Social Competence Among Children with Central Nervous System-Related Chronic Health Conditions: A Review

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Reviewed empirical studies of social competence among children with central nervous system (CNS)-related chronic health conditions published since 1975. The overwhelming majority of studies evaluated social competence at the level of social adjustment; the domains of children's social performance and social skills were relatively neglected (Cavell, 1990). Findings are critiqued with respect to conceptualization of social competence among children with CNS conditions and methodological considerations. Directions for future research include expanding the conceptualization of social competence in this population to include social demands and competencies specific to children with CNS conditions and utilizing explicit theoretical frameworks that allow for competing hypotheses to be tested.

KEY WORDS: social competence; chronic illness; epilepsy; cerebral palsy; spina bifida.

Cerebral palsy, epilepsy, and spina bifida are among the most prevalent chronic health conditions involving the central nervous system (CNS) affecting children.

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2All correspondence should be sent to Jack H. Nassau, Department of Child and Family Psychiatry, Rhode Island Hospital, 593 Eddy Street, Providence, Rhode Island 02903.
and adolescents in the United States (Gortmaker & Sappenfield, 1984). Although a variety of other chronic health conditions (and/or their treatments) may have important implications for the CNS, they are either less prevalent (e.g., brain tumors) or not defined by CNS involvement (e.g., sickle cell disease). Thus, although cerebral palsy, epilepsy, and spina bifida are not exhaustive of the conditions with CNS implications, they may be considered representative of conditions that are defined primarily by CNS dysfunction. Cerebral palsy refers to a variety of disorders of movement and posture caused by a nonprogressive injury of the immature brain (Batshaw & Perret, 1986; Eicher & Batshaw, 1993) and has an estimated prevalence of 2.5/1,000 children and adolescents in the United States (Boyle, Decoufle, & Yeargin-Allsop, 1994). Epilepsy is defined as the presence of recurrent seizures that are not provoked by fever or cerebral insult (Batshaw & Perret, 1986). Prevalence estimates among children and adolescents in the United States range from 3.5/1,000 (Gortmaker & Sappenfield, 1984) to 8.9/1,000 (Boyle et al., 1994). Spina bifida, defined as a spinal deformity caused by an incomplete closure of one or more vertebrae, occurs in approximately 1/1,000 live births (Gortmaker, 1985; Varni & Wallander, 1988) and has an estimated prevalence of 0.4/1,000 children and adolescents in the United States (Gortmaker & Sappenfield, 1984).

Children with CNS-related chronic health conditions are at increased risk for developing emotional and behavioral problems when compared to physically healthy children and to children with non-CNS-related chronic health conditions (e.g., insulin-dependent diabetes mellitus; Breslau, 1985; Cadman, Boyle, Szatmari, & Offord, 1987). One factor that may account for this increased risk is difficulty in developing age-appropriate social competence and peer relations. As with physically healthy children, peer relationships would be expected to exert a socializing influence on children with CNS conditions by shaping appropriate expressions of behavior (e.g., aggression and sharing; Hartup, 1989). Peer relationships might also provide a context for children with CNS conditions to give and receive social support and develop a sense of group membership and interpersonal intimacy (Berndt & Perry, 1986; LaGreca et al., 1995; Zarbatany, Hartmann, & Rankin, 1990). Furthermore, some children with CNS conditions face a number of unique social demands (e.g., coping with stigma, teasing, and social isolation; developing social outlets and activities within the constraints imposed by their condition; and communicating with others about their condition) that might pose significant psychological burden. Attainment of age-appropriate social competence and peer relations may moderate the psychological adjustment of these children by enhancing their adaptation to their condition and increasing their self-esteem (La Greca, 1990; Wallander & Varni, 1989).

Children with CNS conditions may have special problems developing age-appropriate social competence and peer relations. First, some children with CNS conditions have cognitive impairments (e.g., in intelligence, memory, attention, or problem solving) that could hinder their social understanding and, thus, ad-
versely affect their social competence (Crick & Dodge, 1994; Dodge & Price, 1994). Approximately one third of children with spina bifida have below average intelligence and approximately 60% of children with cerebral palsy have mental retardation (Batshaw & Perret, 1986; Eicher & Batshaw, 1993). Although approximately 50% of children with epilepsy have normal intelligence (Batshaw & Perret, 1986), specific cognitive deficits appear to be associated with earlier age of seizure onset and seizure type (Seidenberg, 1989). In addition, antiepileptic medications may have cognitive effects that impact on social competence (Binney, 1994). Second, the overt manifestations of these conditions (e.g., their visibility, disruptiveness, and/or visually disturbing quality) could lead to these children being stigmatized by their peers and, thus, adversely affect their development of social competence by reducing opportunities to engage in age-appropriate peer activities (La Greca, 1990). Children with cerebral palsy or spina bifida may have physical handicaps that require assistive devices (e.g., braces, wheelchair) to help with movement and posture and include impaired bowel and bladder control. Depending on seizure type and response to medication, children with epilepsy may be stigmatized when visually disturbing seizures occur in the presence of peers. The episodic and unpredictable course of epilepsy may make the occurrence of seizures especially frightening to peers.

For all of the above reasons, the impact of CNS conditions on children's social competence is important. However, with the exception of including children with epilepsy, previous reviews of social competence and peer relations among children with chronic health conditions (e.g., Spirito, DeLawyer, & Stark, 1991) have excluded studies of children with CNS conditions. Conclusions that children with non-CNS-related chronic health conditions do not experience poorer peer relations than their healthy peers may not generalize to children with CNS conditions who experience additional problems including impaired cognitive functioning and social stigma. Moreover, children with CNS conditions may experience the very factors (e.g., physical limitations) that appear to be associated with the most significant disruptions in social competence and peer relations in children with non-CNS-related chronic health conditions. To our knowledge, no previous literature review has focused on the social competence of children with CNS conditions. To address this need, this review has two aims: (a) to describe and critique studies that have empirically evaluated the social competence of children with CNS conditions; and (b) to present important directions for future research.

