the failure to succeed in social interactions may have major life consequences.

Various authors have reported impairments in social aspects of communication after traumatic brain injury (TBI) (eg, ). These include difficulty in choosing socially correct methods for interacting, discriminating social cues, and taking the perspective of one’s social conversational partner; having less social interaction and “tact” than peers; impairments in social inference; and difficulty in social problem solving. Singer and Bashir suggested that the interrelationship among language, executive functioning, and self-management of behavior may underlie the social impairments associated with communication disorders. When an impairment such as TBI interferes with cognitive-communicative processes, difficulty with executive functioning and self-management often follows. The relationship between these factors and successful social interactions is often a concern for therapists and teachers who treat and teach youth with TBI. Chapman pointed out that traditional language measures underestimate communication disabilities in children with TBI. She noted that children with TBI have difficulty with complex language tasks such as sequencing action, developing resolutions, and extracting the moral of a story in discourse. Such difficulties may be particularly evident when the injury involves the frontal lobes and can influence the individual’s ability to interact socially in a way that is deemed acceptable by peers, family, and teachers. TBI sustained before or during adolescence may lead to deficits in language organization and pragmatic skills. Adolescence is an important time for the development of cognitive-communicative skills for interpreting implied meanings of language such as sarcasm, negotiation, and complicated pragmatic cues. After a TBI, many of these skills do not continue to develop, and social interactions are compromised. These social pragmatic problems can lead to difficulty in school, work, and community. Therefore, it is important to have tools that permit both the identification of youth with social skills impairments and the characterization of these impairments.

Of the social skills evaluation tools that have been used for children and adolescents with communication disorders, most focus on the assessment of specific behaviors. Typical behavioral assessment tools include inventories, rating scales, and questionnaires completed by parents or teachers. Examples are the Pragmatic Protocol, the Child Behavior Checklist, and the Adolescent Pragmatics Screening Scale. Verbal reasoning tasks such as the test of Interpersonal Negotiation Strategies and the Requests, Hints and Negotiation tasks described by Turkstra, McDonald, and colleagues also have been used to measure aspects of social behavior, in this case by asking subjects directly what they would do in a particular social situation.

It is important to differentiate the ability to encode social information from performance ability. Cavell emphasized that social competence must be measured at three levels of analysis: social skills, social performance on specific tasks, and social adjustment. Most pragmatic assessments focus on social performance, although measures such as peer sociometric ratings also may be used in an attempt to capture social adjustment. Competence at
the level of social skills is rarely addressed. Social skills include encoding skills (ie, the ability to perceive and interpret a situation), decision skills (eg, to generate expected outcomes of behaviors and make decisions based on those expectations), and enactment skills (eg, the ability to generate a response).

One test aimed at the level of social encoding and decision making is the PONS, a test of encoding in which subjects are asked to identify emotions displayed by a speaker (or her upper torso), with or without distortion of the audio signal. This instrument has many limitations, including the use of an adult as the speaker and the questionable ecological and face validity of the stimuli. A second test aimed at the evaluation of encoding and decision making is The Awareness of Social Inference Test (TASIT), developed by Flanagan and colleagues to assess the ability to interpret the “dynamic and often complex displays” of emotion in daily life (p. 6) and to determine speaker intention, attitude, and meaning. The test is based on the results of earlier studies of adolescents and adults with TBI. In this videotape-based test, emotions and social behaviors such as sarcasm are presented in brief conversational vignettes featuring Australian adult method actors, and viewers are asked a series of follow-up questions regarding either the emotion depicted (ie, “Circle the feeling that best matches how she felt.”) or the target social inference (eg, “Is Ruth trying to make Michael feel appreciated?”). The main potential limitations of this instrument for adolescents are the age and accents of the actors.

Two experimental measures have been described for measuring social encoding and decision making. Dodge developed videotape-based tasks to measure children’s response to problem social situations such as provocation. This instrument has been validated in several studies of children with developmental social and behavioral disorders. Wiig and Harris developed experimental videotaped stimuli to evaluate emotion recognition. Adolescents with and without learning disabilities were asked to select which of a printed list of emotions matched an emotion being displayed by an actor in the videotape. The emotions were love, joy, frustration, fear, anger, and embarrassment. Adolescents with learning disabilities made significantly more errors than normally developing adolescents on this task, including unusual substitutions such as matching positive words with negative emotions.

