

Social Skills Training Interventions: A Promising Approach for Children Treated for Brain Tumors

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Abstract

As a result of their disease, its treatment, and late effects, children treated for brain tumors are at risk for developing problems in social functioning in terms of social competence and peer acceptance, poor social skills, and social isolation. Despite research suggesting the effectiveness of social skills training interventions in improving social competence, the effectiveness of social skills training interventions remains understudied in this population. Preliminary studies of social skills training interventions with children treated for brain tumors are described. Suggestions for future research, in particular emphasizing the importance of interventions that impact peer relationships and social reputation, are provided.

Keywords: childhood brain tumors, social functioning, social competence, social skills training.

Pediatric brain tumors represent the second most frequently diagnosed malignancy of childhood (Strother et al., 2002). Children surviving brain tumors experience severe neurocognitive deficits as a result of medical late effects of the tumor and treatment (Butler & Mulhern, 2005; Ris & Noll, 1994). These children experience problems in psychosocial functioning as well, most notably, in the area of social competence. Despite the existence of research which suggests that social skills training interventions may improve social competence in other populations, the effectiveness of social skills training interventions for children surviving brain tumors remains understudied. This paper outlines the specific social deficits exhibited in children treated for brain tumors and their possible etiology, as well as existing social skills interventions and directions for future research.

Poor Social Competence is an Outcome in Children Treated for Brain Tumors

As life expectancy and survival rates for children with brain tumors have improved over the past two decades, increasing focus has been placed on long-term outcomes and adaptation in this population (Peterson & Drotar, 2006). Although the psychosocial outcomes for these patients are beginning to receive more attention, they remain comparatively less explored than the neuropsychological sequelae and late effects of treatment (Fuemmeler, Elkin, & Mullins, 2002; Peterson & Drotar, 2006). One psychosocial outcome consistently reported among children surviving brain tumors is poor social competence (Barakat et al., 2003; Fuemmeler, Elkin, & Mullins, 2002; Mulhern, Carpentieri, Shema, Stone, & Fairclough, 1993; Mulhern, Hancock, Fairclough, & Kun 1992; Radcliffe, Bennett, Kazak, Foley, & Phillips 1996; Ris & Noll, 1994; Vannatta, Gartstein, Short, & Noll., 1998). In fact, although a recent review by Fuemmeler and colleagues (2002) of 31 studies focused on different areas of psychosocial adjustment of survivors of childhood brain tumors yielded mixed findings regarding the adjustment of these children, the authors did conclude that children treated for brain tumors are indeed at risk for significant deficits in social competence.

Definition of Social Competence

Multidimensional in nature, the term social competence was conceptualized by Gresham (1986) as incorporating domains such as social skills, adaptive behavior, and peer acceptance (Elliott & Busse, 1991; Fuemmeler et al., 2002). In their review of the literature regarding social competence in children

with central nervous system (CNS) related conditions, Nassau and Drotar (1997) highlighted Cavell's (1990) model of children's social competence as a useful framework for describing specific facets of social competence relevant to children with these conditions. As described by Nassau and Drotar (1997), the domains of social competence included in the model are: social adjustment, social performance, and social skills (Cavell, 1990).

Specific Deficits of Social Competence in Children with Brain Tumors

Studies assessing social competence in children with brain tumors suggest deficits in all of these areas, although oftentimes unclearly delineated (Fuemmeler et al., 2002). For example, children treated for brain tumors have been reported to have higher rates of behavior problems and less social competence on the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983) than children with other cancers (Carpentieri et al., 1993; Fossen, Abrahamson, & Storm-Mathisen, 1988). In addition, in a study of 29 children post-treatment for hypothalamic/chiasmatic tumors, survivors displayed increased behavior problems and decreased social and academic competence as compared to a normative sample (Foley, Barakat, Herman-Liu, Radcliffe, & Molloy, 2000). Moreover, during the development of the Miami Pediatric Quality of Life Questionnaire (MPQOLQ) Armstrong and colleagues (1999) found that children with brain tumors had significantly lower scores in the domain of social competence, which included engagement in and enjoyment of activities, as well as involvement with a peer group. Children with brain tumors have also been identified as exhibiting deficits in specific skill areas, such as communication skills (Radcliffe et al., 1996).

