



Dissociation and other clinical phenomena in youth with psychogenic non-epileptic seizures (PNES) compared to youth with epilepsy

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ARTICLE INFO

Keywords:

Psychogenic non-epileptic seizures
Epilepsy
Pediatric
Dissociation
Psychological trauma
Depression

ABSTRACT

Purpose: To compare youth with psychogenic non-epileptic seizures (PNES) to youth with epilepsy on demographic and clinical features and the Trauma Symptom Checklist for Children (TSCC).

Method: A retrospective study of 31 patients; 15 patients with PNES (11 females) and 16 patients with epilepsy (8 females) collected consecutively between 2014–2018.

Demographic and clinical information (age of seizure onset, life adversities, individual/family psychiatric history, etc.) were gathered. Scales from the TSCC (Dissociation, Depression, Anxiety) were analyzed.

Results: Eleven of the youth with PNES (YPNES) (73%) were female, mean age was 14.3 ± 1.6 years and years of education were 9 ± 1.9 . Eight of the youth with epilepsy (YWE) (50%) were females, mean age was 11.9 ± 2.8 years and years of education were 5.6 ± 2.9 . All 15 YPNES and over half of their families had comorbid psychological problems whilst rates of personal and family psychiatric histories were much lower in YWE. Well over half of YPNES reported experiencing life adversities while one fourth of YWE reported these types of experiences. Significant differences were observed between YPNES and YWE on TSCC Overt Dissociation ($p < 0.003$), Dissociation ($p < 0.009$), and Depression ($p < 0.001$) scales, with YWE producing lower scores. When the six target variables were condensed into one principal component, the global TSCC score was lower in the epilepsy group, even after adjusting for potential effects age, seizure frequency and intellectual quotient.

Conclusions: The current study's results indicate that YPNES present with comparably higher self-reported symptoms of depression and dissociation than YWE.

1. Introduction

Psychogenic non-epileptic seizures (PNES) are paroxysmal events that resemble epileptic seizures in presentation but lack electrophysiological correlates (i.e., concomitant changes in EEG during seizure activity) or clinical evidence for epilepsy. Instead, PNES are associated with psychological antecedents and other psychiatric comorbidities, and are categorized as functional neurological disorders (FND)/conversion disorders within the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)* [1].

While youth with epilepsy (YWE) have been found to present with numerous psychiatric comorbidities and experience substantial academic and social difficulties [2], less is known about PNES in children. Of the studies that have been conducted, these have reported that youth with PNES (YPNES) present with considerable medical and psychiatric comorbidities, tend to use more medications and intensive medical services, and experience more academic and social difficulties than the

general population due to their functional seizures [3,4,6,7], which can result in missed school days and in differential treatment by staff and peers. Youth with PNES have also been found to experience greater anxiety sensitivity (i.e., fearful perception of somatic symptoms when anxious), rely preferentially on venting coping (solitary emotional expression), and report a higher number of lifetime adversities when compared to their siblings or to youth with epilepsy [3]. Additionally, because YPNES are often improperly diagnosed as having epilepsy, they can be subjected to unnecessary medical interventions and diagnostic tests, and can experience cognitive and psychiatric side effects from the antiepileptic drugs (AEDs) prescribed to them [5,8,9].

The objective of this study was to compare YPNES to YWE on demographic and clinical history as well on psychometric measures of trauma and psychopathology. Similar to findings from adults with PNES, we expected that YPNES would have experienced more adverse/traumatic events and present with higher rates of psychiatric comorbidities than YWE, even though the latter have also been previously

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<https://doi.org/10.1016/j.seizure.2019.06.028>

Received 27 May 2019; Received in revised form 19 June 2019; Accepted 22 June 2019

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described as having high rates of these comorbidities. In particular, we expected dissociation might be elevated in PNES as it has been described that trauma in general [10] and childhood sexual abuse in particular, correlate with dissociative tendencies [11].

