

Original Research

Dysfunctional schema modes as determinants of psychiatric comorbidities: a study in a cohort of people with epilepsy

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Abstract

Introduction and Aims: Symptomatology of epilepsy and its' associated alteration in brain processes, stigma of experiencing seizures, and adverse sequelae of anti-epileptics have been demonstrated to impact behaviour and exacerbate psychopathology. This study examines the role of dysfunctional schema modes in People with Epilepsy (PWE) and their association with psychiatric symptoms.

Methods: Semi-structured interviews were conducted with 108 PWE treated with anti-epileptics for at least one year and with no history or mental disorder or psycho-active substance use. Clinical symptoms were measured utilising the Symptom Checklist-90 (SCL-90) with schema modes measured utilising the Schema Mode Inventory (SMI).

Results: Maladaptive coping and child schema modes were significantly higher in individuals from lower socio-economic status group ($p < 0.01$), with several maladaptive schema modes more prevalent in males. Hostility symptoms were increased in individuals from lower socio-economic classes and were more prevalent early in disease course. Several psychological symptoms including somatisation, interpersonal, obsession, depression, paranoia, hostility, phobia, anxiety, and psychoticism, were predicted by various maladaptive schema modes ($p < 0.001$).

Conclusion: This study highlights the impact of maladaptive schemas, suggesting that PWE might benefit from the introduction of appropriate psychotherapeutic interventions such as schema-focused therapy, particularly if from lower socio-economic classes or in the early stages of their disease course.

Keywords: Dysfunctional schema modes; epilepsy; hostility

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Introduction

Epilepsy is the fourth most common neurological disorder in the world, with 85% of cases occurring in low and middle-income countries, with epilepsy associated with significant physical and psychological morbidity, as well as a reduced quality of life for many individuals (World Health Organisation, 2004; Ngugi *et al.* 2011). The unpredictable nature of seizure activity can impact individuals' quality of life including their ability to engage in vocational and recreational activities (Schulze-Bonhage & Kühn, 2008). The inter-ictal seizure period has in particular but not exclusively been associated with behavioural and psychological adverse sequelae including irritability, aggressive behaviours emotional lability, anxiety, and mood symptoms including depressive and hypomanic symptoms (Farrell *et al.* 2017). Approximately one-

third of people with epilepsy (PWE) are diagnosed with a mental disorder (Michaelis *et al.* 2021) with temporal lobe epilepsy (a focal seizure disorder), particularly associated with the presence of mental disorders (Gurgu *et al.* 2021). Behavioural and psychological symptoms in PWE may be unrelated to their epilepsy diagnosis and occur secondary to a large array of reasons, including an individual's underlying temperament or personality, a comorbid mental disorder, psycho-active substance abuse or other physical health disorders that impair functionality (Schwartz & Marsh, 2000).

Features of epilepsy associated with increased psychological morbidity additionally include an early age of illness onset, increased duration of active illness, an increased frequency of seizure episodes, perceived or actual stigmatisation due to their epilepsy disorder, and variable treatment adherence resulting in increased periods of active symptomatology (Schwartz & Marsh 2000; Berg *et al.* 2010). Indeed, a perception of stigmatisation relating to either or both physical and mental health disorders is a noted risk factor for suicide, with the rate of suicide for PWE approximately three times that of the general population (Zhao *et al.* 2021). Several other psycho-social factors have been

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implicated in increasing the risk of psychological morbidity in PWE and include a lower socio-economic status, being unemployed and limited family support (Wada *et al.* 2004; McCagh *et al.* 2009). In Pakistan, limited advocacy relating to legal rights, particularly in rural regions, and conventional beliefs pertaining both to mental illness and epilepsy where symptoms are on occasion misattributed to religious or supernatural origins resulting in traditional healers being consulted over illness management have additionally been associated with increased psychological morbidity (Shah & Waller, 2000; Khatria *et al.* 2003; Irshad & Bano, 2006; Tellez-Zenteno *et al.* 2007; Sahar, 2012; Ahmad *et al.* 2017a, 2017b).

Schema modes reflect an individual's current dominant emotional state and include coping techniques that are commonly activated by life situations or scenarios to which people are especially susceptible. In order to deal with emotions, schema modes are activated (Bamber, 2004). The four broad domains of the identified schema are: (1) Child, (2) Dysfunctional Coping, (3) Parent, and (4) Healthy Adult Modes; with these described in detail in Table 1 (Petrocelli *et al.* 2001; Bamber, 2004; Lobbestael *et al.* 2007; Gulum & Soygut, 2022). Schema modes emerge early in childhood, are influenced by selective filtering of incoming experiences, and continue to change throughout a person's life (Lobbestael *et al.* 2007). Except for the Healthy Adult (HA) and Happy Child (HC) schema modes, the other 13 modes are viewed as largely dysfunctional. It is believed that dysfunctional modes evolve from maladaptive schemas and unmet core needs, alluding to innate modes that form when a child's emotional, safety, belongingness, and sustenance needs are not addressed (Lobbestael *et al.* 2005; Farrell *et al.* 2012). Individuals frequently alter schema modes in response to situational changes, resulting in the activation of various schemas modes (Young *et al.* 2003). Most healthy people display a variety of schema modes and frequently switch from one mode to others (Young *et al.* 2005). It has been found that people with a range of mental health disorders are more likely to rigidly cling to one maladaptive schema mode (Arntz *et al.* 2005; Lobbestael *et al.* 2009). This can lead to difficulties using multiple schema modes at the same time (Bamber, 2004), as well as increased engagement in dysfunctional coping behaviours (Arntz *et al.* 2005), and rigid coping styles (Lobbestael *et al.* 2009). Previously, we demonstrated that individuals with a range of mental health disorders utilised dysfunctional schema modes (Khalily *et al.* 2011), with increased use of dysfunctional schema modes also demonstrated in individuals with a range of personality disorders (Lobbestael *et al.* 2008; Lobbestael & Arntz, 2012; Salgo *et al.* 2021).

