Evaluation of a Social-Skills Training Group Intervention With Children Treated for Brain Tumors: A Pilot Study

Lamia P. Barakat,1 PhD, Jennifer D. Hetzke,1 MS, Bernadette Foley,2 LSW, Marissa E. Carey,3 PhD, Kunsang Gyato,4 PhD, and Peter C. Phillips,5 MD

1Drexel University, 2The Children’s Hospital of Philadelphia, 3University of Arizona College of Medicine, 4Schneider Children’s Hospital, and 5The Children’s Hospital of Philadelphia and the University of Pennsylvania School of Medicine

Objective  To evaluate the effectiveness of a manual-based, social-skills training, group intervention to improve social skills and social functioning of children treated for brain tumors, and to assess the impact of cognitive functioning on the effectiveness of the intervention.

Methods  Three social-skills training group interventions, each comprised of 5 to 7 children ages 8 to 14 years, were conducted. A parent component was included. In total, 13 children and their parents and teachers completed standard measures prior to and 9 months after the intervention. Children participated in a neuropsychological test battery at baseline.

Results  Social skills and social functioning variables changed in the direction of improved functioning, with several scores showing significant improvement from baseline to the follow-up assessment. Small to medium effect sizes were documented. Higher verbal and nonverbal functioning were associated with greater improvement. Conclusions  Findings are suggestive of the potential effectiveness of social-skills training in groups for children with brain tumors. Multisite, randomized, controlled studies are recommended as the next step.

Key words  pediatric brain tumors, social-skills training, cognitive functioning.

Survival rates for pediatric brain tumor patients have increased in the past 20 years to about 60% (Ries et al., 1999). Increased rates of survival for children with brain tumors have been linked to medical, cognitive, and psychosocial sequelae due to the nature and location of the disease process and the use of intensive treatment methods including surgery, radiation, and chemotherapy.

Low social competence is consistently reported among children treated for brain tumors. Carpentieri and colleagues (1993), in a longitudinal study of 40 children off treatment for 2 to 3 years, reported that children treated for brain tumors showed lower social competence compared with a group of children with other cancers, and both cancer groups showed elevated levels of behavior problems. Findings from a study of 29 children at least 6 months off treatment for hypothalamic tumors were consistent with the Carpentieri et al. study (Foley, Barakat, Herman-Liu, Radcliffe, & Molloy, 2000). Furthermore, in a sample of 38 children 2 to 5 years off treatment for a brain tumor, Radcliffe and her colleagues (1996) found problems in the social sphere and with communication skills, while ratings of behavior problems by mothers, children, and teachers were consistent with normative samples. Other researchers support problematic social functioning, including social isolation, in children treated for brain tumors compared with healthy children using rating scales (Mulhern, Carpentieri, Shema, Stone, & Fairclough, 1993; Mulhern, Hancock, Fairclough, & Kun, 1992) and peer nomination methods (Vannatta, Gartstein, Short, & Noll, 1998).

These problems may be due to deficits in cognitive functioning, changes in physical appearance, increased physical limitations, and missed school days and social activities (Carey, Barakat, Foley, Gyato, & Phillips, 2002; Carpentieri et al., 1993; Mulhern et al., 1993; Spirito et al., 1990; Vannatta et al., 1998). Problems in cognitive func-
tioning that may underlie social-skills deficits have been hypothesized to be due to white matter damage secondary to cranial radiation therapy (Rourke, 1995). The right cerebral hemisphere, which has a greater affinity for multimodal processing and an increased facility for processing complex, novel information, may be more prone to the deleterious effects of radiation, since it has a greater proportion of white matter to gray matter compared with the left cerebral hemisphere (Goldberg & Costa, 1981). Reduced white matter volumes associated with lower IQ scores have been reported in survivors of pediatric brain tumors (Mulhern et al., 1999). In addition, cognitive deficits typically associated with right hemisphere functions are often reported among survivors, and right hemisphere deficits have been correlated with parent report of poor social functioning (Carey et al., 2001). Although social-skills deficits have not been directly linked to white matter loss, it might be expected that survivors of pediatric brain tumors would have difficulties in the acquisition and maintenance of social skills, since these skills require interpretation of multimodal stimuli (e.g., affect, prosody, and language); adaptation to new and complex situations; and spatial, holistic, and integrative processing.