The tasks just described have demonstrated criterion-related validity for the assessment of individuals with pragmatic communication disorders. However, they have several limitations, including the age of the actors, the restricted range of behaviors depicted, and the lack of data regarding the ecological validity of the target behaviors in the daily social lives of adolescents. The purpose of this study was to develop a test of social encoding that would capture aspects of adolescent daily social life and could be used to assess the level of social skill competence in the model of Cavell. In keeping with the recommendations of Damico, the test was designed to use authentic activities, be functional (ie, address activities that would contribute to social success), and help identify specific difficulties that may pose a challenge to a student with social skills impairments.

The specific aims of the study were to assess the reliability and validity of the test for the assessment of normally developing adolescents; to examine the potential influences of age, gender, and race on test scores in these individuals; and to present preliminary data for adolescents with TBI. The effects of race and gender were of particular interest, because aspects of communication behavior have been shown to be influenced by these variables (eg,31-35), and they were not considered in previous measures of social encoding.
METHOD

Participants

Participants were 60 normally developing adolescents without TBI (ND group) and 10 adolescents with TBI (TBI group) recruited as part of a larger study of social communication in adolescents with brain injury. For both groups (premorbidly in the case of the TBI group), participants were required to have no history of language or learning disability, special education services, gifted status, or neurologic or psychiatric disorder affecting cognitive function. Participants represented a range of sociodemographic backgrounds, including urban and suburban settings, with parent occupations encompassing the range of scores on the Hollingshead Four Factor Index of occupations from unemployed or menial service workers to major professionals. All participants were speakers of standard American English.

Demographic information for the ND and TBI groups is summarized in Table 1. Participants in the ND group were recruited from area schools and community sources. Participants in the TBI group were recruited from among patients discharged from two level I trauma hospitals who met the inclusion criteria and had been injured at least 6 months before their enrollment. Of the 10 individuals in the TBI group, two had received therapy aimed at social skills, and all were described by parent or self-report as having some change in social function after the injury.

The study was approved by the institutional review boards of participating school districts and hospitals. Individuals in both groups were invited to participate in the study and gave informed consent or assent (depending on the age of the subject).

Emotions and conversations tasks

To select the emotions and conversation skills stimuli to be used, information was obtained from two sources: the existing literature regarding social impairments in persons with TBI and others with social

Table 1. Subject demographic information. Moderate injury is defined as an admission Glasgow Coma Scale (GCS) score of 9 to 13 or a GCS score of 14 with intracranial lesions; severe injury is defined as a GCS score of 8 or less

<table>
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<tr>
<th></th>
<th>ND group (n = 60)</th>
<th>TBI group (n = 10)</th>
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<tbody>
<tr>
<td>Males:females</td>
<td>30:30</td>
<td>8:2</td>
</tr>
<tr>
<td>Mean age</td>
<td>17 y, 8 mo</td>
<td>16 y, 11 mo</td>
</tr>
<tr>
<td>Age range</td>
<td>13 y, 0 mo–21 y, 7 mo</td>
<td>13 y, 7 mo–21 y, 10 mo</td>
</tr>
<tr>
<td>Injury severity</td>
<td>Moderate</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>—</td>
</tr>
<tr>
<td>Age at injury</td>
<td>&lt;13 y</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>&gt;13 y</td>
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communication disorders (eg, adolescents with developmental learning disabilities) and discussions with, and observations of, more than 200 adolescents (see \textsuperscript{39,40} for a description of data collection procedures). On the basis of this information, five emotions were selected for inclusion: (1) anger, (2) irritation, (3) happiness, (4) sadness, and (5) disgust. Six conversation skills were selected for inclusion: (1) attentive listening behavior, (2) perception of nonverbal cues by the partner, (3) detection of sarcasm by the partner, (4) sharing the conversational burden equally, (5) humility (ie, versus bragging), and (6) speaking at the listener’s level. These skills were those most often identified by adolescents in focus groups and classrooms as the skills needed to be socially successful, and they also represented skills commonly cited in the literature as being impaired in adolescents with TBI\textsuperscript{9,17,25,28,41,42}