A study of peer relationships in children surviving brain tumors sheds light into the consequences and manifestations of social difficulties for these children (Noll et al., 1992; Vannatta, Gartstein, et al., 1998). Using the Revised Class Play peer nomination method (RCP; Masten, Morison, & Pellegrini, 1985), children surviving brain tumors were compared with matched classroom peers on several indices of social reputation. Teachers and students were asked to "cast" their classmates in an imaginary play, yielding ratings along the dimensions of sociability-leadership, aggressive-disruptive, and sensitive-isolated. Results indicated that children treated for brain tumors were nominated significantly more often for socially-isolated roles than their matched peers. Additionally, they were nominated less often by peers as a best friend. Although they were no longer receiving treatment, these children were nominated more as "someone who is tired a lot", "someone who is sick a lot", and "someone who misses school a lot" indicating that peers continued to perceive children surviving brain tumors as displaying signs of a chronic illness. Notably, when the same study design was used with children with cancer and other chronic illnesses, no significant differences in social functioning emerged (Noll et al., 1999; Noll, Vannatta, Koontz, & Kalinyak, 1996), suggesting the unique impact of brain tumors on perceptions of peer acceptance.

These studies highlight the extent of the social difficulties for children surviving brain tumors. Although there is a paucity of research investigating long-term outcomes of children with brain tumors, research on adult survivors of childhood brain tumors points to long-term problems related to social functioning as well such as lower rates of marriage and parenthood, higher rates of divorce, and lower rates of employment (Hays et al., 1992; Lammering, Marky, Lundberg, & Olsen, 1990; Mostow, Byrne, Connelly, & Mulvihill, 1991).

Factors Contributing to Problems in Social Competence

Irrespective of the specific diagnosis, overall research indicates that children with central nervous system (CNS) related conditions are more likely to experience social difficulties than children with chronic illnesses which do not have a CNS component (La Greca, Bearman, & Moore, 2002; Nassau & Drotar, 1997). This may be due to an interaction of the multiple factors which contribute to social

competence. Spence (2003) described cognitive, emotional and environmental factors that jointly contribute to social competence. Cognitive factors include: interpersonal problem-solving skills, accurate processing of social information, social perception and perspective taking abilities, cognitive distortions and maladaptive thinking, and social knowledge. Emotional and environmental factors include: emotional regulation skills and self-monitoring skills, environmental contingencies for social responding, social opportunities and modeling of prosocial skills. With regards to children with CNS related conditions specifically, Nassau and Drotar (1997) suggest that problems in social competence may be due to disease-related and treatment-related impairments such as: cognitive impairments, physical limitations, and visible changes in physical appearance.

Cognitive impairments. Cognitive impairments, such as deficits in intelligence, memory, attention, and problem-solving, are hypothesized to be caused by neurologic sequelae secondary to treatments such as cranial radiation therapy (CRT) or intrathecal chemotherapy (Butler & Mulhern, 2005; Mulhern et al., 1999; Rourke, 1995) as well as tumor type and location (Foley et al., 2000). The neurocognitive effects associated with brain tumors and their treatments include loss in general intellectual functioning, working memory, sequential processing, attention, fine motor skills, and visual-motor coordination (Butler & Mulhern, 2005; Carey et al., 2000; Radcliffe et al., 1992; Radcliffe et al., 1996, Barakat et al., 2003). Findings from a study of the neuropsychological and social functioning of 15 survivors of brain tumors (ages 8-12 years) indicated a pattern consistent with nonverbal learning disabilities (NVLD) in this sample (Carey et al., 2000). Consistent with the model of NVLD, parents of children in the study reported significant social deficits and a tendency for more internalizing symptoms.

Tumor type and location is thought to influence the severity of outcome in survivors of childhood brain tumors. In particular, tumors in the hypothalamic region have been associated with more severe neuropsychological sequelae as well as problems in social competence and academic functioning (Danoff, Cowchock, Marquette, Mulgrew, & Kramer, 1982; Foley et al., 2000). However, it is generally accepted that children with brain tumors are at increased risk for cognitive impairments due to the therapy they receive, in particular, CRT (Butler & Mulhern, 2005). Furthermore, specific neurocognitive deficits may depend on the developmental stage of the child as the neurotoxic late effects of treatment may have effects on brain development and skills which have yet to be acquired (Peterson & Drotar, 2006). Children diagnosed before age 7 have been found to be at greatest risk for losing IQ points, while older children exhibit problems in memory, sequential processing, fine-motor coordination and physical stamina (Radcliffe et al., 1992; Radcliffe et al., 1996).