LITERATURE SEARCH

Two strategies were used to identify peer-reviewed studies of social competence among children with CNS-related chronic health conditions. First, PSYCHLIT, MEDLINE, and CINAHL databases were searched by computer for
<table>
<thead>
<tr>
<th>Reference</th>
<th>Sample (age)</th>
<th>SC</th>
<th>Measure(s)</th>
<th>Control</th>
<th>Findings</th>
<th>Strengths (S); Weaknesses (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammerman, Van Hasselt, Hersen, &amp; Moore (1989)</td>
<td>SB (n = 25)</td>
<td>SA</td>
<td>Parent: Child Behavior Checklist, Social Competence Scale (CBCL-SCS)</td>
<td>Yes (VI, n = 25; Nonhandicapped, n = 25)</td>
<td>CBCL-SCS in nonclinical range; SB subjects less competent than controls on CBCL-SCS; nonambulatory SB subjects less competent; no differences on RPT</td>
<td>S: &gt;1 control group, informant, social competence domain; IQ controlled; functional status considered; W: nonclinical scores compared; RPT psychometrics; no hypotheses stated</td>
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<tr>
<td>Anderson (1979)</td>
<td>CP (n = 89)</td>
<td>SA</td>
<td>Observation: RPT 3-point scale of quality of social life</td>
<td>Yes, for the 1/3 in ordinary schools</td>
<td>21% (vs. 94% of controls) had &quot;satisfactory social lives&quot;; competence of teens in ordinary schools better than that of those in special schools</td>
<td>S: Sample size; &gt;1 CNS group; functional status considered; W: Measure description, psychometrics; CNS groups not analyzed separately; no hypotheses stated;</td>
</tr>
<tr>
<td>Apter et al. (1991)</td>
<td>EP (n = 26)</td>
<td>SA</td>
<td>Mother: CBCL-SCS</td>
<td>Yes (Ast., n = 26; Healthy, n = 90)</td>
<td>EP subjects less competent than healthy controls on all but School subscale; EP boys less competent than asthma controls on Social subscale</td>
<td>S: &gt;1 control group; CBCL subscales analyzed; gender considered; W: Nonclinical scores compared; no hypotheses stated</td>
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<tr>
<td>Breslau (1985)</td>
<td>CP (n = 98)</td>
<td>SA</td>
<td>Mother: Psychiatric Screening Inventory (PSI), Isolation subscale</td>
<td>Yes (CF, n = 65; Healthy, n = 359)</td>
<td>Children with CP or SB more isolated than controls independent of mental retardation (MR); children with MR more isolated than those without</td>
<td>S: Sample size; &gt;1 CNS group; demographics controlled; mental retardation considered; hypotheses stated; W: Competence measure</td>
</tr>
<tr>
<td>Breslau &amp; Marshall (1985)</td>
<td>CP (n = 82)</td>
<td>SA</td>
<td>Mother: PSI, Isolation subscale</td>
<td>Yes (CF, n = 56)</td>
<td>Time 1 and Time 2 Isolation scores correlated .52; no mean change from Time 1 to Time 2; continuity in scores independent of MR</td>
<td>S: 5 year follow-up of Breslau (1985); participation rates; W: Competence measure; no hypotheses stated</td>
</tr>
<tr>
<td>Center &amp; Ward (1984)</td>
<td>CP (n = 101)</td>
<td>SA</td>
<td>Teacher: social acceptance rating</td>
<td>No</td>
<td>30% of CP sample in integrated classrooms socially unacceptable or borderline; those in special classrooms more accepted</td>
<td>S: &gt;1 informant, measure; W: Sample, measure description; measure psychometrics; no hypotheses stated</td>
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<td></td>
<td>(R = 6–16)</td>
<td></td>
<td>Peer: Sociometrics</td>
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Table I. Studies Included in Review*
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample</th>
<th>Measure</th>
<th>Outcome</th>
<th>Hypotheses</th>
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</thead>
<tbody>
<tr>
<td>Eiser, Haver-mans, Pancer, &amp; Eiser (1992)</td>
<td>EP (n = 35)</td>
<td>Parent: CAAP, Peer Relations subscale</td>
<td>Yes (Ast., n = 53; IDDM, n = 144; Leuk., n = 17; Card., n = 16)</td>
<td>Children with epilepsy least well adjusted according to mothers, but not fathers</td>
</tr>
<tr>
<td>Hermann (1982)</td>
<td>EP (n = 50)</td>
<td>Parent: CBCL-SCS</td>
<td>No</td>
<td>Children with &quot;good neuropsychological (NP) functioning&quot; more competent than those with &quot;poor NP functioning&quot; 40-43% had &quot;very restricted&quot; social lives; functional limitations related to quality of social life</td>
</tr>
<tr>
<td>Hirst (1989)</td>
<td>CP (n = 89)</td>
<td>SA 3-point &quot;quality of social life&quot; rating scored from interview</td>
<td>No</td>
<td>Older children had better interpersonal skills; no difference by gender, cognitive skills, or motor skills</td>
</tr>
<tr>
<td>Hosokawa, Kitahara, &amp; Nakamura (1985)</td>
<td>CP (n = 52)</td>
<td>Takenshiki Social Maturity Scale, Interpersonal Skills factor</td>
<td>No</td>
<td>Adolescents with CNS conditions (as a group) display less social initiative than children with non-CNS conditions (as a group) and healthy controls</td>
</tr>
<tr>
<td>Howe, Fein-stein, Reiss, Molock, &amp; Berger (1993)</td>
<td>CP (n = 24)</td>
<td>Parent: Autonomous Functioning Checklist, Social Initiative subscale</td>
<td>Yes (CF, n = 25; IDDM, n = 25; JRA, n = 21; VI, n = 14; Healthy, n = 49)</td>
<td>No difference in perceived peer acceptance between children with SB and controls</td>
</tr>
<tr>
<td>Landry, Robin-son, Cope-land, &amp; Garner (1993)</td>
<td>SB (n = 15)</td>
<td>Self: SSP, Peer Acceptance subscale</td>
<td>Yes (Healthy, n = 15)</td>
<td>SB had poorer social skills and greater loneliness than norms; placement in special classroom associated with poorer outcome</td>
</tr>
<tr>
<td>Lord, Varzos, Behrman, Wicks, &amp; Wicks (1990)</td>
<td>SB (n = 31)</td>
<td>Self: Revised UCLA Loneliness Scale, Parent: PIC, Social Skills subscale</td>
<td>No</td>
<td>S: &gt;1 informant; hypotheses stated; W: Competence measure</td>
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</table>