The format of the tasks was based on the structure of TASIT\textsuperscript{24} and the experimental emotion recognition task of Wiig and Harris.\textsuperscript{32} Emotions or conversation behaviors were depicted in vignettes of 10 to 45 seconds, with a pause between each vignette sufficient to allow the subject to respond. In each vignette, two adolescent amateur actors (local middle school, high school, and college students) improvised scenarios based on the target stimuli. For example, a student was asked to initiate a conversation with his or her partner, and the partner was asked to portray being a “good” or “bad” listener. The actors were Caucasian, African-American, and Hispanic boys and girls and were asked to create scenarios that would occur in daily living. The only rule for the actors was that they could not use words that directly referred to the emotions or conversation behaviors depicted (eg, “You’re talking way over my head.” “You’re making me so mad!”). Otherwise, they were free to give facial, voice, and verbal cues consistent with the target behaviors.

The ecological and face validity of the scenarios was addressed by use of subject feedback during pilot testing of the tasks, with video editing based on this feedback. In the final version of the tasks, stimuli were balanced so that each emotion and conversation behavior was demonstrated by both a boy and a girl and by both a person on the right and a person on the left in the vignette. There were 20 emotions vignettes and 23 conversations vignettes. Of the 39 roles in the emotion vignettes (one featured a sole actor), 27 were played by Caucasian actors (69%), 8 by African-American actors (21%), and 4 by Hispanic actors (10%); 20 were played by female actors and 19 by male actors. Of the 46 roles in the conversation vignettes, 32 were played by Caucasian actors (69%), 9 by African-American actors (20%), and 5 by Hispanic actors (11%); 26 were played by female actors and 20 by male actors.

**Standardized tests**

One method used to evaluate the validity of the social stimuli was to compare performance on the videotape with scores from other measures with a hypothesized relationship to social function. In the model described by Cavell,\textsuperscript{1} social perception is necessary but not sufficient for social behavior. Therefore, it was hypothesized that social perception would be high in most subjects in the ND group, whereas social behaviors would be variable. This hypothesis was tested by comparing scores on the emotions and conversations tasks with scores on the Behavioral Regulation subscale of the Parent version of the Behavior Rating Inventory of Executive Function (BRIEF),\textsuperscript{43} a measure of self-regulation of behavior in daily living. The BRIEF was selected as a behavioral measure, because it has demonstrated validity and reliability in the measurement of aspects of executive function that seemed to relate to social performance. For example, parents were asked to
rate whether their child acted "wilder or sillier than his friends" or had "outbursts for little reason."

On the basis of previous research showing a dissociation between intelligence and social competence, it was hypothesized that emotions and conversations task scores would be unrelated to vocabulary scores. To test this hypothesis, social task scores were compared with scores from the Vocabulary Subtest of the Wechsler Adult Intelligence Scales (Revised) (WAIS-R) or the Wechsler Intelligence Scales for Children (Third Edition) (WISC-III), depending on the age of the subject. A low correlation between these measures would support the divergent validity of the test.

Convergent validity was difficult to assess, given the novelty of the tasks and the expected weak relationship between social encoding and both social behaviors and intelligence. However, Wiig and Harris and Turkstra et al reported correlations between emotion recognition and scores on spatial reasoning tasks. Thus, emotions and conversations scores were correlated with scores on Subtest C of the Raven's Standard Progressive Matrices (RSPM), a measure that was related to pragmatic ability in previous research and is thought to capture fluid intelligence.

Procedure

Participants were tested individually in a quiet room. The videotapes and tests were presented to each participant by the investigator or a trained research assistant.

For the emotions task, subjects were given a scoresheet listing the five emotion choices and designating the speaker in each vignette who was displaying the target emotion (eg, "boy on the left"). For each vignette, the examiner pointed to a speaker (the one noted on the scoresheet) and stated that the question would be about this person. At the conclusion of the vignette, the subject was asked to select which of the five emotions had been displayed by the vignette speaker. Subjects noted their selection on the scoresheet. Administration was self-paced.