Evidence is accumulating which indicates that neurocognitive deficits likely impact social functioning (Butler & Mulhern, 2005). The cognitive impairments mentioned above (i.e attention, working memory, sequential processing, etc.) may affect social competence in as much as they create difficulties in social understanding (Dodge & Price, 1994; Nassau & Drotar, 1997; Poggi et al., 2005). For example, white matter loss secondary to CRT may limit right-hemispheric functions such as multi-modal processing and processing of novel, complex information. Difficulties in processing spatial information and multimodal stimuli (such as language, intonation, and prosody) as well as adapting to novel situations may reduce the ability of survivors of brain tumors to acquire and maintain social skills (Barakat, et al., 2003). There is also evidence that the neurotoxicity of treatment may affect social functioning, especially when young children are treated (Ris, Packer, Goldwein, Jones-Wallace, & Boyett, 2001; Vannatta & Gerhardt, 2003; Vannatta, Gerhardt, & Noll, 1999). Finally, it has also been shown that children with brain tumors, who receive special education services, are at greater risk for problems in social functioning (Foley et al., 2000). This may be due to decreased social opportunities available to those children and the lack of “good” models available in these settings. The neurocognitive effects associated with brain tumors and their treatments therefore represent one factor which may contribute to deficits in social functioning in these children.

Physical limitations and changes in appearance. As previously mentioned, problems in coordination, motor skills and stamina are common for childhood brain tumor survivors as are problems in balance (Radcliffe et al., 1992; Radcliffe et al., 1996; Vance, Eiser, & Horne, 2004). Physical limitations secondary to treatment may further limit opportunities for children to participate in age-appropriate peer activities such as sports activities and other extracurricular activities, and subsequently lead to peer rejection and social isolation (Vance et al., 2004). School absences during treatment may also create difficulties in sustaining relationships (Vannatta, Gartstein, et al., 1998). Changes in physical appearance secondary to treatment may also impact peer relationships by drawing attention to these children and result in subsequent peer rejection (Mulhern et al., 1993; Vance et al., 2004; Vannatta, Zeller, Noll, & Koontz, 1998). In a qualitative study of eight children and adolescents who had survived a brain tumor, Vance and colleagues (2004) noted that parents discussed concerns regarding the impact of treatment on the body image of their children and its detrimental effect on peer relationships. Therefore, increased social isolation due to changes in physical appearance and physical limitations may further impede these children’s ability to acquire and rehearse social skills.

In summary, children with brain tumors have been found to have deficits in social competence including impaired processing of social information, social isolation, and poor communication skills. Furthermore, physical limitations, peer rejection and time away from school lead to a decrease in available environmental contingencies for social responding, decreased social opportunities, and limited “prosocial” models. These problems may contribute to impaired social competence by leading to deficits in skill acquisition, skill maintenance, and performance as delineated by Gresham (1997). Left untreated, problems in social competence are likely to impact both child and family adjustment.