2. Method

This was a retrospective study of 15 (11 female, 4 male) youth with video-EEG-confirmed PNES (2014 to 2018) and 16 youth (8 females, 8 males) with video-EEG-confirmed epilepsy (2015 to 2018). Patients were selected from 39 pediatric cases who were referred for neuropsychological assessment at the Northeast Regional Epilepsy Group between 2014 and 2018. Routinely, all children with PNES are referred for neuropsychological testing upon diagnosis and all children with epilepsy for whom neuropsychology is considered necessary for treatment planning (clinical, academic, psychosocial) are referred. Exclusion criteria were an intellectual quotient (IQ) of < 70 (because of the reading requirements of the self-report trauma scale), or a dual diagnosis of PNES and epilepsy (to assure the distinctness of each cohort). To be included in the study, participants needed to have completed the Trauma Symptom Checklist for Children. The initial number of 39 patients was reduced to 31 because 4 had a dual diagnosis of PNES and epilepsy, and 4 had an IQ of less than 70. During the neuropsychological intake, patients' histories were obtained and select psychometric measures were administered as part of the standard Northeast Regional Epilepsy Group neuropsychological battery.

As noted above, the present study examined scores from the Trauma Symptom Checklist for Children (TSCC) [12]. The TSCC is a self-report, 54-item checklist that measures posttraumatic stress and related psychological symptomatology in children aged 8–16 years. It includes two validity scales (Under-response and Hyper-response), six clinical scales (Anxiety, Depression, Anger, Post-traumatic Stress, Dissociation, and Sexual Concerns), and eight critical items. Profile Forms allow for conversion of raw scores to age- and sex-appropriate *T* scores. The TSCC assesses the following aspects of general dissociative symptomatology: tendencies towards derealization, one's mind going blank, emotional numbing, pretending to be someone else or somewhere else, daydreaming, memory problems and dissociative avoidance. There are two subscales: DIS-O (Overt Dissociation) and DIS-F (Fantasy). The measure uses *T* scores which have a mean of 50 and standard deviation of 10. The TSCC scales are internally consistent (alpha coefficients for clinical scales range from 0.77 to 0.89 in the standardization sample) and exhibit adequate convergent, discriminant, and predictive validity in normative and clinical samples.

2.1. Statistical analysis

Initially, an independent-samples *t*-test was conducted to compare TSCC scales (Anxiety, Depression, Anger, Dissociation) in epilepsy and PNES. Subsequently, considering the small size of the sample (the required Bonferroni correction would prove to be too conservative), it was decided to run statistical tests comparing the 6 target variables in aggregate terms. In order to channel all the statistical power into just one relationship instead of six, the six target variables were represented with one principal component. Variability of the TSCC factor was checked and a linear model for the TSCC factor via backward stepwise selection was conducted. Finally, *potential* effects of age, seizure frequency and IQ were checked.

IRB approval for an anonymous archival record review was obtained with removal of non-relevant PHI (Copernicus IRB NRE1-11-155). This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

3. Results

3.1. Characteristics of each patient group (PNES and YWEs)

3.1.1. Characteristics of YPNES

Eleven of the 15 YPNES patients (73%) were female. Mean age was 14.3 ± 1.6 and years of education were 9 ± 1.9 . The mean time elapsed since experiencing the first seizure until the present evaluation was 5.9 months (± 4.2) and seizure frequency was 0.91 seizures per day (± 1.4). All 15 YPNES presented with psychiatric problems (e.g. anxiety, depression, substance use, attention deficit hyperactivity disorder, etc.). Over half had family psychiatric histories (e.g. mood and anxiety disorders, substance abuse, and attention deficit hyperactivity disorder), and 10 of 15 reported experiencing life adversities. Of those, only three patients reported childhood sexual abuse (CSA). Rather, the most common adversity reported in the PNES sample (6/15) involved loss of one kind or another (e.g. family disruption through death, divorce, illness of a caregiver, or geographic relocation). Another notable finding was that two of the 15 patients with PNES were transgender adolescents who reported bullying by peers or rejection by their family. Nearly half the sample was experiencing educational difficulties and required some form of additional accommodations or assistance. Over half of YPNES were in some form of psychological treatment and were being prescribed some form of psychiatric medication (Tables 1 and 2).