For the conversations task, the subject was told that the question would be about one of the two participants in each vignette and that participant was indicated by the examiner. At the conclusion of each vignette, the subject was asked a yes/no question regarding detection of the skill or deficit (eg, "Is he a good listener?"). Then one or more follow-up questions requiring either information about the basis for the decision (eg, "How can you tell?") or further analysis of the situation (eg, "How does she feel about what he's doing?"). Responses were recorded by the examiner. The time to administer the two tasks varied, depending on the subject's response time but typically was between 30 and 40 minutes.

The standardized tests were administered individually, according to test instructions. Participants were given the BRIEF Parent version and asked to have a parent complete the questionnaire and return it by mail.

Data analysis

Scoring

For the emotions task, responses were scored as correct or incorrect based on the choice circled by the subject on the scoresheet, and the percent of items correctly recognized was calculated for each subject. For the conversations task, items requiring detection were scored as correctly detected or not (eg, "Is she a good listener?" Yes/No). Answers to the follow-up questions were scored as correctly identified or not, using scoring criteria developed by the researchers based on the responses of 20 pilot subjects. The pilot subjects' responses were summarized, and the most frequently occurring responses were listed on the examiner's scoresheet. For example, the follow-up question to "Is she a good listener?" was "How can you tell?" Typical reasons given were lack of eye
contact with the speaker, turning away from the speaker, and fidgeting. Any response that included this information was scored as correct. The percent of items correctly answered was calculated for each subject.

Within-Group Effects Caused by Age, Race, and Gender

The percent of items correct on each videotape task, raw scores from the RSPM, and scaled scores from the vocabulary tests and parent questionnaire were used in data analyses. Data for the emotions and conversations tasks were highly skewed in a positive direction on both tasks and in both groups. Although analysis of variance (ANOVA) procedures are relatively impervious to violations in normality of distribution, a Boxcox transformation was used to generate distributions that were not significantly skewed for the emotions task, $P = .39$, and the conversations task, $P = .35$. Even with this transformation, it must be noted that ceiling effects in the ND group on both tasks limited the analysis of relations between social tasks and other measures of cognitive function and behavior.

A two-way ANOVA of ND group data was performed for each task to test whether scores differed according to the subject’s race (African-American versus Caucasian) or gender (male versus female). Follow-up power analyses were conducted to determine whether the sample size was sufficient to reveal differences caused by these factors. The criterion for power and sample size calculations was .80, and the formula for calculating effect size was $\frac{(M_1 - M_2)}{SD}$, where $(M_1 - M_2)$ is the difference in mean scores for the two groups for one variable (eg, gender, race, or ND/TBI), and $SD$ is the standard deviation of scores of the combined sample for that variable. The relation of age to performance was determined by correlating age in months with transformed scores on each of the two tasks.

Between-Group Effects

Criterion validity was addressed by comparing scores between the normally developing and disordered groups (contrasted groups method). The test was designed to reveal impairments in basic aspects of social encoding, and between-groups differences would support its validity for this purpose. To test this hypothesis, a one-way ANOVA for each task was used to compare performance between TBI and ND subject groups. In addition, the patterns of subject errors were compared between the two groups. Items with the lowest accuracy in the TBI group were compared with the corresponding item scores for the ND group to investigate whether TBI subjects were qualitatively or quantitatively different from their uninjured peers.

Validity

Transformed accuracy scores for the emotions and conversations tasks were correlated with scores from the BRIEF, RSPM, and vocabulary tests by use of a Pearson correlation. A Bonferroni correction was applied to correct for alpha slippage caused by the multiple comparisons performed in this correlational analysis. To test the hypothesis that behavior would be more variable than social information processing, coefficients of variation ($SD/M$) were calculated for emotions and conversations task accuracy scores and for BRIEF scores. The hypothesis would be supported by a higher coefficient of variation for BRIEF scores than for the videotape task scores.

