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Language and social functioning in children and adolescents with epilepsy

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Abstract

Individuals with epilepsy have difficulties with social function that are not adequately accounted for by seizure severity or frequency. This study examined the relationship between language ability and social functioning in 193 children with epilepsy over a period of 36 months following their first recognized seizure. The findings show that children with persistent seizures have poorer language function, even at the onset of their seizures, than do their healthy siblings, children with no recurrent seizures, and children with recurrent but not persistent seizures. They continue to demonstrate poorer language function 36 months later. This poor language function is associated with declining social competence. Intervention aimed at improving social competence should include consideration of potential language deficits that accompany epilepsy and social difficulty.

Keywords

Seizures; Children; Language; Social function

1. Introduction

Individuals with epilepsy have difficulties with social function that are not adequately accounted for by seizure severity or frequency. There are multiple aspects of social function, including social competence and social problems. Social competence has been defined in a variety of ways. Rubin and Rose-Krasnor [1] refer to the ability to develop and maintain positive relationships with others while achieving one's own goals in social interactions [1]. Cavell [2] proposed a three-component model consisting of social adjustment, social performance, and social skills. In contrast, social problems are those characteristics, situational or intrinsic, that the individual demonstrates such as difficulty getting along with

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peers and peer rejections [1] and may result from social skill deficits [2], although such deficits are not the only determinant of social problems.

In childhood, as a group, individuals with epilepsy are more likely to have behavior and mental health problems than their peers [2,3]. As adults, they are more likely than controls to be underemployed, to never marry, and to remain childless [4–7]. Rantanen and colleagues [8] pointed out that in addition to skill deficits, epilepsy-related factors may affect social competence in children with epilepsy.

Several studies have investigated predictors of social function in children with epilepsy; most have focused on seizure-related variables or on family functioning factors. In general, seizure-related variables are only modestly associated with social problems or social competence [9,10], although control of seizures and shorter duration of epilepsy have been associated with better social outcome [11]. Family factors such as overall family function and socioeconomic status [11] are also associated with social function.

There have also been investigations of the relationship between cognition and social function in children with epilepsy. Poor neuropsychological functioning is associated with low social competence in children with epilepsy [12]. Similarly, children with epilepsy and learning disability are more likely to demonstrate social problems than those without learning disability [10]. Caplan et al. [10] found that lower Full Scale IQ, as well as subtle language problems, was predictive of poorer overall social competence in a group of children with complex partial seizures or absence epilepsy. Drewel, Bell, and Austin [13] showed that lower neuropsychological functioning, younger age at onset of epilepsy, and active seizure status were associated with peer difficulties in children with epilepsy. In contrast, a population-based study from Finland showed that individuals with epilepsy who successfully completed their basic education, presumably indicating relatively unimpaired neuropsychological status, did not differ from healthy controls with regard to higher education, employment, or social functioning [14].

Taken together, these findings suggest that both global neuropsychological weakness (IQ) and specific neuropsychological deficits, such as language [9] or attention [13], may contribute to the development of social problems in children with epilepsy. Children with lower language ability may demonstrate poor social competence. Conversely, children with epilepsy who have unimpaired general intelligence and intact language are likely to demonstrate better social competence. These neuropsychological strengths and weaknesses can be conceptualized as protective and risk factors for the development of poor social function and poor social outcome over the course of epilepsy.

The purpose of this study was to examine the relationship between language ability and social functioning in children with epilepsy over a period of 36 months following their first recognized seizure.