There is strong evidence to support the effectiveness of social-skills training in improving social competence in children with various conditions (Forness & Kavale, 1996; Gresham, 1985; Schneider, 1992), and strategies to improve the generality of such interventions are being developed with some success (Fox & McEvoy, 1993). Plante, Lobato, and Engel (2001), following a review of the literature, concluded that the evidence regarding the efficacy of group interventions to improve adaptation in children with chronic medical conditions is promising. However, empirical studies that address interventions for the social-skills deficits that may underlie problems in social adaptation of children with chronic illnesses, particularly brain tumors, are quite limited. Die-Trill et al. (1996) conducted a structured group social-skills intervention with 8 boys who were 1 to 12 years off treatment for brain tumors. Feedback from the participants suggested that the social-skills intervention was helpful. Varni, Katz, Colegrove, and Dolgin (1993) report that children with cancer who received a manual-based, social-skills training, individual intervention perceived greater peer and teacher support and showed fewer behavior problems at 9-month follow-up compared with children who received a standard school reintegration program (children with brain tumors were not included in the sample).

In this report, we present data from a pilot study in which the effectiveness of a manual-based, social-skills training, group intervention for school-age children treated for brain tumors and their parents was evaluated. Social skills related to reducing social isolation (starting, maintaining, and ending conversations, giving compliments), and improving the quality of social interactions (nonverbal social skills, cooperation, conflict resolution) were targeted. We expected that participating children would show improved social skills and social functioning and decreased behavior problems from baseline to postintervention follow-up 9 months later. In addition, we explored the association of cognitive functioning with the children's ability to benefit from the intervention. Based on the literature suggesting an association of cognitive functioning with social skills (Carey et al., 2001), it was expected that higher verbal and nonverbal cognitive functions would be associated with greater improvement in social skills and social functioning and a reduction in behavior problems.

Method

Participants

Children between the ages of 8 and 14 years were identified through the neuro-oncology tumor registry of a large east coast children's teaching hospital. To be eligible, children had to have received treatment for a brain tumor and been off treatment for at least 6 months, and had to live within one hour of the hospital. Families in which parents or children did not speak primarily English were excluded. Of 43 families contacted, 18 agreed to take part in the study and completed baseline measures, yielding an overall participation rate of 42%. Common reasons for refusal included: lack of interest on the part of the child (8), scheduling conflicts (5), insufficient transportation (3), family health problems (2), and other (7) (no-show for baseline assessment, family believed intervention would be too difficult for the child). Participants and nonparticipants were compared on data available through the tumor registry; there were no significant differences with respect to age, ethnicity, or gender. There were no differences between groups in the distribution of brain tumor diagnoses.

The total number of child participants included in the analyses was 13, as 2 families withdrew during the intervention due to time constraints, 1 child died shortly after completing the intervention, and 2 families did not return follow-up assessment forms. Both mothers (13) and fathers (8) participated in the intervention, although data from one primary caregiver were used in the analyses. Attendance was nearly 100% for participants.

The average age of participant children was 10.77 years ($SD = 1.96$, range = 8–14). Most (69.2%) participants were male. Twelve of the participants were white; one
was African American. Eleven of the children lived in two-parent households; 27.2% had a household income under $49,999 per year, 36.4% had a household income of $50,000 to $99,999 per year, and 36.3% had a household income over $100,000 per year. Most fathers had graduated from college and/or graduate school (53.8%).