3.1.2. Characteristics of YWE

Eight of the 16 YWE (50%) were females. Mean age was 11.93 ± 2.76 years and mean years of education were 5.6 ± 2.9 . The mean time elapsed since experiencing the first seizure until the present evaluation was 52.4 months (± 45.3) and seizure frequency was 0.21 seizures per day (± 0.4). Nearly half of YWEs were having academic difficulties (e.g. special education, additional tutoring) and a majority of YWE presented with psychiatric histories including attention deficit hyperactivity disorder, learning (academic) disability, and mood disorders. One quarter reported psychological trauma/adversity; of those, one stated that her adverse experience involved childhood sexual abuse. Less than half of YWE were in some form of psychological treatment and none were being prescribed psychiatric medications. Only 3 reported having a family psychiatric history (Tables 1 and 2).

3.1.3. Comparison between groups on demographic and clinical variables

The samples differed significantly on age ($p < .01$); those with PNES were older. Also, as might be expected, given the age differential, YPNES completed more years of education compared with YWE group. There was a significant difference between duration of PNES ($M = 5.9 \pm 4.2$) and epilepsy ($M = 52.4 \pm .30$); $t(-3.96)$, $p = .001$ before inclusion to the study which may be due to the PNES sample being new onset. There was also a significant difference on seizure frequency with higher frequencies in YPNES ($M = 0.9$) compared to YWE ($M = 0.2$); $t(1.90)$, $p = .03$. Only one patient with PNES was taking an anti-epileptic drug (AEDs) while 13 of 16 YWEs were taking AEDs. Less than 30% of patients with PNES reported a family history of seizures whereas over 50% of YWE reported a family history of seizures (Table 3).

3.1.4. Comparison between groups on psychometric scores

A *t*-test indicated that IQ was greater in the YPNES sample ($M = 96.9$) than in the YWE sample ($M = 85.1$); $t(3.1)$, $p = .002$. A *t*-test indicated that TSCC Depression was greater in the YPNES sample ($M = 55.53$) than in the YWE sample ($M = 41.8$); $t(3.22)$, $p = .001$. TSCC Overt Dissociation was greater for the YPNES sample ($M = 60.8$) than for YWE ($M = 52$); $t(2.27)$, $p = .003$ and general Dissociation was also greater for the YPNES sample ($M = 58.5$) than for YWE ($M = 50.9$); $t(2.53)$, $p = .009$. No significant differences between groups were observed on any of the other TSCC scales (anger, anxiety, and post-traumatic stress) (Table 4). Subsequently, given the small size

Table 1
Demographic and clinical data of youth with psychogenic non-epileptic seizures and youth with epilepsy (YWE).

Patient	Gender	Age	Education	Education details/problems	Duration PNES (months)	Seizure frequency	AEDs	Family history of epilepsy
A (PNES)	Male	11	5	Special education	14	1	No	No
B (PNES)	Female	15	10	Learning problems	6	0.33	oxcarbazepine	Yes
C (PNES)	Female	13	7	None	3	0.02	No	Yes
D (PNES)	Female	14	9	Honor's but struggling	15	0.14	No	No
E (PNES)	Female	15	10	Home school/declining performance	4	3	No	No
F (PNES)	Female	14	9	Special education	6	0.03	No	No
G (PNES)	Male	17	12	None	5	0.02	No	No
H (PNES)	Female	12	7	None	5	1	No	Yes
I (PNES)	Male	15	9	Special education	9	5	No	No
J (PNES)	Female	13	8	Special education	3	0.14	No	No
K (PNES)	Female	15	8	Failing	6	0.01	No	No
L (PNES)	Female	15	9	Honor's	2	1	No	Yes
M(PNES)	Male	14	9	None	3	0.01	No	No
N (PNES)	Female	16	12	Homeschool/ at expectation	1	2	No	No
O (epilepsy)	Female	16	11	None	1	0.14	No	No
P (epilepsy)	Male	16	8	None	7	0.01	levetiracetam	Yes
Q (epilepsy)	Male	11	5	None	60	1	divalproex sodium, oxcarbazepine	Yes
R (epilepsy)	Female	7	2	None	168	0.003	None	None
S (epilepsy)	Female	15	9	Honor's	6	0	levetiracetam	None
T (epilepsy)	Male	15	10	Special education	36	0.003	oxcarbazepine, levetiracetam	Yes
U (epilepsy)	Female	10	4	Additional tutoring	24	1	levetiracetam	None
V (epilepsy)	Male	11	6	Accommodations	18	0.14	ethosuximide	None
W (epilepsy)	Male	15	10	None	43	0.003	None	Yes
X (epilepsy)	Male	10	1	Special education	112	0	levetiracetam	Yes
Y (epilepsy)	Female	8	2	None	11	1	None	None
Z (epilepsy)	Male	13	7	None	60	0	levetiracetam	Yes
Aa (epilepsy)	Female	11	3	Additional tutoring	49	0	levetiracetam	Yes
Bb (epilepsy)	Female	12	6	None	60	0	levetiracetam	Yes
Cc (epilepsy)	Female	15	6	Special education	63	0.07	levetiracetam	None
Dd (epilepsy)	Female	11	6	None	6	0	ethosuximide	None
Ee (epilepsy)	Female	11	4	Retained/special education	108	0.07	levetiracetam	Yes

