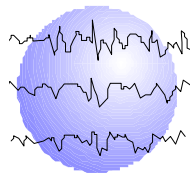


# THE RELATIONSHIP OF IQ AND AGE TO SUICIDAL IDEATION IN CHILDREN WITH EPILEPTIC VS. NONEPILEPTIC SEIZURES

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## ABSTRACT

**RATIONALE:** Pediatric epilepsy patients are at risk for cognitive and mental health problems. Previously, we found suicidal ideation (SI) was more prevalent in hospitalized pediatric patients with psychogenic nonepileptic seizures (PNES) or both PNES and epileptic seizures (MIX) than those with epileptic seizures alone (ES). Currently, our objective is to describe the occurrence of SI as it relates to cognitive functioning, age, and seizure diagnosis in a sample of pediatric epilepsy patients.

**METHODS:** Records of 162 children admitted to an inpatient epilepsy unit from 9/99-4/06 for video-EEG monitoring were reviewed. Inclusion criteria included evaluation by a psychologist during the hospitalization, diagnosis of ES, PNES or MIX by a neurologist, and IQ data obtained within 5 years of the hospitalization. Those with IQ below 40 and those with physiologic nonepileptic events were excluded. All epileptic seizure types were grouped together. Data were analyzed using t-tests for independent samples, ANOVAs, chi-squares, and partial correlations.

**RESULTS:** 47% of the sample was male. 125 had ES, 20 had PNESs, and 17 had MIX. Gender was equally distributed across seizure groups. ANOVA indicated those with ES were younger (mean=12 yrs) than those with MIX (mean=14 yrs;  $p<.01$ ) and IQs were similar across the three seizure groups (ES mean=79, PNES mean=89, and MIX mean=80). 20% of the sample reported SI. This included 18% of ES (N=23), 24% of MIX (N=4), and 30% of PNES (N=6). Chi-square analyses showed a non-significant but clear trend toward higher SI in those with PNES/MIX than ES. T-Tests showed those with SI were older (mean=13 yrs) and with higher IQ (mean=87) than those without SI (mean age=12 yrs,  $p<.05$ ; mean IQ=79,  $p<.01$ ). Correlations confirmed the relationship between SI and IQ ( $p<.01$ ) and between SI and age ( $p<.05$ ). However, age and seizure group were also significantly correlated ( $p<.01$ ). A partial correlation holding the seizure group constant eliminated significance from the age-SI relationship.

**CONCLUSION:** In this selective sample, IQ was related to SI, with IQs closer to the average range showing higher occurrence of SI. A trend of higher SI in PNES/MIX was notable, similar to our previous study that indicated a robust relationship between SI and PNES/MIX in a larger sample. Taken together, these results suggest the presence of PNES and an average IQ may increase risk for SI in pediatric epilepsy patients. This study is limited by patient selection factors. Nonetheless, this report represents progress towards determining key factors in identifying pediatric epilepsy patients at highest risk for SI. Further study of this important issue is clearly warranted.

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## **Introduction:**

- Pediatric epilepsy patients are at risk for difficulties in cognitive functioning as well as mental health problems such as depression.
- Previous studies show that children and adolescents with epilepsy are at increased risk for suicidal ideation, suicide, or both compared to those without epilepsy (1, 2).
- Information about the relationship between comorbid mental health difficulties such as depressed mood and psychogenic nonepileptic seizures (PNES) in pediatric patients is limited.
- In a previous study, we found suicidal ideation (SI) was more prevalent in a sample of hospitalized pediatric patients with PNES or both PNES and epileptic seizures (MIX) than those with epileptic seizures alone (ES) (3).
- The objective of the current study was to refine previous work by describing the occurrence of SI as it relates to cognitive functioning, age, and seizure diagnosis in a similar sample of pediatric epilepsy patients hospitalized for comprehensive seizure evaluation.