To date, only one study (from our group) in a small sample ($n=4$) noted that the maladaptive coping schema modes: compliant surrender (CS), detached protector (DP), detached self-soother and bully and attack (BA), and child modes (maladaptive): vulnerable child (VC), undisciplined child (UC), coping modes were frequently used schema modes in patients with frontal lobe and temporal lobe epilepsy (Zaman & Khalily, 2016). No study to date, however, has explored the association between maladaptive schema modes and psychiatric morbidity among PWE. Consequently, the purpose of this study is to ascertain the utilisation of dysfunctional schema modes in PWE and to examine if there are socio-demographic (i.e. gender, socio-economic status) or clinical factors (i.e. duration of epilepsy diagnosis, type of epilepsy) that moderate any such association. Additionally, we wanted to examine if schema modes were associated with particular current psychological symptoms.

Table 1. Socio-demographic and clinical characteristics

Variables	<i>n</i>	%
Gender		
Male	50	46.3
Female	58	53.7
Marital status		
Single	68	63.0
Married	40	37.0
Socio-economic status (SEC)		
Lower (I)	30	28.8
Middle (II)	52	48.1
Upper (III)	26	24.1
Education		
Primary school not completed	11	10.2
Primary School completed	30	27.8
Secondary School completed	67	62.0
Occupation		
Unemployed	25	23.1
Government employed	13	12.0
Self-employed	28	25.9
Students	23	21.3
Housewife	19	17.6
Type of epilepsy		
Focal seizure	24	22.2
Generalised seizure	84	77.8
Duration of illness		
1–5 years	39	36.1
6–10 years	37	34.3
11–15 years	32	29.6
Aetiology of epilepsy		
Family history	48	44.4
Head injury	10	9.3
Post-secondary	3	2.8
Unknown	47	43.5
	Mean	SD
Age	24.91	7.42

Methods

Participants

Participants included individuals attending neurology departments of various hospitals in Islamabad, Karachi, and Abbottabad in Pakistan. Inclusion criteria included diagnosed patients with epilepsy age 18–65 years, and treated with antiepileptic medications for at least 12 months. Participants were excluded if they had an intellectual disability, dementia, a history of a head injury that resulted in the loss of consciousness lasting more than 3 minutes, fulfilled criteria for a mental disorder (i.e. schizophrenia, recurrent depressive disorder, anxiety disorder with

active symptomatology), fulfilled criteria in the last 12 months for alcohol or psycho-active substance use disorder or could not consent to participate in this study. All participants were referred by their treating consultant neurologist. All responses were anonymised.

Procedure

Demographic and clinical characteristics were attained from participants' clinical files. Socio-economic status was categorised into three groups as per the guidelines of the Asian Bank Development based on income, education, and employment (Chun, 2010). Clinical data included epilepsy diagnosis, aetiology of epilepsy, antiepileptic and other medications. Semi-structured interviews were utilised to establish data pertaining to clinical variables including the age of onset of epilepsy, the frequency, type, and duration of seizures, family history of epilepsy, and awareness regarding illness and management interventions.

Assessments

Schema mode inventory (SMI)

The schema mode inventory (SMI) (Young *et al.* 2003) is a self-report measure with 124 items scored on a 6-point Likert scale from 'never or hardly ever' to 'always.' It evaluates the utilisation of the 14 schema modes by individuals at the time of interview. The schema modes are divided into four categories (Child ($n = 6$), Maladaptive Coping ($n = 5$), Parent ($n = 2$), and Healthy Adult ($n = 1$); see Supplementary Table 1). The Urdu version of SMI was used for this study. Internal consistency has been demonstrated for all subscales. (Cronbach's α range from 0.78 to 0.96; Riaz & Khalily, 2013).

Symptom checklist-90 (SCL-90)

The symptom check list-90 (SCL-90) is a multidimensional five point Likert scale designed to assess psychopathology and psychological discomfort ranging from 'not at all' to 'extremely'. It encompasses nine primary symptom dimensions and intensities: (1) somatisation, (2) obsessive-compulsive, (3) interpersonal sensitivity, (4) depression, (5) anxiety, (6) hostility, (7) phobic anxiety, (8) paranoid ideation, (9) psychoticism, and a global distress scale (Derogatis *et al.* 1976). The Urdu version of the SCL-90 was utilised and excellent internal consistency has previously been demonstrated for this version (Cronbach's $\alpha = 0.71$ – 0.86 ; Shafique *et al.* 2017).