S: >1 informant; hypotheses stated; W: Competence measure. 
S: Limited age range; NP status considered; W: CBCL subscales not analyzed; no hypotheses stated. 
S: Conceptual model; functional status considered; W: Measure description, psychometrics. 
S: Demographics, functional status considered; W: No hypotheses stated. 
S: >1 control group; demographics controlled; hypotheses stated; W: IQ differences controlled; CNS groups not analyzed separately. 
S: Age-, IQ-matched controls; >1 informant; conceptual model; W: Sample size. 
S: >1 informant, measure; functional status considered; W: Comparison to norms; IQ differences not controlled; no hypotheses stated.
<table>
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<tbody>
<tr>
<td>McAndrew (1979)</td>
<td>SB (n = 39)</td>
<td>SA</td>
<td>Self: Semi-structured interview</td>
<td>No</td>
<td>Only 3 subjects had no close friends and 2/3 were rarely or never lonely; 1/2 described as &quot;socially isolated&quot;</td>
<td>S: Description; W: Measure psychometrics; social isolation definition unclear; no hypotheses stated</td>
</tr>
<tr>
<td>Sillanpää (1992)</td>
<td>EP (n = 86)</td>
<td>SA</td>
<td>Family: Interview</td>
<td>Yes (Healthy, n = 316)</td>
<td>12% of children with EP (versus 1% of controls) had &quot;social integration handicap&quot; (i.e., fewer human contacts)</td>
<td>S: Sample unselected, size; W: SES not controlled; social handicap definition unclear, no hypotheses stated</td>
</tr>
<tr>
<td>Stores (1978)</td>
<td>EP (n = 70)</td>
<td>SA</td>
<td>Teacher: Conner's Rating Scale, Social Isolation factor</td>
<td>Yes (r = 103)</td>
<td>Boys in 3/4 EP groups more socially isolated than controls; no difference between EP girls and controls</td>
<td>S: Sample size; matched control; seizure type considered; W: Competence measure; no hypotheses stated</td>
</tr>
<tr>
<td>Tew &amp; Lawrence (1985)</td>
<td>SB (n = 44)</td>
<td>SA</td>
<td>Self: Rogers Personal Adjustment Inventory, Social Maladjustment Scale</td>
<td>Yes (Healthy, n = 52)</td>
<td>SB children more socially maladjusted than controls; children with shunted hydrocephalus less competent than those without shunted hydrocephalus</td>
<td>S: Unselected sample; demographics, functional status considered; W: IQ differences not controlled; measure psychometrics; no hypotheses stated</td>
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<tr>
<td>Thompson, Kronenberger, Johnson, &amp; Whiting (1989)</td>
<td>SB (n = 50)</td>
<td>SA</td>
<td>Parent: Missouri Children's Behavior Checklist, Sociability Factor</td>
<td>No</td>
<td>2% had low social skills profile, 32% had sociable profile; family functioning predicted variance in sociability factor beyond demographic and CNS variables</td>
<td>S: Sample size, description; &gt;1 IV; conceptual model; W: Description of profiles, sociability factor</td>
</tr>
<tr>
<td>Tin &amp; Teasdale (1984)</td>
<td>SB (n = 8)</td>
<td>SP</td>
<td>Observation: Frequency of social interactions</td>
<td>Yes (Healthy, n = 8)</td>
<td>SB children more often alone and fewer interactions than controls; controls initiated fewer interactions with SB children than with other peers</td>
<td>S: Matched controls; observational data; W: Sample size; measure, interrater reliability; no hypotheses stated</td>
</tr>
<tr>
<td>Van Hasselt, Ammerman, Hersen, Riegel, &amp; Rowley (1991)</td>
<td>SB (n = 26)</td>
<td>SA</td>
<td>Parent: CBCL-SCS</td>
<td>Yes (Healthy, n = 29)</td>
<td>According to fathers (but not mothers), children with SB less competent than controls only on School subscale; no differences on RPT</td>
<td>S: Limited age range; &gt;1 informant, social competence domain; CBCL subscales analyzed; IQ differences controlled; W: Sample description</td>
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<tr>
<td>Study</td>
<td>Group A</td>
<td>Group B</td>
<td>Comparison Method</td>
<td>Findings</td>
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<tr>
<td>Wallander, Feldman, &amp; Varni (1989)</td>
<td>SB (n = 61)</td>
<td>SA Mother: CBCL-SCS</td>
<td>No</td>
<td>CBCL-SCS in nonclinical range; 23% &quot;maladjusted&quot;; no differences as function of disease severity</td>
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<tr>
<td>Wallander, Hubert, &amp; Varni (1988)</td>
<td>CP (n = 27)</td>
<td>SB (n = 23)</td>
<td>SA Mother: CBCL-SCS</td>
<td>No</td>
<td>Less competent than norms; more competent on Social subscale; SB more competent than CP; child and maternal IVs predict competence</td>
<td></td>
</tr>
<tr>
<td>Wallander, Varni, Babani, Banis, DeHaan, &amp; Wilcox (1989)</td>
<td>CP (n = 27)</td>
<td>SB (n = 23)</td>
<td>SA Mother: CBCL-SCS</td>
<td>No</td>
<td>52% &quot;maladjusted&quot;; more competent on Social subscale; SB more competent than CP; IQ and adaptive functioning contributed to competence</td>
<td></td>
</tr>
<tr>
<td>Wallander, Varni, Babani, Banis, &amp; Wilcox (1988)</td>
<td>SB (n = 77)</td>
<td>CP (n = 19)</td>
<td>SA Mother: CBCL-SCS</td>
<td>Yes (IDDM, n = 80; Hemophilia, n = 40; JRA, n = 19; Obesity, n = 30)</td>
<td>CP subjects less competent than SB subjects and controls; no difference between SB subjects and controls</td>
<td></td>
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<tr>
<td>Wallander, Varni, Babani, Banis, &amp; Wilcox (1989)</td>
<td>SB (n = 17)</td>
<td>CP (n = 17)</td>
<td>SA Mother: CBCL-SCS</td>
<td>Yes (IDDM, n = 74; JRA, n = 23; Obesity, n = 22)</td>
<td>CP subjects less competent than SB subjects and controls; no difference between SB subjects and controls</td>
<td></td>
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<tr>
<td>Westbrook, Bauman, &amp; Shinnar (1992)</td>
<td>EP (n = 64)</td>
<td>SP Self: impact of EP on peer relations; &quot;disclosure management&quot;</td>
<td>No</td>
<td>2/3 report EP does not impact peer relations; younger subjects report greater impact; 1/2 sometimes or often keep EP secret</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whitman, Herrmann, Black, &amp; Chhabria (1982)</td>
<td>EP (n = 83)</td>
<td>SA Mother: CBCL-SCS</td>
<td>No</td>
<td>Demographic and severity variables did not predict significant variance in social competence</td>
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</tbody>
</table>