2. Method

2.1. Participants

Children were prospectively recruited from July 2000 through March 2004 at two large academic medical centers in Indianapolis and Cincinnati and through private practice physicians and school nurses throughout Indiana. Inclusion criteria were age 6–14 years, a first recognized unprovoked seizure (symptomatic, cryptogenic, or idiopathic) within 3 months of enrollment, and an IQ above 55. The Kaufmann Brief Intelligence Test, Second Edition [15] was administered to all children at baseline only. Children were excluded if their seizure was provoked (i.e., associated with toxin, infection, trauma, or mass lesion) or if they had a chronic illness or functional impairment limiting activities of daily living. Children were *not* excluded for having prior unrecognized seizures. Seizure type and epileptic syndrome were classified by a board-certified child neurologist using International League Against Epilepsy criteria [16] following review of the parent's description of the seizure, the child's EEG and/or neuroimaging findings, and all other relevant information available at the evaluation of the first recognized seizure. This study was approved by the institutional review boards at both participating institutions. Parents provided written consent, and children gave assent. Telephone follow-up took place at 9, 18, 27, and 36 months. Neuropsychological assessment was done at baseline (enrollment), 18 months, and 36 months.

A comparison group of 93 siblings, who were in the same age range as the children with seizures, was also recruited to participate.

Out of 349 children enrolled, 208 had recurrent seizures, and 44 had persistent seizures, defined as seizures reported at every follow-up interval. Out of the 97 children with no recurrent seizures, 48 (19 girls and 29 boys, mean (SD) age = 9.7 (2.7) years) had both baseline and 36-month neuropsychological and behavioral [Child Behavior Checklist (CBCL)] [17] data. Out of the 208 children with recurrent seizures, 123 (71 girls and 52 boys, mean (SD) age = 9.9 (2.5) years) had both baseline and 36-month neuropsychological and CBCL data. Out of the 44 children with persistent seizures, 22 (12 girls and 10 boys, mean (SD) age = 8.8 (2.4) years) had both baseline and 36-month data. There were 93 siblings (47 girls and 46 boys, mean (SD) age = 9.9 (2.7) years) who had both baseline and 36-month data. The children in the groups with seizures did not differ with respect to seizure type or syndrome. A significantly greater number of children in the group with persistent seizures were on antiepileptic medication at the 36-month time point than in the other two groups with seizures. None of the groups differed from each other with respect to age or IQ. The children in the groups with seizures did not differ with respect to the time between the first recognized seizure and baseline neuropsychological testing. These data are shown in Table 1.

The Child Behavior Checklist (CBCL) [17], which yields age- and sex-adjusted T-scores for social competence and social problems, was administered to each child's parent or guardian at baseline, 18 months, and 36 months. Higher Social Competence T-scores indicate better social function; higher Social Problems T-scores indicate worse social function.

Children completed a test battery of standardized, well-established neuropsychological tests. Factor analysis of the results of this test battery yielded four neuropsychological factors that we labeled Language, Processing Speed, Executive/Attention/Construction, and Verbal Memory and Learning. The Language factor was made up of scores on the Phonological Memory and Phonological Awareness subscales of the Comprehensive Test of Phonological Processing [18] and the Formulated Sentences and Concepts & Directions subtests of the clinical Evaluation of Language Fundamentals, Third Edition [19]. The factors were derived from the larger study sample and have been described elsewhere [20]. Factor scores have a mean of 0 and a standard deviation of 1.

3. Statistical methods

3.1. Language

Paired T-tests were used to explore change in language scores in siblings and children with no recurrent, recurrent, and persistent seizures from baseline to 36 months following a first recognized seizure. Two-sample T-tests were used to investigate differences in language scores between children with no recurrent seizures, recurrent seizures, and persistent seizures at baseline and 36 months. Linear mixed models were used to compare the language scores of children in each of the three seizure groups with their siblings at both baseline and 36 months. Family was a random effect, and recurrence group (no recurrent, recurrent, or persistent seizures vs. sibling) was a fixed effect.

3.2. Social competence and social problems

Paired t-tests were used to explore change in social competence and change in social problem scores in siblings and children with no recurrent, recurrent, and persistent seizures from baseline to 36 months following first recognized seizure.