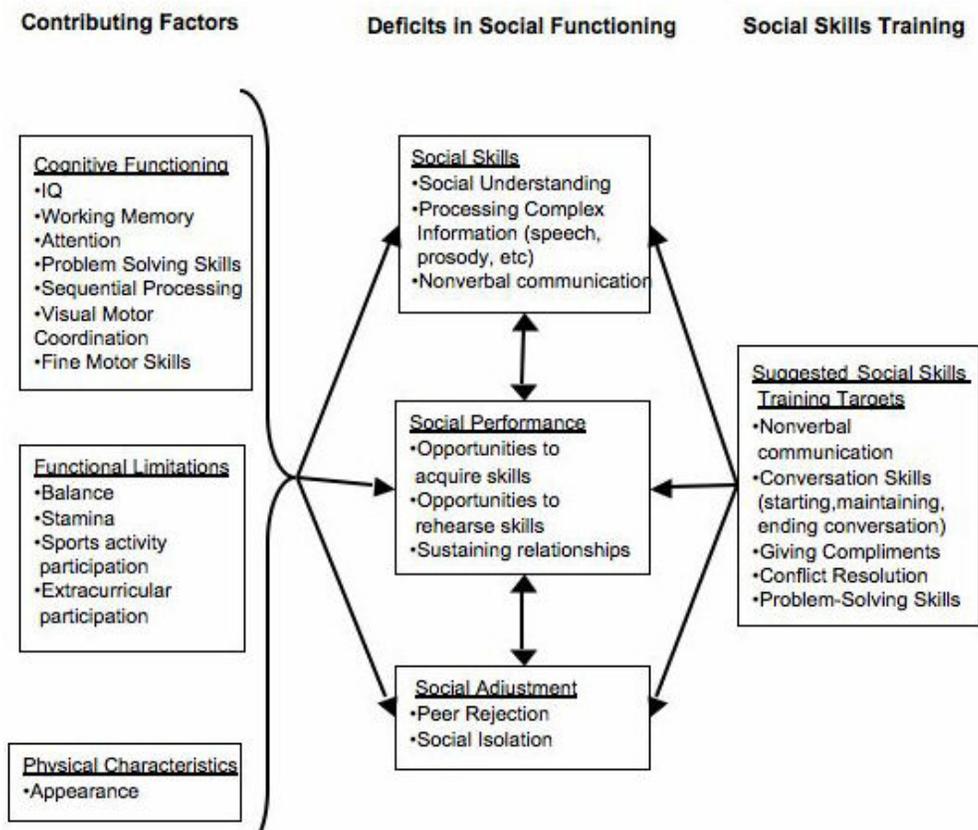


Figure 1.

Impact of Poor Social Competence on Adjustment

In their review of the research regarding the impact of social relationships on the emotional development of children and adolescents with chronic illnesses, La Greca and colleagues (2002) emphasized the benefits of emotional and social support in both facilitating adaptation and enhancing treatment adherence and other health-promoting behaviors in children with chronic illness. Deficits in social functioning among children with brain tumors may have far reaching effects into the quality of life of these children (Armstrong et al., 1999; La Greca et al., 2002; Peterson & Drotar, 2006; Varni & Katz, 1997). It has been suggested that an inability to develop age-appropriate peer relationships may account for increased emotional and behavioral problems (Nassau & Drotar, 1997). While there have been mixed results in studies investigating adaptive functioning in children with brain tumors (Fuemmeler et al., 2002), several studies have reported that children with brain tumors are at risk for internalizing and externalizing problems (Bamford et al., 1976; Danoff et al., 1982; Fossen et al., 1998; Glaser et al., 1997; Hoppe-Hirsch et al., 1990; Mulhern et al., 1993). Furthermore, research suggests peer relationships contribute to a healthy self-concept and may predict adaptation in adulthood for those experiencing childhood chronic illness (Noll et al., 1992). Consequently, socially isolated children with brain tumors often fail to gain from the protective benefits of social support. As a result, enhancing the social competence of children with brain tumors may moderate their psychological adjustment (Nassau & Drotar, 1997).

In addition to the impact on child adaptation, the late effects of treatment, which may include impairments in social functioning, can have a devastating effect on family functioning as well (Fuemmeler, Mullins, & Marx, 2001; Peterson & Drotar, 2006). For example, in their assessment of the psychosocial functioning of brain tumor survivors who were at least 2 years post-diagnosis and their parents, Radcliffe and her colleagues (1996) found that parents who reported that their children exhibited poorer social competence and communication skills than the normative comparison group, simultaneously reported elevated levels of parenting stress. Similarly, the relationship between family functioning and parental reports of poor social competence approached significance in families of childhood hypothalamic/chiasmatic brain tumor survivors (Foley et al., 2000). Problems in social competence may therefore have implications for both child and family adaptation.

The Effect of Social Skills Training Interventions on Social Competence

Despite evidence suggesting that maximizing the social competence of children treated for brain tumors may enhance their overall adjustment, very few interventions geared towards improving social competence exist for this population. This is also surprising, given the evidence supporting the effectiveness of social skills training interventions in improving competence of children with various conditions such as learning disabilities and cancer (Forens & Kavale, 1996; Gresham, 1985, Schneider, 1992; Varni, Katz, Colegrove, & Dolgin, 1993). Schneider (1992) conducted a meta-analysis of 79 social skills training interventions for children in order to estimate their effectiveness in enhancing peer relations and found an average moderate effect size of .40. Importantly, as in other subsequent meta-analyses, several factors were noted to be correlated with higher effect sizes such as: participant diagnosis (studies with withdrawn children had higher effect sizes than studies using aggressive children), type of technique (studies using modeling and coaching techniques had greater effect sizes than social-cognitive procedures or multi-treatment packages), and type of control (studies using attention controls had higher effect sizes than studies with a no treatment control). While some meta-analyses have yielded mixed findings regarding the effectiveness of social skills training interventions (due in large part to methodological difficulties of studies) (Beelmann et al., 1994; Quinn et al., 1999), other studies have found that the strategies of modeling, coaching, role-play, feedback and reinforcement have been effective in improving social skills responses (Spence, 2003). Several problems with the social skills training literature were noted as well including: the lack of long-term follow-up in studies, the lack of treatment integrity