## **Methods:**

- Project approved by the Institutional Review Board of Children's Hospitals and Clinics (IRB #0604-033)
- Medical records of children ages 6 years through 18 years admitted to an inpatient epilepsy unit for continuous video-EEG monitoring to clarify seizure-like episodes, for surgical evaluation, or for medication adjustments from 09/99-04/06 were retrospectively reviewed.
- Inclusion criteria included evaluation by a pediatric psychologist during the hospitalization, diagnosis of ES, PNES or MIX by a pediatric neurologist, and IQ data obtained from any source within 5 years of the hospitalization. In 6 cases where a FSIQ was not available, the Verbal or Performance IQ score most consistent with other areas of cognitive functioning was used. Those with IQs below 40 and those with physiologic nonepileptic events were excluded.
- 162 cases met inclusion criteria, representing a highly selective participant sample.
- All epileptic seizure types were grouped together. Data were analyzed using t-tests for independent measures, ANOVAs, chi-squares, and partial correlations.

## **Results**

Table 1 describes the sex, age, and IQ distribution based on seizure type for this sample. Table 2 describes the presence of SI in context of sex, age, and IQ of patients.

Table 1

**Sex, age, and IQ distribution based on seizure type**

	ES	PNES	MIX
Total #	125 (77%) <sup>a</sup>	20 (12%) <sup>a</sup>	17 (11%) <sup>a</sup>
Sex: Males	64 (51%) <sup>b</sup>	8 (40%) <sup>c</sup>	4 (24%) <sup>d</sup>
Females	61 (49%) <sup>b</sup>	12 (60%) <sup>c</sup>	13 (76%) <sup>d</sup>
Age: Mean (SD) <sup>e</sup>	12 years (3.5 yrs)*	12 years (3.4 yrs)	14 years (2.3 yrs)
Range	6-18 years	6-18 years	10-17 years
IQ: Mean (SD) <sup>e</sup>	79 (17.9)	89 (15.4)	80 (17.7)
Range	42-128	54-111	47-107

ES = Epileptic Seizures  
 PNES = Psychogenic Nonepileptic Seizures  
 MIX = both epileptic and psychogenic nonepileptic seizures  
 \*Significantly younger than MIX group ( $p < .01$ )

a= percentage of total sample;  
 b=percentage of ES cases;  
 c=percentage of PNES cases;  
 d=percentage of MIX cases;  
 e= Standard Deviation

Table 2

**Presence of SI in context of sex, age, and IQ of patients**

	SI	No SI
Total #	33 (20%) <sup>a</sup>	129 (80%) <sup>a</sup>
Sex: Males	13 (39%) <sup>b</sup>	63 (49%) <sup>c</sup>
Females	20 (61%) <sup>b</sup>	66 (51%) <sup>c</sup>
Age: Mean (SD)	13 years (2.9 yrs)*	12 years (3.6 yrs)
IQ: Mean (SD)	87 (17.4)**	79 (17.5)

SI= Suicidal Ideation  
 \* statistically significant at the .05 level  
 \*\* statistically significant at the .01 level

a= percentage of total sample  
 b=percentage of "SI" cases  
 c=percentage of "No SI" cases