The brain tumor diagnoses of the children were as follows: 4 with posterior fossa primitive neuroectoderm tumors, 3 with astrocytomas, 3 with optic pathway gliomas, 2 with gangliogliomas, and 1 with pineal germinoma. Average age at diagnosis was 4.82 years (SD = 3.24, range = 4 months–10 years), and average time off treatment was 4.22 years (SD = 2.72, range = 1–10 years). Four children were treated with surgery + radiation + chemotherapy, 2 children with surgery + radiation, 1 child with radiation + chemotherapy, 2 with chemotherapy only, 1 with radiation only, and 1 with surgery + chemotherapy + bone marrow transplantation. Parents reported that 9 children had learning problems, 9 were in special education placements, and 5 had repeated a grade. As a group, they had an average of 10.08 days absent from school in the past year, and 5 had repeated a grade. As a group, they had an average of 10.08 days absent from school in the past year, and 5 had repeated a grade.

**Measures**

**Social-Skills Rating System**

Children, parents, and teachers were asked to complete their respective versions of the Social-Skills Rating System (SSRS; Gresham & Elliott, 1990), a measure of both positive and negative social behaviors in which respondents rate on a 3-point scale the frequency at which behaviors are exhibited. Reliability and validity for this scale are acceptable. Standard scores for the Social Skills and Problem Behaviors (parent and teacher) subscales were used.

**Child Behavior Checklist, Youth Self-Report, and Teacher Report Form**

The Child Behavior Checklist (CBCL), Youth Self-Report (YSR), and Teacher Report Form (TRF) (Achenbach, 1991) are widely used in samples of children with chronic illness and have established reliability and validity. These scales provide a measure of both adaptive and maladaptive behaviors from multiple informant. The CBCL and TRF are normed for ages 4–18 and 5–18, respectively. The YSR, however, provides norms for children between the ages of 11 and 18. In order to include multiple child-report measures, the scores for the 5 children younger than 11 were derived using the 11-year-old norms. For these questionnaires, the Internalizing Behavior Problems and Externalizing Behavior Problems Scale standard scores were used as well as the Total Social Competence (CBCL, YSR) or Adaptive Functioning (TRF) Scale standard scores.

**Miami Pediatric Quality of Life Questionnaire**

The Miami Pediatric Quality of Life Questionnaire (MPQLQ; Armstrong et al., 1999) requires children and parents to evaluate objective frequency and subjective importance of 39 behaviors or activities along a 5-point scale to assess general quality of life. Although developed with a pediatric oncology sample, the MPQLQ is not disease specific. Three subscales—social competence, emotional stability, and self-competence—and a total score are computed. The objective social competence subscale, reflecting satisfactory friendships and participation in activities, was used. Cronbach’s alpha for this subscale with this sample was .60 for the parents’ report and .88 for the children's report.

**Wechsler Intelligence Scale for Children–Third Edition**

The Wechsler Intelligence Scale for Children–Third Edition (WISC–III; Wechsler, 1991) was administered as part of a neuropsychological assessment battery used to evaluate a separate research question related to the utility of the nonverbal learning disability (NVLD) model in children treated for brain tumors. One of the most frequently used measures in child neuropsychological assessment, the WISC–III provides an estimate of a child's level of cognitive functioning. It is normed for children between the ages of 6 and 16 years and is demonstrated to have excellent reliability in its standardization sample. The Verbal Comprehension Index (VCI) was used as a measure of verbal skills; the Perceptual Organization Index (POI) was used as a measure of nonverbal abilities.

**Program Evaluation**

At the last session, parents and children were asked to evaluate the intervention using feedback forms created specifically for the study. Participants rated how interesting and helpful the workshops were on a Likert-type scale and answered open-ended questions. Parents were asked, for example, to describe their expectations for both themselves and their children during the intervention. Children were asked to identify those aspects of the intervention they liked the best and the least.

**Procedure**

Approximately one month (M = 0.99, SD = 1.37, range = 0–4) prior to the intervention, and following consent by
parents and assent by children, a comprehensive neuropsychological test battery was administered to children by a supervised advanced clinical psychology graduate student. Parents and children were asked to complete baseline measures. Teachers, identified by participants, were mailed release-of-information and baseline forms to complete and return via a self-addressed, stamped envelope. The mean number of months between the last session and completion of follow-up forms was 9.56 (SD = 4.84, range = 6–20) for parents, 9.79 (SD = 4.92, range = 6–20) for children, and 9.02 (SD = 4.80, range = 6–22) for teachers. The protocol was approved by the appropriate institutional review boards.