of the sample, a decision to channel the statistical power into just 1 relationship instead of 6 target variables (represented with one principal component) was made. The first principal component was determined to explain most of the variability (62.892%) in the standardized versions of target variables. Next, the variability of the TSCC factor (first principal component) in the PNES and epilepsy groups was analyzed and showed that, on average, the TSCC factor was higher for PNES patients (Table 5). Subsequently, an "optimal" linear model for the TSCC factor via backward stepwise selection was run. The candidate predictors were Condition (epilepsy, PNES), age, seizure frequency and IQ. Initially, the "full model", contained all the candidate predictors. The least significant predictors were dropped one by one until all the remaining predictors were statistically significant at the 5% significance level. The normality-based and bootstrap-based p-values were determined to be consistent, indicating that the "TSCC" profile was different between the PNES and epilepsy groups (Table 6a and b). After examining the coefficients, it was concluded that the TSCC variables were lower in the epilepsy group, after adjusting for the potential effects of age, seizure frequency and IQ.

4. Discussion

The aim of our study was to compare youth with epilepsy (YWE) to those with PNES (YPNES) on demographic and clinical features and on dissociation, depression, and anxiety from the Trauma Symptom Checklist for Children (TSCC). Our results confirmed previous studies regarding personal and familiar clinical variables and contribute particularly novel information on the presence of elevated dissociative symptoms in this group of patients.

Our results corroborated previous studies that examined psychopathology in YPNES [3,13]. All the YPNES in our sample had comorbid psychopathology, including internalizing disorders, attention deficit

hyperactivity disorder, substance abuse, symptoms of emotional dysregulation (self-injury/cutting), and suicide attempts. This is consistent with high rates of psychiatric comorbidities in YPNES previously reported, even when compared to their siblings [13]. Our sample of YPNES were also being prescribed more psychotropic/psychiatric medications than YWE and the majority were receiving some form of psychotherapy. Fortunately, our sample revealed that YPNES were not being prescribed anti-epileptic drugs (AEDs) with the exception of one, while YWE were being prescribed AEDs with the exception of three (who were seizure-free). None of the YWE had been prescribed psychiatric medications and only 5 were attending psychotherapy. Previous studies have reported quite elevated rates of psychiatric comorbidities (predominantly internalizing behavioral disturbances) in pediatric epilepsy [14]. In particular, illness-related variables (e.g., seizure frequency, earlier age of onset and longer duration, the effects of AEDs) often do impact behavioral function in youth with epilepsy and family resources are often seriously stretched by epilepsy and other comorbidities [15]. Despite YWE often presenting with significantly increased behavioral problems and stressors, it would seem that our sample of YPNES presented with even greater rates of these difficulties.

The two samples differed significantly on full scale IQ, with YPNES earning higher scores. Approximately one fourth of YWEs earned scores below 80, which is consistent with previous reports of intellectual functioning in epilepsy [16]; this might be associated with the long duration of epilepsy in our sample. The groups did not differ appreciably in learning difficulties, as both presented with relatively frequent academic difficulties and were often receiving additional services. Rates of learning difficulties in YPNES were comparable to rates reported previously [17]. Five (31%) YWE were formally diagnosed with a learning (academic) disability or needed additional assistance for learning which is consistent with previous reports of learning difficulties in YWE [18]. The two samples differed on seizure characteristics,

Table 2
Psychiatric clinical data for YPNES and YWE.