procedures, and the lack of verification of the child's mastery of a social skill. Generally, then, research on the effectiveness of social skills training interventions in non-chronic illness populations supports its potential utility for children with brain tumors.

In an attempt to address the problems in social competence observed in children with cancer, Varni and colleagues (1993) compared an explicit individual, social skills training intervention with a school reintegration program for 64 children (ages 5 to 13) newly diagnosed with cancer (children with brain tumors were excluded from this study). It was hypothesized that by improving social skills, the overall psychosocial adjustment of children newly diagnosed with cancer would be improved, as would their perceived social support. While all children received the standard school reintegration training, the experimental group received 3 1-hour manual-based social skills training sessions addressing the areas of social cognitive problem solving, assertiveness training, and handling teasing and name-calling. Results suggested that children who received the social skills training intervention perceived greater peer and teacher supports and exhibited fewer behavior problems at a 9-month follow-up. Based on the findings, the authors suggested that social skills training may be conceptualized having preventative or protective effects, as its benefits to survivors of childhood cancer may increase in the long-term.

Social Skills Training Interventions for Children Treated for Brain Tumors

Despite evidence pointing to the effectiveness of social skills training interventions in improving social competence in children and adolescents with a variety of problems, to our knowledge, only two published interventions exist which targeted the social functioning of children with brain tumors specifically. The first intervention to address the social skills deficits of children with brain tumors was a short-term group-based intervention devised by Die-Trill and colleagues (1996). The participants included 8 boys (average age 12 years), who were 1 to 2 years post-treatment and had been identified by parents and treatment staff as socially isolated or experiencing problems interacting with peers. Types of brain tumors included medulloblastomas, infratentorial glioma, and optic nerve meningioma, supratentorial glioma, and supratentorial choroids plexus papilloma. The 16-week behaviorally-based intervention targeted social skills that were identified from the participants' discussion of their perceived social difficulties in the first session. Skills taught in the intervention included: assertiveness, making new friends, dealing with peer rejection, handling teasing by peers, and responding to questions about one's medical condition. Strategies of modeling, role-play with feedback, and reinforcement of appropriate and successful behaviors were used to implement the intervention. Homework was given and reviewed in subsequent sessions to reinforce skill learning. Qualitative feedback (obtained through visual analog scales and open-ended questions of child and parent participants) indicated that the intervention was helpful. However, a major limitation of the study was the fact that no objective empirical assessments of baseline skill level or outcome of treatment were administered. The study was further limited by the fact that it included a small sample of male participants, and incorporated no long-term follow-up of treatment effects. Despite its shortcomings, this study represented the first of its kind to include a homogenous sample of brain tumor survivors and address their specific social skills deficits. Qualitative findings suggested that social skills training interventions may be helpful in improving the social functioning of children with brain tumors (Die-Trill et al., 1996).

In an effort to further examine the effectiveness of social skills training interventions for children with brain tumors, as well as elucidate factors underlying the variability in children's responses to these interventions, Barakat and colleagues (2002) piloted a group-based, manualized social skills intervention for school-age children treated for brain tumors and their parents. This intervention was based partly on the individual, social skills intervention created by Varni and colleagues (1993), as well as established social skills training programs (Elliott & Gresham, 1993; Gresham, 1985). Participants included 13 children ages 8 to 14, who had been off treatment for a brain tumor for at least 6 months and their parents.

Three separate groups of 5 to 7 children completed the intervention, which consisted of 6 sessions. A concurrent parent group was included, and assessments occurred at baseline and 9-month follow-up.