3.3. Association between change in language and change in social competence and problems

Linear mixed models were used to investigate the association between change in language and change in both social competence and social problems from baseline to 36 months (change scores calculated as 36 month – baseline), adjusting for the baseline social score and child age. The interaction term between the language change score and recurrence group was included. If the interaction term was not significant ($p > 0.10$), the interaction term was removed from the model, and results are presented based on the model including only main effects. Family was a random effect, and recurrence group was a fixed effect. Social competence and social problem scores were standardized prior to modeling as recommended by Fraizer et al. [21].

4. Results

4.1. Language

The mean language factor scores at baseline and 36 months for recurrent seizure group are shown in Table 2. None of the groups with seizures were different from the others with regard to language at baseline. Siblings and children with recurrent seizures showed a

significant improvement in language scores from baseline to 36 months ($t = 2.58, p = 0.011$ and $t = 2.12, p = 0.036$, respectively). There was a trend toward improvement in language scores among children with no recurrent seizures ($t = 1.86, p = 0.069$) and no change in language scores among children with persistent seizures ($t = 0.32, p = 0.755$).

Siblings' language scores significantly differed from those of children with recurrent seizures at both baseline and 36 months ($F = 7.27; p = 0.008$ and $F = 10.28; p = 0.002$, respectively). The siblings' language scores were also significantly different from the language scores of children with persistent seizures at 36 months ($F = 6.52; p = 0.013$).

4.2. Social competence

The mean social competence T-scores at baseline and 36 months for all groups are shown in Table 3. Siblings and children with no recurrent seizures as well as children with recurrent seizures obtained ratings of social competence at 36 months that were generally higher than at baseline, whereas children with persistent seizures had lower social competence ratings at 36 months than at baseline, although none of the comparisons were statistically significant.

There was a significant interaction between change in language and group (statistic = 4.77, $p = 0.004$) (see Fig. 1). Among siblings, higher language scores were associated with increasing social competence; however, this association was not statistically significant ($\beta = 0.09, p = 0.229$). Among children with no recurrent and persistent seizures, however, improvement in language was also associated with increasing social competence ($\beta = 0.30, p = 0.019$ and $\beta = 0.61, p = 0.008$, respectively). There was not a significant association between change in language and change in social competence among children with recurrent seizures ($\beta = -0.11, p = 0.172$). Age was not associated with change in social competence ($F = 0.03, p = 0.858$).

4.3. Social problems

The mean social problem T-scores at baseline and 36 months for all groups are shown in Table 3. Siblings and children with no recurrent seizures or recurrent seizures obtained ratings of social problems at 36 months that were higher than at baseline; however, the change was statistically significant only among children with recurrent seizures ($t = -1.06, p = 0.293$; $t = -1.47, p = 0.148$, and $t = -4.07, p < 0.001$, respectively). Children with persistent seizures showed no change in social problems from baseline to 36 months ($t = 0.03, p = 0.979$).

There was not a significant interaction between change in language and group ($F = 0.53, p = 0.664$). Change in social problems was not significantly associated with either change in language or continued seizures ($F = 1.90, p = 0.172$ and $F = 0.36, p = 0.781$). Child age at baseline was significantly associated with change in social problems ($F = 9.77, p = 0.002$). Social problems improved among older children, whereas social problems in younger children remained unchanged. The mean improvement in social problems among children and siblings who were at least ten years old was 2.8, $SD = 5.9$. The mean improvement in social problems among children and siblings less than ten years of age was 0.3, $SD = 7.1$.

5. Discussion

These findings show that children with persistent seizures have lower language scores, even at the onset of their seizures, than do their healthy siblings, children with no recurrent seizures, and children with recurrent but not persistent seizures. They continue to demonstrate poorer language function 36 months after the onset of their seizures, whereas their healthy siblings and children with recurrent seizures show improvement in language skill. This poor language function is not associated with increased social problems. That is, children who have increasing difficulty with language over time do not demonstrate increasing social problems. They do, however, demonstrate declining social competence. Those children who have lower language scores at 36 months compared with their scores at baseline also have lower social competence ratings at 36 months compared with their ratings at baseline.