Patient	Patient's psychiatric history	Family psychiatric history	Stressors/psychological trauma	Psychological treatment	Psychiatric drugs
A (PNES)	Depression/anxiety	Bipolar/anxiety	Death of family member	Yes	Sertraline
B (PNES)	Substance use	None	Divorce/remarriage/relocation of family	No	None
C (PNES)	ADHD	Depression/bipolar/anxiety/ADHD	Sexual abuse	No	melatonin
D (PNES)	Panic disorder	Anxiety/alcoholism	Paternal Verbal abuse	Yes	Fluoxetine
E (PNES)	Depression/anxiety/ substance use/ eating disorder/suicide attempt	Depression/anxiety/ADHD	None reported	Yes	Fluoxetine
F (PNES)	Bipolar	Bipolar/ADHD/Substance abuse	None reported	Yes	aripipraxole, alprazolam
G (PNES)	Anger control issues	Panic disorder	None reported	No	Alprazolam
H (PNES)	Depression 2ary to family reaction to being transgender	None reported	Physical abuse	Yes	None
I (PNES)	Panic disorder/depression/ suicide attempt	Depression/paternal suicide	Extended maternal hospitalization	Yes	Fluoxetine
J (PNES)	Self-harm	None reported	Family bankruptcy/bullying/death of family member	Yes	Sertraline
K (PNES)	PTSD/ADHD/ substance use	None reported	Prostitution/ physical abuse/ relocated other country	Yes	None
L (PNES)	Depression/suicide attempt	Substance abuse/ depression/ADHD	None reported	Yes	None
M (PNES)	OCD/depression 2ary to transgender/ bullying	None reported	Bullying	Yes	Escitalopram
N (PNES)	Panic disorder	None reported	Sexual abuse/ death of relative	Yes	None
O (epilepsy)	Anxiety disorder	None reported	None	No	Lexapro
P (epilepsy)	None	None	None	No	None
Q (epilepsy)	Depression	None	Witnessed abuse of mother by father	Yes	None
R (epilepsy)	None	None	None	No	None
S (epilepsy)	None	Anxiety/depression	Incest	No	None
T (epilepsy)	LD/depression	None	Bullying	No	None
U (epilepsy)	None	None	None	No	None
V (epilepsy)	None	None	None	No	None
W (epilepsy)	Depression	None	None	No	None
X (epilepsy)	ADHD	Depression/anxiety	None	No	None
Y (epilepsy)	Anxiety	None	None	Yes	None
Z (epilepsy)	Self-harm behavior	None	None	Yes	None
Aa (epilepsy)	ADHD, LD	None	None	Yes	None
Bb (epilepsy)	LD/anxiety	LD	None	Yes	None
Cc (epilepsy)	LD	None	None	No	None
Dd (epilepsy)	None	None	Bullying	No	None
Ee (epilepsy)	LD	None	None	No	None

ADHD = attention deficit/hyperactivity disorder, PTSD = post-traumatic stress disorder, OCD = obsessive compulsive disorder, LD = Learning (academic) disability.

specifically, YPNES reported higher frequencies of seizures per day compared to YWE. Seizure frequency in our PNES sample was fairly comparable to that which has been reported in youth from Canada [19]. Noting differences of this kind in seizure onset and frequency could provide important information regarding a potential diagnosis prior to conducting video-EEG testing.

The PNES sample demonstrated significantly higher TSCC Depression scores when compared to YWE. This scale includes items regarding: feelings of sadness, unhappiness, loneliness; episodes of tearfulness, depressive cognitions such as guilt, and self-denigration, self-injuriousness and suicidality. This finding is especially noteworthy since depression in children and adolescents with epilepsy is in fact a

Table 3
Comparison between YWP and YWE on demographic and clinical variables.