*S: Sample size; W: Comparison to norms; CBCL subscales not analyzed*
studies published after 1975. The search was limited to studies published after 1975 because a comprehensive review of adjustment to chronic childhood disorders (Pless & Pinkerton, 1975) was published in that year. Articles containing either the words cerebral palsy, epilepsy, or spina bifida combined with phrases (gleaned from the databases' thesauruses) reflecting some aspect of social behavior (e.g., social competence) or peer relations (e.g., social acceptance) in either the title, abstract, or key words were requested. Second, reference lists of previously located studies were reviewed for articles published after 1975.

Studies were included in the review if they met the following criteria: (a) inclusion of children or adolescents with cerebral palsy, epilepsy, or spina bifida; (b) inclusion of at least one measure of children's social competence that was analyzed separately from other dependent measures; and (c) separate analysis of social competence data from children with at least one CNS condition (i.e., cerebral palsy, epilepsy, and/or spina bifida). Using these criteria, 43 articles were initially reviewed, of which 27 met the above criteria. At least one empirical study evaluating some aspect of children's social competence or peer relations was found for each of the CNS conditions listed above; 10 studies contained more than one of the CNS conditions under consideration. Reviewed articles are listed alphabetically by author in Table I and are marked with an asterisk in the References.

**REVIEW OF LITERATURE**

**General Conceptual Model of Children's Social Competence**

For the following reasons, Cavell's (1990) model of children's social competence provides a useful framework within which to describe and critique studies of the social competence of children with CNS conditions. First, Cavell's model is sensitive to a wide range of issues (e.g., peer relationship development, communication) in children's social development that may be affected by the presence of a CNS condition. Furthermore, the model considers domains of social competence that may be differentially sensitive to the effects of CNS conditions. These domains include (a) social adjustment (e.g., are children with CNS conditions accepted by their peers or socially withdrawn compared to other children?); (b) social performance (e.g., how do children with CNS conditions actually behave in typical peer situations such as entering a peer group?); and (c) social skills (e.g., do children with CNS conditions possess the basic skills, such as the ability to evaluate nonverbal cues, necessary to behave competently in typical peer situations?).

The overwhelming majority of studies (24/27) assessed social competence
at the level of social adjustment as defined by Cavell (1990). Only 3 of 27 studies assessed these children’s social performance and only 2 studies assessed their social skills. Two studies (Ammerman, Van Hasselt, Hersen, & Moore, 1989; Van Hasselt, Ammerman, Hersen, Reigel, & Rowley, 1991) assessed both the social adjustment and social skills of these children.

Study Designs

Two basic study designs were utilized to study social competence among children with CNS conditions: (a) comparison of the social competence of children with CNS conditions to either normative data or to control samples of either children with non-CNS-related chronic health conditions or physically healthy children; and (b) description of the relationships between independent variables and social competence among children with CNS conditions. Studies reporting group comparisons in social competence (n = 20) are discussed separately from those reporting relationships between independent variables and social competence (n = 13). Within the section on group differences, the review is organized in accord with Cavell’s (1990) model (i.e., findings regarding children’s social adjustment, social performance, and social skills are discussed separately). The section on correlates of social competence is organized according to the independent variable(s) used in analyses.

Group Differences in Social Competence

Social Adjustment of Children with CNS-Related Chronic Health Conditions

Eighteen studies assessed the social adjustment of children with CNS conditions through comparisons between the study sample and either normative data (n = 4) or a control group (n = 14). Physically healthy children served as controls in 8 studies, whereas children with non-CNS-related chronic health conditions served as controls in 4 studies; 2 studies included both types of control groups.

Evaluations of children’s social adjustment generally involved summary or global assessments of social functioning. Taken together, available findings indicated that children with CNS conditions were less socially competent compared to normative data, physically healthy children, or children with non-CNS-related chronic health conditions. However, it is important to note that the strength of the findings depended on how social adjustment was operationalized and measured. In 4 studies that employed the Total Social Competence Scale of the Child Behavior Checklist (CBCL; Achenbach, 1979; Achenbach & Edelbrock, 1983) children with CNS conditions were less socially competent than either a normative sample of non-clinic-referred children (Wallander, Feldman, & Varni, 1989;
Wallander, Hubert, & Varni, 1988; Wallander, Varni, Babani, Banis, DeHaan, & Wilcox, 1989) or a physically healthy control group (Ammerman et al., 1989; Apter et al., 1991). In 2 studies that employed a control group of children with non-CNS-related chronic health conditions (Wallander, Varni, Babani, Banis, & Wilcox, 1988, 1989), children with cerebral palsy were less competent than these controls, but children with spina bifida were not.