Goals of the intervention were to address problematic areas relating to social competence highlighted in the brain tumor literature such as social isolation and the quality of social interactions. Consequently, specific skills targeted included nonverbal social skills, conversation/communication skills such as starting, maintaining, and ending conversations, giving compliments, and conflict resolution. A typical session was structured around presenting information in multiple formats (visual, verbal) so as to appeal to the various cognitive strengths of the participants. First, interventionists provided a definition of the particular skill in question, and facilitated a discussion regarding the rationale behind the desired behavior and situations in which it would be used. Next, interventionists modeled both “good” and “bad” examples of the particular skill. Guided role-plays were then used as a means of providing children an opportunity to rehearse the skills and receive corrective feedback from other group members and interventionists. Role-plays were structured around real life situations school-age children are likely to encounter such as making conversation on the school bus, connecting with peers during lunch, etc. Peers provided feedback via a “thumbs up” or “thumbs down” method, which was devised in order to encourage participation from those children not directly participating in the role-plays. Visual reminders of the specific skills such as flip charts and signs were provided as well.

In order to address the issue of generalization of treatment effects, several components were incorporated into the treatment, including a manualized parent group and homework. The parent group was used to teach the targeted social skills, problem-solve ways in which the skills could be practiced at home and at school, and discuss the impact of the child’s illness on the family. Information sharing was another important component of the parents’ group, as parents collaborated with one another in devising ways to practice the skills and shared information on other available supports for their children. For example, parents shared information about summer camp programs, extra-curricular activities, special education programs available in the schools, and helpful tips about setting up “play dates” with willing peers.

Homework was another important component devised to support the generalizability of treatment. Homework was given each week to promote practicing of the targeted skill in different situations, and was reviewed at the beginning of each subsequent session with parents and children together. For example, one week, children had to write a skit in which they practiced skills such as introducing themselves to people, joining a conversation, and maintaining a topic of conversation. These skits were then role-played and videotaped by families to encourage maintenance.

In addition to addressing the concern of generalizability, this study also attempted to improve upon methodological issues of other studies such as a lack of objective assessment procedures and treatment integrity procedures. Assessment measures were administered to child participants, their parents, and teachers at time intervals of one month prior to the intervention, and 9 months post-treatment. They included: the Social Skills Rating System (SSRS; Gresham & Elliott, 1990), the CBCL and Youth Self-Report (YSR) and Teacher Report Form (TRF), and the MPQLQ. A neurocognitive measure (The Wechsler Intelligence Scale for Children-Third Edition (WISC-III); Wechsler, 1991) was administered only at baseline as a tool for predicting variability in outcome. Additionally, to ensure treatment fidelity, all interventions were observed to ensure adherence to the manual and competence of administration.

Post-treatment measurement indicated significant improvement in child-reported Social Competence (as measured by the MPQLQ), Internalizing Behavior problems (on the YSR), parent-reported Total Competence (on the CBCL), and teacher-reported Externalizing problems (on the TRF) and Problem Behaviors (on the SSRS). Therefore, despite limitations such as the small sample size and

lack of a comparison or control group, findings from this study provided further support for the potential effectiveness of social skills training interventions for children surviving brain tumors.

Future Directions in Research and Practice

Results from the aforementioned studies have important implications for future research regarding the effectiveness of social skills training interventions in improving social competence in children surviving brain tumors. Research efforts would do well to systematically verify whether skills attained are due to a faithfully administered treatment versus other factors (Schneider, 1992). Specifically, future research should incorporate methodology which strengthens the validity of the study of social skills training interventions, such as incorporating peer matched attention controls and treatment fidelity procedures with larger samples gleaned through multi-site studies. Also, the identified programs implemented education in specific skills, modeling, guided role plays with corrective feedback, homework assignments, and a parent component to promote generalization. However, effective components of social skills training interventions for children with chronic illness generally, and for children treated for brain tumors specifically, have not yet been identified (Barakat, Gonzalez, & Weinberger, 2007). Moreover, delineation of which components promote development of specific social skills, lead to improvements social functioning, or result in changes in peer acceptance has not been accomplished.