Reliability

Ten subjects from the ND group (17%) were re-tested within 1 month ($M = 20$ days, range $= 3-31$ days) to assess test-retest reliability. Because of the small sample size, Spearman’s rank correlation coefficient was calculated for this analysis, and paired sign
Table 2. Mean scores for the ND group on the emotions and conversations tasks, by gender and race. Standard deviations are in parentheses

<table>
<thead>
<tr>
<th></th>
<th>Males (n = 30)</th>
<th>Females (n = 30)</th>
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<tbody>
<tr>
<td></td>
<td>African-American (n = 9)</td>
<td>Caucasian (n = 21)</td>
</tr>
<tr>
<td>Emotions task</td>
<td>91.05 (5.42)</td>
<td>93.15 (6.48)</td>
</tr>
<tr>
<td></td>
<td>89.67 (8.78)</td>
<td>92.59 (9.76)</td>
</tr>
<tr>
<td>Conversations task</td>
<td>92.35 (10.10)</td>
<td>96.06 (3.80)</td>
</tr>
<tr>
<td></td>
<td>94.94 (4.24)</td>
<td>94.40 (6.07)</td>
</tr>
</tbody>
</table>

tests were used to evaluate the direction of any practice effect. Inter-rater reliability was established during the training phase of test development and was greater than 98% for the two tasks.

A criterion alpha level of .05 was set for all statistical analyses. Data were analyzed using Stata™ statistical software.

RESULTS

Reliability

In regard to test-retest reliability, there was a significant correlation between scores at the first and second test administration for both the emotions task, Spearman's rho = .70, P = .02, and the conversations task, Spearman's rho = .68, P = .03. There was no evidence of a significant practice effect on either task. From the first to the second administration of the emotions task, five subject scores increased and five decreased, binomial P = .62. From the first to the second administration of the conversations task, scores increased for four subjects and decreased for six subjects, binomial P = 1.00. All changes were within 1 SD of the mean for the ND group.

Effects caused by race, gender, and age

Summary data for the ND group are presented in Table 2. There was no significant effect of gender or race, or interaction of gender and race, for either the emotions task, all Fs ≤ 2.37, P's > .05, or the conversations task, all Fs ≤ .51, P's > .05. It is possible that there was insufficient power to detect a difference in the population means. However, power analyses revealed that significant differences would be obtainable only in a very large sample (eg, for a power of .80, approximately 900 subjects would be needed to detect a significant difference caused by race on the conversations task). There was no significant correlation of age with either the emotions or conversations task scores, r = -.11, P = 1.00, and r = .12, P = .92, respectively.

Table 3. Summary of conversations and emotions task scores for TBI and ND subject groups

<table>
<thead>
<tr>
<th></th>
<th>ND group (n = 60)</th>
<th>TBI group (n = 10)</th>
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<tbody>
<tr>
<td>Emotions task</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>91.97</td>
<td>76.63</td>
</tr>
<tr>
<td>SD</td>
<td>7.87</td>
<td>10.99</td>
</tr>
<tr>
<td>Median</td>
<td>94.44</td>
<td>80.00</td>
</tr>
<tr>
<td>Conversations task</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>94.78</td>
<td>87.80</td>
</tr>
<tr>
<td>SD</td>
<td>5.85</td>
<td>7.57</td>
</tr>
<tr>
<td>Median</td>
<td>96.80</td>
<td>90.04</td>
</tr>
</tbody>
</table>
ND group versus TBI group

Scores for the ND and TBI groups are summarized in Table 3. Because the raw (untransformed) data are skewed toward high scores, median values also are presented. There was a significant difference between the ND and TBI group scores on the emotions task, $F(1,68) = 25.22, P = .00$. There also was a significant difference between the ND and TBI group scores on the conversations task, $F(1,68) = 10.36, P = .00$.

For the emotions task, there were eight items on which more than two subjects in the TBI group made errors. As shown in Figure 1, error patterns across these items were similar between the ND and TBI groups, $r = .80, P = .02$. Although TBI subject accuracy rates were lower than those of the control group, items that were answered incorrectly by more subjects in the control group also were answered incorrectly by more subjects in the TBI group. The TBI errors included close errors such as the substitution of angry or disgusted for irritated and also unusual errors such as the substitution of happy for sad, angry, or irritated.

For the conversations task, error patterns were dissimilar between the ND and TBI groups, $r = -.42, P = .30$. Figure 2 depicts accuracy rates for the eight items on which TBI subjects made the most errors. The most common error in the TBI group was failure to detect either the speaker's sarcasm or the listener's response to sarcasm (six questions). Other errors included the failure to accurately identify that a speaker is bragging or identify the listener's reaction to a speaker who is bragging (two questions).