These findings indicate that children with persistent seizures are more likely to have difficulties with forming and maintaining friendships or group memberships [22] and other forms of social competence than to have overt social problems, such as being teased or not liked. They are consistent with others' findings of poor social competence [23], although one recent study found that children with epilepsy may be more susceptible to bullying [24]. It may be that the language weaknesses that often accompany epilepsy make children with seizures more likely to have difficulty with social information processing [25] and that such difficulties lead to poor social competence but do not necessarily lead to increased social problems.

Age at the onset of seizures is an important factor in the relationship between language and social function. Although it was not associated with social competence over time, age at seizure onset was associated with change in social problems such that older children had fewer social problems at 36 months than at baseline. Younger children did not demonstrate this improvement. Older age at onset of seizures might, thus, be conceptualized as a protective factor with regard to the effects of cognitive change on social function. That is, children who were older at the onset of their seizures had fewer social problems associated with language declines. We showed a similar relationship among age at onset, declines in processing speed, and depression symptoms in this sample [26] such that children who were older at the onset of their seizures had fewer depression symptoms associated with processing speed declines.

Limitations of this study include the different numbers of participants in our subgroups with seizures, ranging from 21 to 123 children. These varying numbers reflect the trajectory that follows new-onset seizures: some individuals do not have another seizure, some have one or more additional seizures but have seizure-free periods, and some, a smaller number, have persistent seizures. The failure to find significant changes may reflect these group size differences. Also, it is difficult to disentangle language and overall cognitive function, which in itself may contribute to social competence problems. We have attempted to examine language as one of a number of cognitive determinants of social function. Finally, although the CBCL has been used in many studies of children with epilepsy and other chronic illnesses [27,28], it must be acknowledged that it was not designed for such populations.

Despite these limitations, these findings have implications for the care of children with epilepsy.

Early recognition and identification of the social difficulties that may accompany epilepsy, particularly in the context of persistent seizures, is critical for appropriate intervention. Such interventions have been developed and investigated in children and adults with autism and other developmental disorders [29] as well as in adults with schizophrenia [30]. There have also been a number of studies of behavioral intervention targeting social function in epilepsy [31–34] although as Mittan [35] has noted, even those that had promising results have not been subjected to further study. Early effective intervention may lead to the amelioration of the longer-term aspects of impaired social function and its associated societal costs.

Although the changes found in this study are rather small in magnitude, they may be considered early indicators of the cognitive and behavioral course of epilepsy. That is, children with difficult-to-treat seizures are more likely over time to develop problems in cognition, behavior, and social function than are children whose seizures are well controlled from their onset. Recognition of these types of early indicators will be important for improving potential outcomes.

Understanding of the particular factors that contribute to the development of social difficulties will allow for the tailoring of intervention strategies [8,13]. We have studied language in this context, but the variety of other neuropsychological deficits that may accompany epilepsy are likely to play a role as well. We found that children with language weakness and children at younger ages are at greater risk of poor social competence. Following the obvious recommendation of “social skills training” for individuals with epilepsy who have social difficulties may lead nowhere if the accompanying risk factors for neuropsychological weakness, which are likely to vary across individuals and across development, are not taken into account.

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References

1. Rubin, KH.; Rose-Krasnor, L. Interpersonal problem-solving. In: Van Hasselt, VB.; Hersen, M., editors. Handbook of social development. New York: Plenum; 1992. p. 283-323.
2. Cavell TA. Social adjustment, social performance, and social skills: a tri-component model of social competence. *J Clin Child Psychol.* 1990; 19:111–22.
3. Davies S, Heyman I, Goodman R. A population survey of mental health problems in children with epilepsy. *Dev Med Child Neurol.* 2003; 45:292–5. [PubMed: 12729141]
4. Rutter, M.; Graham, P.; Yule, W. A neuropsychiatric study in childhood. Spastics International Medical Publications; 1970.
5. Jalava M, Sillanpaa M, Camfield C, Camfield P. Social adjustment and competence 35 years after onset of childhood epilepsy: a prospective controlled study. *Epilepsia.* 1997; 38:708–15. [PubMed: 9186254]
6. Sillanpaa M, Jalava J, Kaleva O, Shinnar S. Long-term prognosis of seizures with onset in childhood. *N Engl J Med.* 1998; 338:1715–22. [PubMed: 9624191]