Perhaps just as important, researchers are confronted with the task of empirically demonstrating the impact of social skills training interventions on the actual social functioning of children with brain tumors. That is, although existing behavioral interventions may be effective in enhancing social skill repertoires and ultimately social competence, these interventions are not able to change or alter the environmental response/contingency, in particular, peer responses. Moreover, research such as that by Vannatta and colleagues (1998), which showed that peers continued to perceive children surviving brain tumors as chronically ill well after the end of active treatment, would suggest that peer perceptions do not shift easily. Therefore, whether the outcomes obtained from these interventions have social validity, is yet to be determined. The incorporation of peer nomination methods such as those used by Noll and colleagues (1992) may help elucidate the relationship between social skill attainment and gains in peer relationships. For example, it may well be the case, that despite improvement in explicit social skills, these children may not overcome problems regarding their social reputation and peer acceptance. If that is the case, it will be necessary to devise methods to impact upon these important outcome variables. Placing children in environments in which they are likely to be successful may help mitigate this problem. This challenge encompasses within it the need to disentangle the relationship between social skills, social competence, and actual social functioning.

Within this context, some researchers suggest that effectiveness of social skills training interventions may be enhanced when packaged as part of multi-component treatment (Butler & Mulhern, 2005; Schneider, 1992; Spence, 2003). Spence (2003) recommended that these interventions be used in association with other training methods such as interpersonal problem-solving skills training, cognitive restructuring, training in perception and perspective taking, self-regulation skills, and emotional regulation methods. In their review of neurocognitive interventions for children surviving cancer, Butler and Mulhern (2005) extrapolated from the traumatic brain injury literature which suggests that multimodal approaches to cognitive remediation which incorporate behavioral interventions, cognitive-behavioral therapy, metacognitive strategies and social skills training seem provide the most benefit to patients. To the extent that multicomponent treatments would benefit the social functioning of children surviving brain tumors has yet to be evaluated.

While social skills training interventions for special populations are available in the community, the principles on which they are based and the strategies employed vary. Those who seek to implement

social skills training interventions for children surviving brain tumors would do well to incorporate an empirical basis to their programs. Such interventions should consider inclusion of parent components, which have been shown to be useful in helping to establish realistic expectations for success, trouble shooting of skill acquisition, and increase the overall generality of findings (Barakat et al., 2007; Barakat et al., 2003). Additionally, research with special populations, suggests that interventions incorporating peer models may be less artificial than those using adult social skills trainers, and may subsequently better generalize to other individuals and settings (Hetzke, 2004; Rogers, 2000). For example, a peer-mediated approach used by Strain and Hoyson (2000) for preschoolers and school-age children with autism yielded an increase in the frequency of spontaneous social interactions among the children with autism and the trained, non-disabled peers. Strain and Danko (1995) tested an intervention for children with autism using siblings as facilitators and found through observational methods an increase in the frequency of positive social interactions, as well as an improvement in the quality of those interactions. Hetzke (2004) piloted a sibling-mediated social skills training intervention for four children with Asperger's syndrome and found that all four children exhibited improvements on at least two parent-reported measures of social functioning. Other peer-mediated interventions have been successful in facilitating the maintenance of social skills and generalization across settings (Laushey & Heflin, 2000; Odom et al., 1999). The utility of incorporating sibling and or peer components in interventions for brain tumor survivors have yet to be tested, but may further contribute to the maintenance and generalization of social skills, as well as help improve peer acceptance and social reputation.

Finally, while much useful information can be gleaned from the general social skills training literature, it is imperative to be mindful of the ways in which the social challenges relating to children and families affected by brain tumors are unique from those in other populations. Most notably, unlike children who have a long-standing developmental delay and similar to individuals with a traumatic brain injury, children with brain tumors experience a regression or decline in their social skills as a result of their illnesses. Subsequently, patients and families are forced to adjust to a new set of expectations for their children, and navigate their children through painful experiences such as facing rejection by old friends and remembering their children's level of functioning prior to illness. Furthermore, parents must continue to readjust to the impact of late effects well beyond the end of treatment. Drotar (2006) identified several areas for improving future intervention research for children with cancer, and recommended that future research focus on developing programs which educate caregivers about the neurodevelopmental late effects of treatment in order to help prepare them for the challenges ahead. The importance of addressing these types of issues while working with parents cannot be overstated.

Conclusions

Children treated for brain tumors are at risk for problems in social functioning due to tumor and treatment effects on neurocognitive skills, physical functioning, and physical appearance. Acknowledging that substantial future research is needed to document the efficacy of this approach, social skills training interventions based on behavioral principles of education, modeling, and role-plays show promise in improving the social competence and social functioning of children treated for brain tumors. Provision of such an intervention within a multi-component treatment package that targets parents and includes siblings may further enhance the effectiveness of social skills training in improving social skills, social functioning, and peer acceptance for children treated for brain tumors.

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