![Chart](image.png)

**Fig 1.** Error patterns in ND and TBI subjects on the Emotions task.
Validity

BRIEF Parent questionnaires were returned for 29 (48%) of the subjects, exceeding the 15% return rate typically observed by the BRIEF authors (S. Guy, Personal communication, February 16, 2001). The average BRIEF scaled score was 49.48, SD = 10.68. As predicted, in the ND group there was no significant correlation between scores for the Behavioral Regulation subscale of the BRIEF and scores on the emotions and conversations tasks, $r = .25, P = 1.00$ and $r = .24, P = 1.00$, respectively. The coefficients of variation were .22 for BRIEF scores, .11 for emotions task scores, and .07 for conversations task scores. This was consistent with the hypothesis that social information processing would vary less than social behavior. There was no significant correlation between measures of vocabulary and scores on the emotions and conversations tasks, $r = .16, P = 1.00$, and $r = .16, P = 1.00$, respectively. These findings tend to support the divergent validity of the tasks, although interpretation is limited by the ceiling effect in scores on the videotape tasks.

Scores on the RSPM Subtest C were not significantly correlated with scores on either the emotions task, $r = .14, P = 1.00$, or the conversations task, $r = .00, P = 1.00$. Thus, the convergent validity of the tasks was not supported.

The effect size of the between-groups difference for the emotions task was 1.48 SD, with a power of 1.00 at an alpha level of .05. The effect size for the between-groups
difference for the conversations task was 1.33 SD, with a power of .90 at an alpha level of .05. These findings support the criterion-related validity of the tasks.

**DISCUSSION**

An on-line videotape test of emotion recognition and judgment of conversation skills was developed for adolescents ages 13 to 21. The test was designed to measure basic social behaviors that are typically mastered in adolescence, and, consistent with this, scores for normally developing subjects were generally high for both tasks included in the test. The validity of the test for evaluating emotional and social encoding in adolescents and its potential for adolescents with TBI were addressed in several ways. First, the test was based on sources of information such as a theoretical model of social competence, the literature on social skills in persons with TBI and other acquired and developmental communication disorders, and data from the target population. Second, pilot subjects provided feedback regarding the extent to which test stimuli represented real events in daily living. Third, actors in the videotape were the age, race, and cultural groups of the target population. Fourth, some evidence of divergent validity was provided by the weak correlation of task scores with scores on a test of vocabulary, which was not expected to relate to social encoding, although ceiling effects on the encoding tasks limited this analysis. Last, the tasks’ criterion-related validity was supported by the significant difference in scores between normally developing subjects and their peers with TBI.

Evidence for convergent validity was not found, because scores from the social recognition tasks were not correlated with scores on a test of spatial reasoning. This finding may be due to several factors, including the restricted range of scores on both the social encoding tasks and the RSPM and the use of scores from only one subset of that test.

In the sample described, there was no significant effect of race, gender, or age on performance. Although the sample size and power of the analysis suggest that such effects may be present in a larger sample, the sample size required to show an effect is very large, and the actual difference between means is small. Thus, an obtained effect is not likely to be practically significant. If this type of task is relatively insensitive to the gender and race effects studied here, it may have broad application among speakers of standard American English. The tasks may have ecological validity in dialect speakers as well. In a preliminary field test of TASIT, first-generation Hispanic students were able to accurately identify target behaviors such as sarcasm, even though they had limited English proficiency and TASIT speakers were Australian actors. These results suggest that social interactional behaviors such as sarcasm may be shared by the larger culture of adolescence.

The performance of adolescents with TBI differed significantly from that of their uninjured peers in regard to both the recognition of emotions and the detection and integration of on-line social behaviors. It is noteworthy that effects were found even in this small and heterogeneous sample of adolescents with TBI, and further evaluation of the validity and reliability of social encoding tasks in this population is warranted.

An analysis of errors revealed that subjects in the TBI group made similar errors in emotion recognition, albeit with greater frequency, but made qualitatively different errors on identification of social conversation skills. It is of interest that subjects in both groups had the greatest difficulty identifying sadness in the last of the Emotions vignettes (No. 20). For this single item, an attempt was made to replicate the TASIT format of dissociating the verbal from the nonverbal aspects of
the emotion, so that the verbal message ("I got an 85 on my test.") was relatively neutral, whereas the actor’s voice and facial expression were sad. This mixed message was successfully conveyed by the professional actors in TASIT,24 but the amateur actors used here were unable to replicate the effect.