7. Smeets VMJ, van Lierop BAG, Vanhoutvin JPG, Aldenkamp AP, Nijhuis FJN. Epilepsy and employment: literature review. *Epilepsy Behav.* 2007; 10:354–62. [PubMed: 17369102]
8. Rantanen K, Eriksson K, Nieminen P. Social competence in children with epilepsy—a review. *Epilepsy Behav.* 2012; 24:295–303. [PubMed: 22595143]
9. Strine TW, Kobau R, Chapman DP, Thurman DJ, Price P, Balluz LS. Psychological distress, comorbidities, and health behaviors among U.S. adults with seizures: results from the 2002 National Health Interview Survey. *Epilepsia.* 2005; 46:1133–9. [PubMed: 16026567]
10. Caplan R, Sagun J, Siddarth P, Gurbani S, Koh S, Gowrinathan R, et al. Social competence in pediatric epilepsy: insights into underlying mechanisms. *Epilepsy Behav.* 2005; 6:218–28. [PubMed: 15710308]
11. Tse E, Hamiwka L, Sherman EMS, Wirrell E. Social skills problems in children with epilepsy: prevalence, nature, and predictors. *Epilepsy Behav.* 2007; 11:499–505. [PubMed: 17928272]
12. Hermann BP, Whitman S, Hughes JR, Melyn M, Dell J. Multietiological determinants of psychopathology and social competence in children with epilepsy. *Epilepsy Res.* 1988; 2:51–60. [PubMed: 3197680]
13. Drewel EH, Bell DJ, Austin JK. Peer difficulties in children with epilepsy: association with seizure, neuropsychological, academic, and behavioral variables. *Child Neuropsychol.* 2009; 15:305–20. [PubMed: 19093265]
14. Koponen A, Seppala U, Eriksson K, Nieminen P, Uutela A, Sillanpaa M, et al. Social functioning and psychological well-being of 347 young adults with epilepsy only — population-based, controlled study from Finland. *Epilepsia.* 2007; 48:907–12. [PubMed: 17430406]
15. Kaufman, AS.; Kaufman, NL. Kaufman Brief Intelligence Test. Circle Pines, MN: American Guidance Service; 1990.
16. Berg AT, Berkovic SF, Brodie MJ, Buchhalter J, Cross JH, Boas WVE, et al. Revised terminology and concepts for organization of seizures and epilepsies: report of the ILAE Commission on Classification and Terminology, 2005-2009. *Epilepsia.* 2010; 51:676–85. [PubMed: 20196795]
17. Achenbach, TM.; Rescorla, LA. Manual for the ASEBA school-age forms and profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families; 2001.
18. Wagner, R.; Torgesen, J.; Rashotte, C. Comprehensive test of phonological processing. Austin, TX: Pro-Ed; 1999.
19. Semel, E.; Wiig, EH.; Secord, WA. Clinical evaluation of language fundamentals. 3rd. San Antonio, TX: The Psychological Corporation; 1995.
20. Byars AW, deGrauw TJ, Johnson CS, Fastenau PS, Perkins SM, Egelhoff JC, et al. The association of MRI findings and neuropsychological functioning after the first recognized seizure. *Epilepsia.* 2007; 48:1067–74. [PubMed: 17442004]
21. Fraizer PA, Tix AP, Barron KE. Testing moderator and mediator effects in counseling psychology. *J Couns Psychol.* 2004; 51:115–34.
22. Sillanpaa M, Cross JH. The psychosocial impact of epilepsy in childhood. *Epilepsy Behav.* 2009; 15:S5–S10. [PubMed: 19298867]
23. Jakovljevic V, Martinovic Z. Social competence of children and adolescents with epilepsy. *Seizure.* 2006; 15:528–32. [PubMed: 16860578]
24. Hamiwka LD, Yu CG, Hamiwka LA, Sherman EM, Anderson B, Wirrell E. Are children with epilepsy at greater risk for bullying than their peers? *Epilepsy Behav.* 2009; 15:500–5. [PubMed: 19631586]
25. Crick NR, Dodge KA. A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychol Bull.* 1994; 115:74–101.
26. Austin JK, Perkins SM, Johnson CS, Fastenau PS, Byars AW, deGrauw TJ, et al. Self-esteem and symptoms of depression in children with seizures: relationships with neuropsychological functioning and family variables over time. *Epilepsia.* 2010; 51:2074–83. [PubMed: 20412284]
27. Meijer SA, Sinnema G, Bijstra JO, Mellenbergh GJ, Wolters WHG. Social functioning in children with a chronic illness. *J Child Psychol Psychiatry.* 2000; 41:309–17. [PubMed: 10784078]
28. Mackner LM, Crandall WV. Psychosocial adjustment in adolescents with inflammatory bowel disease. *J Pediatr Psychol.* 2006; 31:281–5. [PubMed: 15802606]