	PNES (mean/ standard deviation or percent)	Epilepsy (mean/standard deviation or percent)
Age (years)	14.33 ± 1.59	11.93 ± 2.76
Gender (female)	73%	50%
Education (grade)	9 ± 1.89	5.56 ± 2.87
Education problems (yes)	53%	44%
Duration of disorder (months)	5.87 ± 4.22	52.44 ± 45.30
Seizure frequency (per day)	0.91 ± 1.43	0.21 ± 0.4
AEDs (% taking)	6%	81%
Family history of seizures (yes)	27%	56%
Psychiatric history (yes)	100%	63%
Family psychiatric history (yes)	53%	19%
Psychological treatment (yes)	73%	31%
Psychiatric medication (yes)	67%	0
Stressors/psychological trauma (yes)	67%	25%

AEDs: Antiepileptic drugs.

Table 4
Comparison between YWP and YWE on psychometric measures.

	PNES (Mean and standard deviation)	Epilepsy (Mean and standard deviation)	t test statistical significance (p < 0.05) *
FSIQ	96.33 (9.3)	85.07 (11.9)	0.002*
TSCC Anger	48.87 (7.1)	42.81 (9.2)	0.69
TSCC Anxiety	54.73 (9.1)	48.25 (9.1)	0.57
TSCC Depression	55.53 (13.3)	41.81 (10.4)	0.001*
TSCC Dissociation Overt	60.8 (8.0)	52 (8.6)	0.003 *
TSCC Dissociation Fantasy	51.2 (14.8)	46.38 (7.7)	0.47
TSCC Dissociation	58.47 (8.8)	50.84 (7.7)	0.009*

FSIQ: full scale intellectual quotient, TSCC: Trauma Symptom Checklist for Children.

Table 5
Principal component explains most of the variability in the 6 target variables.

Total Variance Explained					
Initial Eigenvalues			Extraction Sums of Squared Loadings		
Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
3.774	62.892	62.892	3.774	62.892	62.892
.921	15.354	78.247	.921	15.354	78.247
.522	8.708	86.955	.522	8.708	86.955
.457	7.612	94.567	.457	7.612	94.567
.319	5.314	99.880	.319	5.314	99.880
.007	.120	100.000	.007	.120	100.000

Component Score Coefficient Matrix

	Component					
	1	2	3	4	5	6
TSCC Anger	.195	.323	.929	.775	.336	-.028
TSCC Anxiety	.214	-.126	-.777	.373	1.165	-.185
TSCC Depression	.201	.454	-.595	.354	-1.115	-1.606
TSCC Dissociation F	.190	.518	.101	-1.075	.360	2.401
TSCC Dissociation O	.226	-.532	.109	-.013	-.506	7.983
TSCC Dissociation	.231	-.455	.267	-.409	-.196	-8.178

Table 6
a, b) Assessment of statistical significance based on normality and bootstrap.

6a								
Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	1.471	.508		2.897	.007	.433	2.509
	Condition	-.970	.318	-.493	-3.050	.005	-1.621	-.320

6b							
Model		B	Bootstrap			95% Confidence Interval	
			Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	1.471	.017	.513	.010	.460	2.466
	Condition	-.970	-.010	.319	.006	-1.576	-.314

common comorbidity, and suicide risks are reported to be higher than in the general population [20]. Higher depression scores in YPNES suggest they may even be at a greater risk than YWE for this comorbidity.

Furthermore, YPNES presented with significantly higher TSCC

Dissociation (overt and general) scores than YWE. The Dissociative scales in the TSCC assess characteristics including: derealization, mind going blank, emotional numbing, pretending to be someone else or somewhere else, daydreaming, memory problems, and dissociative avoidance. This finding is intriguing because in adults, individuals with

epilepsy compared to those with PNES have not been found to necessarily differ in regards to dissociative phenomena [21,22]. Possibly, dissociative phenomena are exhibited differently in youth than in adults, and the age when PNES presents for the first time could represent an important distinction to consider. Additionally, because the option of “fight or flight” in minors is often manifestly absent as they cannot leave or effect changes in the family home or the school setting (where academic disabilities and social problems may emerge), dissociation may represent the most convenient recourse.