**Overall sample (See Table 1):**

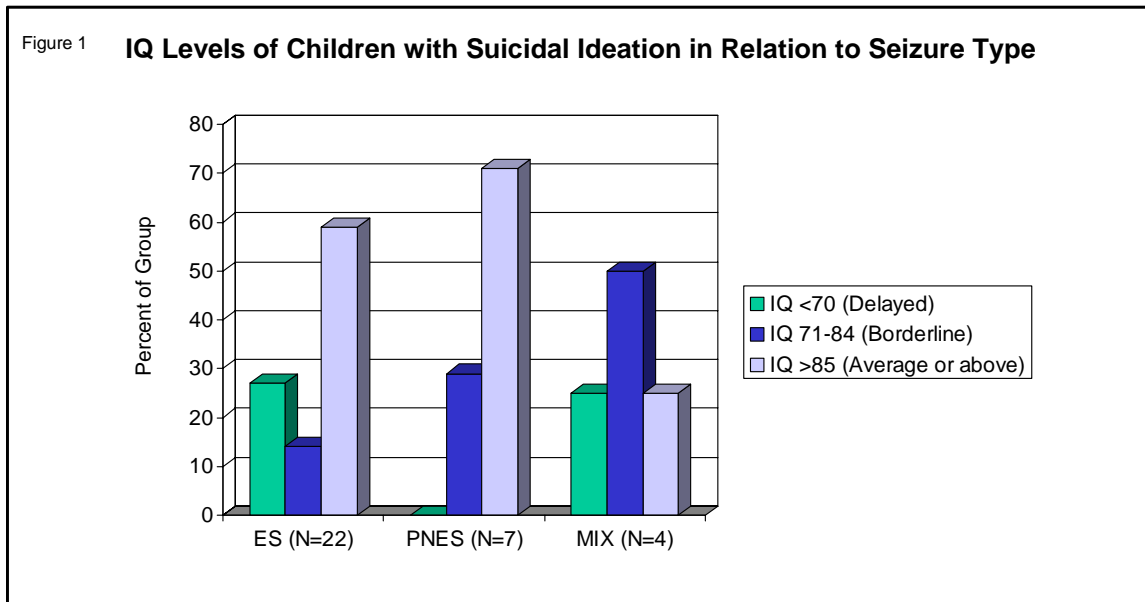
- 77% of this sample were diagnosed with ES, 12% with only PNESs, and 11% were a MIX
- Chi-square revealed no significant gender differences ( $p > .08$ ) across seizure groups: 49% of the ES, 60% of PNES, and 76% of MIX were female
- ANOVA indicated those with ES were younger ( $p < .01$ ) than those with MIX
- T-tests showed IQs were similar ( $p > .09$ ) across the three seizure groups

**SI (See Table 2):**

- 20% of the entire selected sample reported SI. This includes 18% of those with ES, 24% of those with MIX, and 30% of those with only PNES.
- Chi-square analyses revealed no differences in SI between seizure type. Although not significant, there is a trend towards higher SI in those with PNES/MIX vs ES, consistent with our previous study.

**SI in Relation to IQ and Seizure Group (See Table 2 & Figure 1):**

- Chi-square analyses showed non-significant gender differences for SI
- T-Tests showed those with SI were older (mean=13 yrs) and with higher IQ (mean=87) than those without SI (mean age=12 yrs,  $p < .05$ ; mean IQ=79,  $p < .01$ ).
- Correlations confirmed the relationship between SI and IQ ( $p < .01$ ) and between SI and age ( $p < .05$ ).
- Age and seizure group were also significantly correlated ( $p < .01$ ).
- Partial correlation holding the seizure group constant eliminated significance from the age-SI relationship but maintained significance between IQ and SI ( $p < .01$ ).



## Conclusions:

- In this selective sample, IQ was related to SI.
  - IQs closer to the average range had higher occurrence of SI.
- Though not significant, a trend of higher SI in PNES/MIX was noted.
  - This is consistent with our previous study with a larger sample indicating a *robust* relationship between SI and PNES/MIX.
- Taken together: the presence of PNES and an IQ within the average range may increase risk for SI in hospitalized pediatric epilepsy patients.
  - This may be due to a variety of factors that can contribute both to SI and PNES, possibly including: a) increased ability of average kids to understand and perceive stressors, or b) increased demands from the environment placed on individuals with more typical abilities.
- This may also suggest the possibility that lower cognitive abilities serves as a protective factor against SI in this sample.
- Clinicians should screen “normally” functioning pediatric patients for mental health difficulties such as suicidal ideation, particularly if PNES are present.
- Results are limited by and should be considered within the context of the specific patient selection factors.
- These findings represent progress towards determining key factors in identifying pediatric epilepsy patients at highest risk for SI. Further study of this important issue is warranted, particularly for “normally” functioning children presenting with clinical features of psychogenic nonepileptic seizures.