Similarly, in all 5 studies that utilized measures of social isolation that were either derived from larger instruments of child behavior (e.g., Conners Teacher Rating Scale, Conners, 1969; Psychiatric Screening Inventory, Langner, Gersten, McCarthy, & Eisenberg, 1976) or through interviews, children with CNS conditions were reported to be less socially competent (i.e., more socially isolated) than either physically healthy children (Anderson, 1979; Breslau, 1985; Sillanpää, 1992; Stores, 1978) or children with non-CNS-related chronic health conditions (Breslau, 1985; Breslau & Marshall, 1985). In one descriptive study that did not include a comparison group (McAndrew, 1979), approximately 50% of children with spina bifida were socially isolated according to self-reports on a semistructured interview. In the only study that addressed children's social competence at two points in time (Breslau & Marshall, 1985) mothers' reports on the Psychiatric Screening Inventory indicated that children with CNS conditions were more socially isolated than children with non-CNS-related conditions at both an initial assessment and at an assessment 5 years later.

Furthermore, in an additional 3 out of 4 studies that assessed social adjustment using subscales from larger inventories (e.g., the Peer Relations subscale of the Child and Adolescent Adjustment Profile; Ellsworth, 1979), children with CNS conditions were less socially competent (i.e., had poorer peer relations) compared to norms (Lord, Varzos, Behrman, Wicks, & Wicks, 1990), physically health children (Tew & Lawrence, 1985), or children with non-CNS-related chronic health conditions (Eiser, Havermans, Pancer, & Eiser, 1992). Only Landry, Robinson, Copeland, and Garner (1993), who utilized the Peer Acceptance subscale of the Harter Self-Perception Profile (Harter, 1985) found no differences between children with a CNS condition (i.e., spina bifida) and physically healthy controls.

Only one study (Center & Ward, 1984) utilized sociometric procedures to measure the social adjustment of children with CNS conditions. Sociometric procedures have the distinct advantage of gathering data concerning social acceptance directly from children's peers. In their study, children with cerebral palsy who were integrated into regular classrooms were less socially accepted than their healthy peers, with 30% considered socially unacceptable.

Inconsistent findings emerged from studies that assessed more specific domains of social adjustment. For example, after finding differences between children with CNS conditions and control groups on the Total Social Competence Scale of the CBCL (Achenbach, 1979; Achenbach & Edelbrock, 1983), two studies (Ammerman et al., 1989; Apter et al., 1991) separately analyzed each of
the three subscales (i.e., Activities, School, and Social) that constitute the scale. Compared to physically healthy controls, Ammerman et al. (1989) reported that children with spina bifida were less competent on each of the three subscales, whereas Apter et al. (1991) reported that adolescents with temporal lobe epilepsy were less competent on the Activities and Social subscales, but not on the School subscale. Van Hasselt et al. (1991) reported that children with spina bifida were less competent than physically healthy children only on the School subscale. In the one study that also included a control group of participants with a non-CNS-related chronic health condition, Apter et al. (1991) reported that adolescent boys with temporal lobe epilepsy were less socially competent than those with asthma only on the Social subscale.

Six studies of children's social adjustment included children with different CNS conditions (e.g., children with cerebral palsy and children with spina bifida) and compared these children's social competence. In each of 4 studies using the CBCL, Wallander and colleagues (Wallander, Hubert, et al., 1988; Wallander, Varni, Babani, Banis, DeHaan, et al., 1989; Wallander, Varni, Babani, Banis, & Wilcox, 1988, 1989) reported that children with cerebral palsy were less competent than children with spina bifida. However, Breslau (1985) and Hirst (1989) did not report differences in isolation between these groups.

Social Performance of Children with CNS-Related Chronic Health Conditions

Only 2 studies assessed the social performance (i.e., children's behavior in discrete peer situations) of children with CNS conditions through comparisons with a control group. Physically healthy children served as controls in one study, whereas both physically healthy children and children with non-CNS-related chronic health conditions served as controls in the other study.

Both Howe, Feinstein, Reiss, Molock, and Berger (1993) and Tin and Teasdale (1985) reported that children with CNS conditions were less socially competent than either physically healthy children or children with non-CNS-related chronic health conditions. Using parents' reports on the Autonomous Functioning Checklist (Sigafoos, Feinstein, Damond, & Reiss, 1988), Howe et al. (1993) found that children and adolescents with CNS conditions exhibited less autonomous social initiative than either physically healthy children or children with non-CNS-related chronic health conditions.

In a particularly informative assessment of children's social performance using observational data of peer interactions, Tin and Teasdale (1985) compared children with spina bifida attending regular schools to physically healthy children matched individually on age, gender, race, socioeconomic status, and academic ability. Children's social performance was assessed through observations of interpersonal interactions during lunch and on the playground; these observations yielded frequency counts which were entered into seven categories including
total amount of interaction and source of interaction (i.e., did the subject or a peer initiate the interaction). Results indicated that children with spina bifida had fewer interactions with peers and were more frequently alone compared to controls. However, whereas there were no differences in the amount of interaction initiated by children with spina bifida and controls, peers initiated significantly fewer interactions with children with spina bifida than with controls. Thus, children with spina bifida initiated interactions with peers, but were neglected by peers compared to physically healthy children (controls).

_Social Skills of Children with CNS-Related Chronic Health Conditions_

Only 2 studies assessed the social skills, defined as abilities in various specific components of peer situations, of children with CNS conditions. Van Hasselt and colleagues (e.g., Ammerman et al., 1989; Van Hasselt et al., 1991) compared the social skills of children and adolescents with spina bifida to those of physically healthy children and adolescents. In each of these studies, subjects completed a role-play test with a confederate during which they were rated on verbal (e.g., speech duration, hostile statements) and nonverbal (e.g., smiles, gaze, physical gestures) indices of social skill. The role-play tests covered the interpersonal tasks of initiating a conversation and making friends, negative assertion (e.g., responding to a situation by denying unreasonable requests) and positive assertion. In both studies, the level of social skill demonstrated by children and adolescents with spina bifida did not differ from that demonstrated by physically healthy children and adolescents.