29. Gevers C, Clifford P, Mager M, Boer F. A theory-of-mind-based social cognition training program for school-aged children with pervasive developmental disorders: an open study of its effectiveness. *J Autism Dev Disord.* 2006; 36:567–71. [PubMed: 16586154]
30. Choi KH, Kwon JH. Social cognition enhancement training for schizophrenia: a preliminary randomized controlled trial. *Community Ment Health J.* 2006; 42:177–87. [PubMed: 16732472]
31. Austin JK, McNelis AM, Shore CP, Dunn DW, Musick BA. A feasibility study of a family seizure management program: “be seizure smart”. *J Neurosci Nurs.* 2002; 34:30–7.
32. Lewis MA, Salas I, de la Sota A, Chiofalo N, Leake B. Randomized trial of a program to enhance the competencies of children with epilepsy. *Epilepsia.* 1990; 31:101–9. [PubMed: 2406126]
33. Shore CP, Perkins SM, Austin JK. The Seizures and Epilepsy Education (SEE) Program for families of children with epilepsy: a preliminary study. *Epilepsy Behav.* 2008; 12:157–64. [PubMed: 18086460]
34. Snead K, Ackerson J, Bailey K, Schmitt MM, Madan-Swain A, Martin RC. Taking charge of epilepsy: the development of a structured psychoeducational group intervention for adolescents with epilepsy and their parents. *Epilepsy Behav.* 2004; 5:547–56. [PubMed: 15256193]
35. Mittan RJ. Psychosocial treatment programs in epilepsy: a review. *Epilepsy Behav.* 2009; 16:371–80. [PubMed: 19783217]