Indeed, clinical dissociation occurs when there is an interference in the normal integrative functions of consciousness or identity and operates on a continuum that extends from normal states of dissociation (e.g., daydreaming or being immersed mentally in a television show) to abnormal dissociative states (dissociative amnesia or fugue). In children, abnormal dissociation has also been called “defensive dissociation” in that it protects a child’s ability to function within their environment by removing overwhelming memories, feelings, sensations and cognitions from the consciousness [23]. Dissociation in the PNES sample may defensively protect the child from distressing situations with PNESs representing an abnormal dissociative state. As speculated by Salpekar et al. [24], learning challenges and numerous comorbid personal (and family) psychiatric disorders may contribute to youth later developing PNES. Additionally, a number of family environmental factors have been specifically associated with dissociation, including lack of parental care and warmth [25], and poor relationship between parents and/or alcohol abuse in the family home [26]. Interestingly, in the study by Maaranen et al. [27], high somatoform dissociation was not found to be associated with domestic violence, including sexual and physical abuse. Dutra et al. [28] concluded that experiences of emotional abuse, impaired attachment and limited parental affective involvement may play an important role in the development of dissociative tendencies. Experiences of loss like the ones found in our PNES youth sample (see below) could consequently result in dissociative tendencies and perhaps even in psychogenic non-epileptic events.

As for psychological trauma/adverse experiences, one fourth of YWE reported adverse experiences, while YPNES reported significantly higher rates (67%). Of note, childhood sexual abuse was less common (20%) in YPNES than has been reported in adults with PNES (~30%) [22]. This is consistent with comparably low rates of violence and sexual abuse in youth with PNES that have been reported elsewhere [3]. The most common adverse experiences in our sample appeared related to some form of loss (e.g., death or illness of a caregiver, divorce, relocation). We speculate that the less violent or invasive nature of the adverse experiences reported by YPNES may have contributed to the the non-clinical levels of certain post-traumatic symptomatology in our study (i.e., Defensive Avoidance, Anxious Arousal, Intrusive Experiences).

Similar to YWE, life at home, in school and other social settings is upset by the onset of PNES and therefore it is not surprising to observe high levels of distress in both samples. However, YPNES and their families face some additional challenges with what is often a confusing road until a diagnosis is reached and after, may further struggle to understand the diagnosis. Additionally, patients and their families sometimes encounter rejection and judgmental attitudes from health professionals which further complicates matters [29]. The presence of these particular issues may further explain some of the differences noted between both samples.

Limitations of the present study include its retrospective design, small sample size, and reliance on youth self-report to assess psychological/psychiatric functioning. The use of standardized scores on the TSCC controls for the difference in age between both samples but the increased number of psychiatric diagnoses and participation in psychological treatment may have been affected by there being more adolescents in the PNES sample. Since age differential might considerably affect expression of psychopathology, future studies should

aim to compare samples more closely matched in age. While information on psychological symptoms was collected through a direct clinical interview with the young person, future studies should consider including other informants, such as parents or teachers, who might contribute different perspectives to the patients’ symptoms and risk factors. In addition, it would be interesting for clinical application, to compare children with epilepsy who have elevated psychopathology (e.g., depression) with children who have PNES (and expected elevated psychopathology) on features of dissociation. This might provide a better understanding for how dissociation may contribute to PNES and how to distinguish these children in clinic.

Treatment of children diagnosed with dissociative disorders is briefer and often more straightforward than in adult populations. Similarly, prognosis for children with PNES is better than in adults, with reports of approximately 80% becoming seizure-free [28]. Therefore, timely recognition of dissociative symptoms and initiation of treatment that targets these symptoms are highly recommended [30].

5. Conclusion

The current study’s results indicate that YPNES present with comparably more psychological symptoms than YWE, including on psychometric measures of depression and dissociation. These findings are especially notable when it is considered that YWE are known to present with considerable psychiatric comorbidities and academic and social difficulties. Early long-term video EEG monitoring is suggested for the timely establishment of the diagnosis of PNES. Thorough psychological evaluations (including the use of measures such as the TSCC) in youth presenting with paroxysmal behavioral changes could assist in reaching an accurate differential diagnosis which could then potentially lead to better outcome of the disorder.

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