_Correlates of Social Competence Among Children with CNS-Related Chronic Health Conditions_

Studies of factors that influence individual variation are important because they may provide insight into processes that underlie the development of social competence among children with CNS conditions. Eight studies determined whether subgroups of children with CNS conditions (e.g., boys vs. girls) differed in social competence, whereas 5 studies used correlational or multiple regression procedures to determine the amount of variance in social competence accounted for by various independent variables. All but 1 of these 13 studies (Hosokawa, Kitahara, & Nakamura, 1985) assessed children’s social adjustment.

_Severity of Condition_

Seven studies, of which all but 1 employed a group difference analytic strategy, evaluated the influence of condition severity on social competence. Using various measures of social adjustment (i.e., the Social Competence Scale
from the CBCL (Achenbach, 1979; Achenbach & Edelbrock, 1979, 1983), Social Maladjustment Scale from the Rogers Personal Adjustment Inventory (Rogers, 1961), Social Skills Scale from the Personality Inventory for Children (Wirt, Lachar, Klinedinst, & Seat, 1984), and unstandardized ratings of quality of social life, 6 studies found that children with more severe presentations were less socially competent than those with less severe presentations. Comparable findings were obtained regardless of whether severity was operationalized as degree of medical intervention (e.g., children with spina bifida and shunted hydrocephalus vs. those without hydrocephalus; Tew & Lawrence, 1985), functional impairment (e.g., ambulatory vs. nonambulatory; Ammerman et al., 1989; Hirst, 1989), neuropsychological impairment (Hermann, 1982), or type of school placement (e.g., special vs. mainstreamed classrooms; Anderson, 1979; Lord et al., 1990; Wallander, Hubert, et al., 1988).

For example, Hirst (1985) found that adolescents with three or more severe impairments were more likely to have very restricted social lives than those with fewer than three impairments. In an analysis of combinations of different impairments, he concluded that almost any combination of severe functional impairments could lead to restrictions in social life, but that combinations including IQ less than 85, walking problems, and obesity had a more negative effect on adolescents' social lives than other combinations of functional impairments not including these characteristics. Only Wallander, Feldman, et al. (1989), who studied the influence of a variety of severity parameters including lesion level, number of shunt surgeries, ambulation status, and bladder function among children with spina bifida, reported no differences in children's social competence as a function of condition severity.

Demographic Characteristics

Three studies evaluated the influence of demographic characteristics on the social competence of children with CNS conditions. Of the 2 studies that assessed the influence of age on children's social adjustment, one (Westbrook, Bauman, & Shinnar, 1992) reported that older children with CNS conditions were more socially competent (i.e., reported less perceived stigma) than younger children, whereas the other (Wallander, Hubert, et al., 1988) reported no differences in social competence (as measured by the CBCL; Achenbach & Edelbrock, 1983). In the one study that assessed the influence of age on children's social performance, Hosokawa et al. (1985) reported that older children with CNS conditions were more socially competent than younger children as measured by an instrument similar to the Vineland Social Maturity Scale (Doll, 1953). In 2 studies of children's social adjustment, no differences in social competence were reported as a function of gender (Wallander, Hubert, et al., 1988) or ethnicity (Westbrook et al., 1992).
Combinations of Independent Variables

Using multiple regression procedures, 4 studies evaluated the percentage of variance in children's social competence accounted for by demographic, condition severity, and child and family functioning independent variables separately and in combination. All of these studies assessed children's social adjustment.

Whitman, Hermann, Black, and Chhabria (1982) reported that a combination of demographic and severity variables did not significantly predict the social competence of children with epilepsy as measured by the CBCL (Achenbach, 1979). However, Thompson, Kronenberger, Johnson, and Whiting (1989) reported that a combination of demographic, severity, and family functioning variables explained a significant amount of variance in the social competence of children with spina bifida as measured by the Missouri Children's Behavior Checklist (Sines, Pauker, Sines, et al., 1969). Furthermore, using the CBCL (Achenbach & Edelbrock, 1983), Wallander, Hubert, et al. (1988) reported that child and maternal temperament variables explained a significant portion of variance in the social competence of children with CNS conditions, and Wallander, Varni, Babani, Banis, DeHaan, et al. (1989) reported that children's adaptive functioning significantly added to the variance accounted for in social competence beyond that accounted for by intelligence.

In summary, the reviewed studies of individual differences in children's social competence indicate that measures of functional severity (e.g., cognitive impairment, restricted mobility) are associated with social competence in children with CNS conditions, such that children with poorer functional status are less socially competent. Conclusions concerning the impact of demographic (e.g., age) and family variables (e.g., family functioning) are less clear largely due to the fact that only a few studies included these variables in analyses.

CRITIQUE

Although group comparison and correlational studies have contributed important initial findings regarding social competence among children with CNS-related chronic health conditions, the conclusions that can be drawn from the reviewed studies are limited by several important methodological problems and conceptual issues.

Conceptualization of Social Competence

One major problem of the reviewed literature is that only 8 studies presented an explicit theoretical model of how children's social competence might be affected by the presence of a CNS-related chronic health condition. Three studies
employed implicit conceptual models (i.e., stated hypotheses) without providing a clear rationale for the hypotheses. Sixteen studies did not state a priori hypotheses that would indicate an implicit conceptual model. Consequently, competing hypotheses were generally not proposed and most results were described and interpreted without a priori attention to the mechanisms (variables) that might account for or explain the results. Thus, the manner in which several causal or moderating factors may either contribute to or interfere with the development of social competence in children with CNS conditions has not been well described by the reviewed research. Moreover, the absence of a priori hypotheses to guide statistical analyses also increased the likelihood of obtaining spurious findings, especially when multiple comparisons were made (Wallander, 1992).