**Intervention**

Three social-skills interventions took place between May 1999 and June 2000. Specific social skills were targeted and the detailed manual was developed based on the brain tumor and the social-skills training literature and through collaboration with pediatric psychologists involved in social-skills training (Elliott & Gresham, 1991; King et al., 1997; Michelson et al., 1983; Noll, personal communication, August 1998; Varni, personal communication, September 1998; Varni & Katz, 1989; Walker et al., 1983). The manual provided a script for the interventionists (two interventionists for the children's groups and two interventionists for the parents' groups) for each session with example role-plays and specific homework assignments. Interventionists were advanced clinical psychology graduate students or mental health professionals. Each session was observed to ensure adherence to the manual, and supervision took place before and directly after each session to discuss competence in implementing the intervention. Groups met weekly for six sessions in which the following social skills were targeted in order to decrease isolation and improve friendships: nonverbal communication; starting, maintaining, and ending conversations; giving and receiving compliments; empathy and conflict resolution; and cooperation. To ensure completion of homework and to review concepts, weekly homework assignments were reviewed with parents and children at the beginning of each session. Participants then met in separate groups.

In the children's groups, interventionists provided a definition of the skill, led the children in a discussion of the rationale for the behavior and situations in which the behavior would be necessary, and modeled both good and bad examples of the skill. The majority of session time was devoted to guided role-plays in which children rehearsed the skills and received social reinforcement and corrective feedback from peers and interventionists. Signs and flip charts were provided as visual reminders during this stage. Children generally worked in pairs or triads to role-play a real-life scenario provided by the interventionist. Those children not directly involved in the role-play were asked to observe and then provide feedback. An overall evaluation was given (i.e., thumbs up or thumbs down) and specific points were discussed. One scenario in the conversation skills session brought all of the children together to practice their skills as they pretended to travel to school on a bus. Pairs of chairs were arranged to simulate the bus, and two children were seated and instructed to begin a conversation. The remaining children then had to join in the conversation as they were “picked up” at their individual bus stops.

The parent component, included in order to improve generality of results (Fox & McEvoy, 1993), was manualized, incorporating information regarding the targeted social skills, problem-solving barriers to practicing social skills at home and at school, and discussion of the impact of the brain tumor on the child and on the family. Parents also collaborated to help one another develop creative ways to practice the targeted social skills with their children and to generally enhance their children's functioning. For example, because two interventions took place in early spring, parents shared information on appropriate day-camp programs. Also, parents shared suggestions on how to guide their children in setting up play dates. Interventionists emphasized the ongoing need for parents to evaluate and reinforce or correct their child's use of the social skills outside the intervention setting.

Strategies to support the generality of the intervention were essential components of the curriculum. Weekly homework assignments were given to allow children the opportunity to practice the targeted skill over the course of the week in different situations. Parents and children received weekly handouts describing the targeted social skill and the assignments, and answers were recorded in bound homework notebooks, which were distributed to children during the first session. One assignment from the week devoted to conversation skills required children to write a skit in which they introduced themselves to a group of individuals, joined a conversation, maintained the topic for at least three exchanges, and finally ended the conversation appropriately. The following week, these skits were role-played by the families during the homework review. In addition to supervising and assisting with homework, parents were encouraged to discuss the weekly lessons with their children and even practice role-plays if possible. To encourage maintenance further, the final session brought
the parents and children together in a game format, which required cooperation and teamwork among the children. Interventionists reinforced children’s and parents’ use of the previously taught social skills.