Most errors on the conversation skills task were related to the detection of sarcasm and the feelings it evokes in the listener, consistent with the results of previous studies showing impaired comprehension of sarcasm and other forms of social inference in adults,27 children,10,11,52 and adolescents with TBI. Other errors were related to the detection of bragging and its effects on the listener. Bragging shares with sarcasm the characteristic of combining an explicit message (in this case, "I'm great.") with an implicit message ("You’re not as great."). Errors on this type of item are consistent with the finding of Dennis and colleagues10 that children with TBI had difficulty understanding underlying intents. It is interesting to note that individuals with TBI made errors not only on the detection of bragging and sarcasm as they were expressed but in describing the recipient’s reaction even when they accurately identified the speaker’s behavior. It would be of interest to assess whether this represents a failure shift to the perspective of the listener, a phenomenon that has been documented in TBI,17 or is related to difficulty in understanding communicative intent on the listener side as on the speaker side.

The assessment of social recognition may provide useful information in rehabilitation. To illustrate, two subjects (subjects A and B) in the TBI group were described by their parents and teachers as frequently exhibiting "socially inappropriate behaviors." Both sustained frontal lobe injuries and had difficulty communicating in social settings. However, subject A earned a score of 94% on the conversations task, and subject B received a score of 75%. These results suggest that although the daily behavior of these two individuals might be similar, the reasons for that behavior might differ. For example, subject A may recognize social cues but be unable to regulate his behavior accordingly, whereas subject B may not consistently recognize social cues. Thus, therapy directed at sensitization to social cues could be more useful for subject B, whereas strategies for self-monitoring might be more appropriate for subject A.

The video assessment tasks have several limitations in their current form. First, the behaviors sampled were designed to represent minimum competencies for adolescent communication, and deficits in processing subtle pragmatic cues may not be revealed. Second, the tasks are specific to the culture of the participants and are not likely to reflect the values and behaviors of individuals in, for example, Eastern cultures. Third, the relatively high scores in both groups suggest that the tasks could be shortened. For example, each behavior could be presented only once. However, the gain in time would be offset by a possible decrease in the reliability of the test and the increased possibility that deficits may be missed in individuals with disorders such as right-sided neglect.

The tasks used did not seem to be sensitive to age differences. This was unsurprising given the basic skill level of the tasks and the fact that conversational behaviors such as those sampled here may be established by the early teen years. Nevertheless, it would be of interest to determine the age at which consistently high performance levels are attained. This would increase the usefulness of the test, because many social interventions occur before high school.

The results support the potential application of such measures for the assessment of individuals with TBI. Data from this preliminary sample suggest directions for future research. First, it would be of interest to explore
the relationship between age at injury and the ability to identify social cues. It may be that an early frontal lobe injury impairs the ability to learn social cues and that individuals injured later in life may have better encoding skills. Alternatively, individuals who are injured at a young age may have had several years of experience and therapy, whereas those with relatively recent injuries may not have had sufficient time to develop compensatory strategies. Second, the interaction of premorbid developmental learning disabilities and injury also should be addressed in future research. Individuals with pre-existing developmental disorders were excluded from this study for lack of an appropriate comparison group, but these individuals represent a substantial portion of the TBI population. Third, the measurement of more subtle and complex social communication behaviors should be attempted, although it was encouraging to find that individuals with TBI had many strengths in the identification of basic social behaviors. The tasks currently are being expanded and refined for this purpose. Finally, it would be of interest to compare task accuracy to measures of social performance other than the BRIEF, which was not designed specifically to capture social communication function. In particular, comparisons with direct observation of verbal and nonverbal social communication behaviors could yield information that would be highly relevant for intervention planning.

Video assessment tasks were developed to address an aspect of social skill that may have an important influence on significant life outcomes. The results provide preliminary evidence of validity and reliability for the assessment of aspects of social encoding in adolescents. The data suggest that performance does not vary significantly depending on the age, gender, and race of the adolescent. The results support the potential usefulness of encoding-based measures in the evaluation of persons with TBI, and the results obtained may influence the direction of intervention for social communication disorders.

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