The lack of attention to the development of specific conceptual models describing how children's social competence may be affected by the presence of a CNS condition has promoted a view of social competence for this population that has focused almost exclusively on children's social adjustment and has neglected other potentially important domains of social competence (e.g., social performance and social skills). In addition, unique social demands (e.g., managing stigma, disclosure and explanation about their condition) faced by children with CNS conditions, but not physically healthy peers, have been largely overlooked.

**Measurement of Social Competence**

The manner in which children's social competence was operationalized and measured also poses significant problems. Social adjustment was operationalized mainly in terms of social activity (e.g., rates and quality of children's participation in various peer activities) and by measures that were originally designed to assess psychological, rather than social, functioning. Specific instruments employed (with the number of studies using them) included the CBCL (10; Achenbach, 1979, 1991; Achenbach & Edelbrock, 1979, 1983), Psychiatric Screening Inventory (2; Langner et al., 1976), Child and Adolescent Adjustment Profile (1; Ellsworth, 1979), Conners Teacher Rating Scale (1; Conners, 1969), Harter Self-Perception Profile (1; Harter, 1985), Missouri Children's Behavior Checklist (1; Sines et al., 1969), Personality Inventory for Children (1; Wirt et al., 1984), and Rogers Personal Adjustment Inventory (1; Rogers, 1961). These instruments generally comprise several scales, of which only one actually assesses any domain of social competence. For example, the CBCL (Achenbach, 1979, 1991; Achenbach & Edelbrock, 1979, 1983) contains 138 items, 20 of which form the Social Competence Scale. The Social Competence Scale itself is divided into three subscales labeled Activities, School, and Social. Respectively, these subscales reflect judgments of rates and quality of children's participation in various
sports, hobbies, and organizations; school performance (i.e., grades); and involvement and behavior with peers.

Several factors hinder the validity of findings obtained from the abovementioned measures. First, all of these instruments were originally designed to assess physically healthy children's functioning and may not be valid for children with CNS conditions. The psychometric properties of these instruments, when used in samples of children with CNS conditions, have not been well established. Second, because most of these instruments were designed to detect psychopathology as opposed to variations within the normal range of functioning, the significance of findings regarding group differences between children with CNS conditions and comparison samples is difficult to interpret (Perrin, Stein, & Drotar, 1991). For example, the CBCL (Achenbach, 1979, 1991; Achenbach & Edelbrock, 1979, 1983) employs $T$ scores and a cutoff beyond which children's social competence would be considered deviant. However, the validity and clinical significance of statistically significant differences within the normal range of functioning are not clear. Third, results based on such operational definitions of children's social competence are misleading when studying children with CNS conditions because they may reflect direct consequences of the children's condition on their ability to participate in social activities as opposed to deficits in children's social competence per se (Drotar, Stein, & Perrin, 1995; Perrin et al., 1991). For example, consider a child with cerebral palsy who requires the use of a wheelchair. This child's rate of engagement in the types of peer activities measured by the CBCL may be reduced because of access and transportation difficulties and not because of any lack of social ability or interest.

The remaining 7 studies of children's social adjustment operationalized social adjustment as either peer acceptance or quality of social life through the use of sociometric procedures or unstandardized rating scales derived from concurrently collected interview data. A clear benefit of sociometric procedures, through which children with CNS conditions were nominated by their peers as friends (or not) and ascribed various social qualities, is that data are gathered from children's peers as opposed to from parents or teachers as is often the case with questionnaires. The validity of results from studies that used unstandardized rating scales is threatened because these scales lack psychometric data.

**Study Design**

Four studies did not collect data from control samples, but instead relied on comparisons with normative data to obtain results. However, Lavigne and Faierroutman (1992) showed that comparisons to normative data tend to overestimate psychosocial deficits in samples of children with a variety of chronic health conditions. Comparisons to normative data may overestimate deficits in children with CNS conditions because normative samples are typically selected to exclude
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children with mental retardation or serious adjustment problems and, thus, are not representative of the general population of children (Perrin et al., 1991).

Of the 15 controlled studies, 8 collected data from healthy children, 4 collected data from children with non-CNS-related conditions, and 3 collected data from both. Generally speaking, where differences in social competence were reported, children with CNS conditions were less competent regardless of the type of control group employed. However, inferences that can be drawn differ depending on the type of control group used. Although more difficult to recruit, employing children with non-CNS-related conditions as controls is probably preferable because it allows for results to be discussed with respect to the specific effects of CNS conditions on social competence; when only healthy children are employed as controls, it is impossible to conclude whether differences in competence are a result of having any chronic condition or of having a CNS condition.

Sample Characteristics

Eleven studies utilized samples of children whose ages varied by 10 or more years (e.g., 4–14 years old). However, only 3 of these studies controlled for the effects of age on children’s social outcomes. The inclusion of children and adolescents of vastly different ages makes the clinical significance of findings difficult to interpret given the varied developmental tasks facing children of different ages (Perrin & Gerrity, 1984). This is a particular problem because the functions of children’s peer relationships, and thus what constitutes socially competent behavior, are hypothesized to undergo significant developmental changes. For example, whereas peer relationships in middle childhood are generally characterized by the underlying theme of defining a peer group, self-exploration through self-disclosure is a dominant theme in adolescent peer relations (Parker & Gottman, 1989). The peer relations of children and adolescents with CNS conditions may undergo similar broad developmental processes.

In addition, too many studies (see Ammerman et al., 1989; Breslau, 1985; Landry et al., 1993; Van Hasselt et al., 1991, for exceptions) paid insufficient attention to potential differences in cognitive functioning between children with CNS conditions and comparison groups. Because CNS conditions may impact aspects of cognitive functioning (e.g., attention, memory) that are important for the development of social competence (Crick & Dodge, 1994; Dodge & Price, 1994) it is imperative to know whether differences in social competence are explained by differences in cognitive functioning. Of the 4 studies that controlled for intellectual differences between CNS and control groups, 3 reported differences in social competence. However, no studies reported data on specific cognitive functions (e.g., attention).