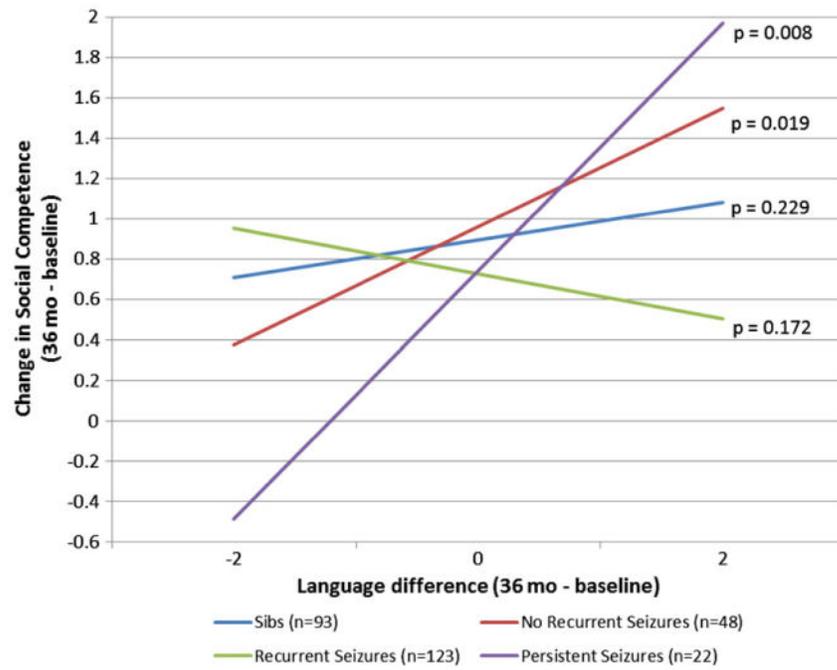


Fig. 1. Relationship between change in social competence scores and change in language scores across 36 months.

Table 1

Clinical characteristics of groups with seizures and the sibling group.

Groups	Age at baseline in years			KBIT ^a IQ score at baseline			Time from first seizure to baseline neuropsychological testing in months		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Siblings	93	9.90	2.66	93	105	13	-	-	-
No recurrence	48	9.66	2.69	48	105	15	46	2.60	1.16
Recurrence	123	9.87	2.46	123	103	15	121	2.72	1.24
Persistent	21 [*]	8.79	2.38	22	100	14	20	3.00	1.69

^{*} p < .05.

^a KBIT = Kaufman Brief Intelligence Test [15].

Table 2

Language factor scores for groups.

Groups	Baseline		36 months		36 months–baseline		Paired t-test 36 months vs. baseline	
	Mean	SD	Mean	SD	Mean	SD	T-Value	p-Value
Siblings (n = 93)	0.24	0.84	0.39	0.83	0.15	0.57	2.58	0.011*
No recurrence (n = 48)	0.06	0.73	0.19	0.76	0.13	0.49	1.86	0.069
Recurrence (n = 123)	0.01	0.97	0.10	0.95	0.09	0.46	2.12	0.036*
Persistent (n = 22)	-0.22	0.90	-0.18	1.03	0.03	0.50	0.32	0.755

Factor scores were derived from factor analysis of the dataset described in Byars [20] and have a mean = 0, SD = 1;

* p < .05.

Table 3

Social competence and social problems.

Groups	Baseline			36 months			36 months–baseline			Paired t-test 36 months vs. baseline	
	n	Mean	SD	n	Mean	SD	n	Mean	SD	t-Value	p-Value
<i>Social competence</i>											
Siblings	91	47.00	7.52	90	48.60	8.30	88	1.43	9.23	1.45	0.149
No recurrence	48	46.31	9.28	46	48.96	7.85	46	2.57	9.63	1.81	0.078
Recurrence	123	46.25	8.32	121	46.53	8.76	121	0.24	9.32	0.28	0.778
Persistent	21	49.14	9.41	21	46.86	9.01	20	-1.10	9.77	-0.50	0.620
<i>Social problems</i>											
Siblings	92	54.18	7.07	93	53.53	5.22	92	-0.66	6.01	-1.06	0.293
No recurrence	48	54.02	5.74	48	52.94	4.42	48	-1.08	5.11	-1.47	0.148
Recurrence	123	57.26	9.26	123	54.61	6.61	123	-2.65	7.22	-4.07	<0.001*
Persistent	22	55.59	6.16	22	55.64	7.63	22	0.05	8.01	0.03	0.979

T-scores for the Social Competence and Social Problems scales of the Child Behavior Checklist.

T-scores have a mean = 50, SD = 10;

* p < .05