**Approach to Data Analyses**

As a first step, summary statistics for the baseline and 9-month follow-up social skills and social functioning scores were computed, and the standing of the sample relative to the normative values for these scales was noted. Additional preliminary analyses included assessment of the role of somatic symptoms in YSR/CBCL/TRF scores, differences in scores across raters, and examination of the correlations among the demographic, disease-related, social-skills, and social functioning variables. Second, results of paired-samples t-tests to examine change over time were presented, and effect sizes were computed using procedures recommended by Jaccard and Guilamo-Ramos (2002). Third, VCI and POI scores were compared, and the association of the VCI and POI with change scores was examined (as computed by subtracting the baseline score from the follow-up score for social skills and social functioning and by subtracting the follow-up score from the baseline score for the behavior problem variables so that higher change scores reflect improved social functioning). Spearman correlations were used due to the lack of normal distribution of POI and change scores. A p value of .05 was chosen with no correction in order to allow for the identification of potential areas of change. Trends, identified at p < .10, were interpreted also. Finally, participant evaluations were described.

**Results**

**Preliminary Analyses**

Examination of the means and standard deviations of the social-skills and social functioning variables as reported by children, parents, and teachers revealed that functioning was within the normal/average range at the baseline and follow-up assessments (see Table I). Follow-up analyses were conducted as suggested by Drotar, Stein, and Perrin (1995) to assess the contribution of somatic symptoms to level of problems reported and change in scores over time. Findings were similar across raters, so findings from the YSR are reported here. Examination of frequencies indicated relatively few endorsements of somatic items and small change from baseline to follow-up, with three exceptions. Overtired was endorsed by 7 children at baseline and 5 children at follow-up. Stomach aches/cramps was endorsed by 4 children at baseline and 3 children at follow-up. Dizzy was endorsed by 3 children at baseline and 4 children at follow-up.

**Table I. Social Skills and Social Functioning at Baseline and 9-Month Follow-up**

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Follow-up</th>
<th>t</th>
<th>p</th>
<th>Eta²</th>
<th>%a</th>
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<td><strong>Child Report</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>YSR Internalizing</td>
<td>49.20 (11.19)</td>
<td>44.00 (8.89)</td>
<td>2.65</td>
<td>.026*</td>
<td>.44</td>
<td>18</td>
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<tr>
<td>YSR Externalizing</td>
<td>47.80 (13.81)</td>
<td>40.50 (12.96)</td>
<td>2.03</td>
<td>.073*</td>
<td>.31</td>
<td>0</td>
</tr>
<tr>
<td>YSR Total Competence</td>
<td>40.33 (12.10)</td>
<td>48.00 (9.25)</td>
<td>–1.65</td>
<td>NS</td>
<td>.25</td>
<td>27</td>
</tr>
<tr>
<td>MPQLQ Social Competence</td>
<td>2.85 (.93)</td>
<td>3.31 (.74)</td>
<td>–3.37</td>
<td>.008**</td>
<td>.51</td>
<td></td>
</tr>
<tr>
<td>SSRS Social Skills</td>
<td>102.60 (13.69)</td>
<td>109.50 (16.68)</td>
<td>–1.55</td>
<td>NS</td>
<td>.20</td>
<td>9</td>
</tr>
<tr>
<td><strong>Parent Report</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>CBCL Internalizing</td>
<td>58.27 (9.42)</td>
<td>55.00 (12.88)</td>
<td>1.27</td>
<td>NS</td>
<td>.25</td>
<td>27</td>
</tr>
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<td>CBCL Externalizing</td>
<td>50.91 (15.27)</td>
<td>47.64 (14.85)</td>
<td>1.68</td>
<td>NS</td>
<td>.29</td>
<td>9</td>
</tr>
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<td>SSRS Problem Behaviors</td>
<td>104.50 (19.36)</td>
<td>100.00 (15.92)</td>
<td>1.26</td>
<td>NS</td>
<td>.15</td>
<td></td>
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<td>CBCL Total Competence</td>
<td>35.27 (10.36)</td>
<td>40.09 (10.59)</td>
<td>–2.24</td>
<td>.049**</td>
<td>.33</td>
<td>27</td>
</tr>
<tr>
<td>MPQLQ Social Competence</td>
<td>2.55 (.40)</td>
<td>2.62 (.48)</td>
<td>–.49</td>
<td>NS</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>SSRS Social Skills</td>
<td>91.27 (12.64)</td>
<td>97.00 (13.33)</td>
<td>–1.39</td>
<td>NS</td>
<td>.16</td>
<td>27</td>
</tr>
<tr>
<td><strong>Teacher Report</strong></td>
<td></td>
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<tr>
<td>TRF Internalizing</td>
<td>56.20 (9.98)</td>
<td>51.60 (6.60)</td>
<td>1.61</td>
<td>NS</td>
<td>.22</td>
<td>40</td>
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<td>TRF Externalizing</td>
<td>56.00 (12.21)</td>
<td>53.10 (10.47)</td>
<td>2.24</td>
<td>.052*</td>
<td>.36</td>
<td>20</td>
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<tr>
<td>SSRS Problem Behaviors</td>
<td>104.00 (12.42)</td>
<td>100.40 (11.94)</td>
<td>1.95</td>
<td>.084*</td>
<td>.30</td>
<td>0</td>
</tr>
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<td>TRF Adaptive Functioning</td>
<td>48.20 (8.97)</td>
<td>47.30 (9.72)</td>
<td>.35</td>
<td>NS</td>
<td>.01</td>
<td>20</td>
</tr>
<tr>
<td>SSRS Social Skills</td>
<td>97.90 (10.54)</td>
<td>99.80 (12.97)</td>
<td>–.68</td>
<td>NS</td>
<td>.03</td>
<td>0</td>
</tr>
</tbody>
</table>