Finally, all but a few studies were conducted at a single site. Unfortunately,
single-site research projects are almost always hindered by the relatively small populations of children with any one CNS condition available for study, especially if researchers limit their study to a particular age group. Because of the inherent small samples and idiosyncratic characteristics of any one research site, results from such studies may not generalize to the broader population of children with CNS conditions.

**DIRECTIONS FOR FUTURE RESEARCH**

Future research concerning social competence among children with CNS-related chronic health conditions would benefit from (a) reconceptualization of what constitutes socially competent behavior in this population and (b) the use of theoretical models to generate hypotheses about how social competence may be enhanced or disrupted. In addition, future research must address the fact that social competence may vary as a function of specific CNS conditions (e.g., children with cerebral palsy vs. those with epilepsy), dimensions that are common to different diagnoses (e.g., degree of cognitive impairment), as well as normative issues (e.g., children's gender or developmental level; Holden, Chmielewski, Nelson, Kager, & Foltz, 1997).

A situational analysis such as that outlined by Cavell (1990) and DiGirolamo, Quittner, Ackerman, and Stevens (1997) would be a useful way to elucidate relevant social demands and conceptualize socially competent behavior among children with CNS conditions. In such a process, measures of relevant social demands and strategies (i.e., competencies) used to cope with them would be developed out of interviews with children and their parents. The strength of this approach lies in its ability to define developmentally appropriate social demands and competencies within specific CNS conditions. Because relevant social demands would be expected to vary as the goals of social behavior change as a function of developmental level (Parker & Gottman, 1989; Perrin & Gerrity, 1984), a situational analysis would allow researchers to directly examine developmental changes in social competence. In addition, rather than focusing on normative social demands (e.g., social acceptance), future research should concentrate on elucidating social demands that are specific to CNS conditions as a whole (e.g., disclosing and/or explaining their condition in response to peers' questions, managing stigma) and those that are specific to particular CNS conditions (e.g., developing social outlets within the context of physical limitations). Empirical comparisons of social demands across CNS conditions would enable researchers to determine which demands are common to children with CNS conditions as a group and which are specific to particular CNS conditions.

After developmentally appropriate social demands have been defined, investigations of social competence should concentrate on assessments of chil-
dren's social performance and social skills. These domains have been neglected by the reviewed research. In fact, current findings beg the question, "why are children with CNS conditions less socially adjusted than controls?" Although current findings indicate that children with CNS conditions are less socially adjusted than their peers, the 2 studies that examined social skills (Ammerman et al., 1989; Van Hasselt et al., 1991) did not report social skill deficits in these children. Several appropriate strategies are available to assess social performance and social skills. Observational measures of children's social behaviors in naturalistic environments reflecting developmentally appropriate social demands would be a useful way of measuring these children's social performance (Cavell, 1990). Laboratory measures (e.g., Dodge, Petit, McClaskey, & Brown, 1986) that identify specific social information-processing deficits (e.g., in children's ability to attend to and encode nonverbal social cues) encountered during developmentally appropriate social demands would be a useful way of measuring these children's social skills. The combination of these social performance and social skill assessments would enable researchers to first characterize social behaviors that are relatively effective versus those that are relatively ineffective and, second, to describe the social skill competencies that underlie these social behaviors.

This reconceptualization of social competence paves the way for theoretical models to predict social competence among children with CNS conditions. Two models that appear especially useful for generating hypotheses with respect to social competence in this population are the social information-processing model described by Crick and Dodge (1994) and Wallander and Hubert's (1987) model that delineates environmental factors related to the development of social competence. The relevance of Crick and Dodge's (1994) model lies in its microlevel analysis of the individual's cognitive processes (e.g., encoding and interpreting social cues; clarifying social goals; and developing, choosing, and enacting social behavior) that underlie social behavior. Wallander and Hubert's (1987) model is an important adjunct because it includes environmental factors (e.g., opportunity to learn and display social behavior) that influence the development of social competence.

Within the structure of these two models, several specific important research questions concerning the processes by which social competence is enhanced or disrupted among children with CNS conditions may be forwarded. The models allow for research that addresses potential differences both within and across different CNS conditions. For example, research has yet to determine the specific effects of cognitive impairment (a dimension that varies within specific CNS conditions and cuts across different CNS conditions) on social competence in this population. Within the framework of the social information-processing model, studies examining (a) accuracy of encoding and interpretation of nonverbal (e.g., facial) social cues and/or (b) generation of alternative behavioral
responses among subgroups of children with cognitive deficits would help to clarify the link between cognitive impairment and social competence among children with CNS conditions. In such studies, attempts should be made to recruit subjects with specific cognitive deficits in attention and/or memory as these specific abilities appear to be especially crucial for encoding and interpreting social cues and accessing alternative behavioral responses (Crick & Dodge, 1994). One would hypothesize that among children with different CNS conditions, those with weaknesses in attention and/or memory would be more likely to inaccurately encode and interpret social cues and generate fewer response alternatives than would those without such weaknesses.

Wallander and Hubert's (1987) model is probably most useful for answering questions that specifically focus on environmental factors that influence the development of social competence. For example, research has yet to determine the specific effects of social stigma on these children's opportunities to learn and develop appropriate social behaviors. One hypothesis is that children's perceived stigma leads to their avoidance of developmentally appropriate activities and thus reduces their opportunities to learn and develop appropriate social behaviors. An alternative hypothesis is that social stigma leads peers to avoid children with CNS conditions and thus reduces their opportunities to learn and develop appropriate social behavior.

Reconceptualizing the meaning of social competence among children with CNS conditions and utilizing theoretical models to further study their social skills and social performance will enhance the value of future research. Our knowledge will be advanced by elucidating developmentally appropriate social demands, differentiating aspects of social competence that are common to children with CNS conditions as a whole from those that are specific to particular CNS conditions and, consequently, identifying specific areas of intervention.

REFERENCES


References marked with an asterisk indicate studies included in review.
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