Where applicable, percentage of children who moved from the clinical or low average to the nonclinical or average range from baseline to follow-up.

*p < .10.

**p < .05.**
No variables were controlled in the analyses as correlations showed 2 significant associations (out of 160 correlations). There were no significant correlations of demographic variables (child age, child sex, total household income, parent education levels, parent marital status) and disease-related variables (days absent from school, learning problems, current medication status) with the social functioning variables at baseline. Months off treatment was significantly correlated with child MPQLQ Social Competence \(r = .75, p = .005\) and child SSRS Social Skills \(r = .67, p = .017\) at baseline.

**Evaluation of Change in Social Skills, Social Competence, and Behavior Problems**

Paired-samples \(t\)-tests indicated significant improvement in child MPQLQ Social Competence \([t(9) = -3.37, p = .008]\) and YSR Internalizing Behavior Problems \([t(9) = 2.65, p = .026]\) and a trend for YSR Externalizing Behavior Problems \([t(9) = 2.03, p = .073]\) (see Table I). For parent-reported variables, there was significant improvement for CBCL Total Competence \([t(10) = -.24, p = .049]\). For teacher-reported variables, the following scores showed trends for improvement: TRF Externalizing Behavior Problems \([t(9) = 2.24, p = .052]\) and SSRS Problem Behaviors \([t(9) = 1.95, p = .084]\). Examination of effect sizes suggests small to medium effects from baseline to follow-up assessment, with the largest effect sizes shown for child-reported variables. Additionally, about one third to one fifth of children’s scores (on the YSR/CBCL/TRF) moved from the clinical range to the nonclinical range from baseline to follow-up, suggesting clinical significance.

**Cognitive Functioning and Social-Skills Change Scores**

The mean WISC–III VCI score was 91.83, which is in the average range (SD = 17.03, range = 63–123). The mean WISC–III POI score was 79.75, which is in the borderline range (SD = 18.43, range = 51–104). The mean POI score was found to be significantly lower than the mean VCI score \([t(11) = -2.75, p = .019]\). The VCI score was significantly associated with change in YSR Internalizing Behavior Problems \((r = .81, p = .003)\), change in YSR Externalizing Behavior Problems \((r = .73, p = .017)\), and change in teacher SSRS Social Skills \((r = .93, p = .000)\). The POI score was significantly associated with change in YSR Internalizing Behavior Problems \((r = .66, p = .040)\). Correlations suggested that higher verbal and nonverbal functioning were associated with improved social skills and decreased behavior problems. The Figure presents scatterplots for these significant correlations with each participant’s change score plotted against his or her VCI or POI score.

**Program Evaluation**

Parents and children agreed that the intervention met their goals and reported that they were highly or extremely satisfied with the intervention (a thumbs up on the children’s form). The children most enjoyed the role-plays and making friends. Parents most enjoyed talking with other parents, spending special time with their children, and seeing their children’s excitement.

**Discussion**

Findings provide tentative support for the potential effectiveness of a social-skills training, group intervention for children treated for brain tumors. Significant improvement from baseline to follow-up was found for child-reported MPQLQ social competence and parent-rated CBCL total competence, and a significant reduction in child-reported internalizing behavior problems was found. Trends were found for reductions in child-reported externalizing behavior problems, teacher-reported externalizing behavior problems, and teacher-reported SSRS problem behaviors. Some evidence of clinical significance was found in that a number of children moved from the clinical to the nonclinical range in terms of behavior problems and social competence. Other variables did not reach significance, and effect sizes ranged from small to medium. In addition, parents and their children rated the program quite positively.

Overall, findings regarding the influence of cognitive functioning are suggestive but require further exploration. The VCI of the WISC–III was more consistently associated with change over the course of the intervention than was the POI. The finding associating verbal abilities with greater improvement is not particularly surprising, as the intervention had a strong verbal component in explanations, demonstrations, and role-plays. The children in this sample had significantly lower scores on the POI of the WISC–III compared with their scores on the VCI, which is consistent with reports of a pattern of deficits as described by the NVLD model in children treated for brain tumors (Buono et al., 1998; Carey et al., 2001). As regards the lack of stronger support for the role of nonverbal abilities in the effectiveness of the intervention, it may be that the standard measures used in this study do not adequately capture the nonverbal skills involved in social functioning. Future studies might incorporate emerging direct measures of social attribution, interpretation of af-
fect and prosody, and demonstration of nonverbal components of social skills.

Social functioning of the children who participated was rated within the normal range across informants at baseline. Yet, observation by the interventionists indicated that the children showed social-skills deficits that impacted their ability to interact appropriately with peers and adults. Moreover, the parents in their groups remarked consistently that social adjustment was one of their primary concerns for their children. Therefore, although parents anecdotally reported difficulty in moving their children toward higher social functioning, the standard instruments used in this study did not appear to measure adequately the social problems experienced by these children. In addition, the use of the YSR with children under age 11 certainly resulted in unreliable statements regarding level of functioning and may have overestimated internalizing behavior problems due to high endorsement of overtired and dizzy. The use of peer nomination methods and teacher/class assessment within the same academic year might improve the accuracy of the measures. In addition, further work in integrating assessment of social skills, social competence, and actual social functioning may elucidate factors that impact social functioning in children with brain tumors.

The participation rate was moderately low, and although basic demographic and disease-related variables did not differ between participants and nonparticipants, it is possible that the nonparticipants had more complicated psychological and social issues that made the demands of the intervention outweigh perceived benefits. The apparent difficulty in participating for so many families may make this group of motivated participants unrepresentative of the problems and issues that face other families of children with brain tumors. Using a comparison group, future studies must attend to these issues by providing

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**Figure 1.** Verbal Comprehension Index and Perceptual Organization Index standard scores plotted against change scores.
support in transportation and child care for siblings, and/or conducting the intervention closer to the homes of the families.

Results from this pilot study are preliminary but suggest the importance of further research to assess the efficacy of group social-skills training interventions for children treated for brain tumors. Although central to such research is the use of a randomized design with a larger sample, reports of case studies using the intervention would further our understanding of its effectiveness. In addition to the recommendations made to improve the design of future studies, the following aspects of the group social-skills training seemed essential to the effectiveness of this intervention: Explanations were provided in both nonverbal (demonstrations and role-plays) and verbal modalities (hand-outs and posters with explanations as props) to appeal to children's varying cognitive strengths; activities were interactive and relevant to the everyday lives of the children involved to maintain interest; and concepts were repeated within and across sessions. Incorporation of a parent component and of joint activities with parents and children further promoted maintenance and generalization.

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