Statistical analysis

Statistical analysis was conducted using the Statistical Package for Social Sciences for Windows (SPSS Inc., IBM, New York, USA) Version 27.0. Descriptive statistics including frequency, percentages, mean and standard deviation were reported. Analysis of variance was performed to examine the effect of socio-economic status (low, middle and upper), and duration of epilepsy (<5 years, 6–10 years, and >11 years), with independent *t*-tests utilised to examine the effect of gender on the study variables. Post hoc analyses were conducted utilising Tukey's test. In the general linear model, process macro-Model 1 was used to examine how the duration of illness affected the relationship between dysfunctional child modes and hostility. Multiple regression analysis were utilised to determine the predictive value of schema modes in determining symptoms on the SCL-90.

Results

Demographic and clinical data

Demographic and clinical data are presented in Table 1, with mean schema mode and psychological symptoms for cohort presented in supplementary data (Table S2). Participants included 108 individuals with a mean age of 24.9 (SD \pm 7.4) years. Of note, 54% of participants were female, with middle socio-economic status most prevalent (48.1%). Generalised seizures were more common (78.0%) than focal seizures with an equal distribution of epilepsy duration (36.1% v. 34.3% v. 29.6%) across the three age categories examined (<5 years, 6–10 years, and \geq 11 years). The aetiology of epilepsy included individuals with a likely genetic component due to the presence of a first-degree family member diagnosed with epilepsy ($n = 48$, 44.4%) and a history of head trauma ($n = 10$, 9.9%), with 47 individuals (43.1%) having no identified or putative aetiological factor related to their epilepsy diagnosis.

Psychometric instrument and demographic data

A significant difference between groups in terms of dysfunctional modes was noted for socio-economic class with mean scores for eight dysfunctional schema modes significantly higher in the lower SEC group compared to middle and upper class [child domains schemas – impulsive child (IC), angry child (AC), undisciplined child (UC), and enraged child (EC); maladaptive coping domains – detached protector (DP), bully and attack (BA), and the parent domain mode of punishing parenting (PP)] (see Table 2). Lower SEC were significantly associated with higher rates of hostility ($F = 4.28$, $p = 0.02$), but with no other clinical symptoms.

Male gender was associated with higher mean scores on dysfunctional schema modes including the child domain schemas IC, and UC, the maladaptive domains schemas; compliant surrender (CS), detached self-soother (DSS) and self-aggrandiser (SA), and the parent schema mode punishing and demanding parent (DP), but also the two functional schema modes of happy child (HC) and happy adult (HA) (see Table 3).

Duration of epilepsy diagnosis was demonstrated to have a moderating effect on the relationship between the dysfunctional child modes and hostility ($F = 3.23$, $p = 0.04$), with duration of illness associated with 3% of the additional variance in this relationship ($B = 0.01$, $p < 0.05$, $\Delta R^2 = 0.03$) (Fig. 1), suggesting that a shorter duration of illness is related to higher levels of hostility.

Seizure type (focal or generalised) was not associated with different mean scores for any schema modes or psychological symptoms.

Psychological factors associated with epilepsy

Semi-structured interviews demonstrated that stress ($n = 8$, 7.4%), fatigue ($n = 2$, 1.9%), and poor adherence with anticonvulsant medications ($n = 9$, 8.3%) were frequent triggers for seizures, with ($n = 43$, 97.2%) unable to determine any precipitants. Concern of experiencing further seizures ($n = 84$, 77.8%), interference with daily routine secondary to epilepsy ($n = 99$, 92%), and fear of stigma if they informed others in their workplace of their diagnosis ($n = 73$, 67.6%) were additionally prevalent factors described by participants. PWE who disclosed their history of epilepsy at work with colleagues showed lower levels of psychopathology across all subscales of SCL-90 as compared to those who could not share ($p < 0.01$).

Table 2. Socio-economic class and association with schema modes and clinical symptoms

	Low (<i>n</i> = 30)		Middle (<i>n</i> = 52)		Upper (<i>n</i> = 26)		Statistics			Hochberg's GT2 SEC groups
Variables	Mean	(SD)	Mean	(SD)	Mean	(SD)	<i>F</i>	<i>p</i>	η^2	
Child domain										
AC	34.05	(8.05)	27.48	(9.73)	26.69	(9.82)	5.89	< 0.01	0.10	1 > 2,3
EC	36.03	(11.30)	26.34	(11.67)	25.42	(11.61)	8.16	< 0.001	0.13	1 > 2,3
IC	32.14	(8.79)	26.64	(9.25)	25.19	(10.08)	4.66	0.01	0.08	1 > 2,3
UC	19.95	(5.79)	17.48	(5.25)	16.38	(4.94)	3.42	0.03	0.06	1 > 2,3
VC	30.49	(10.67)	25.94	(9.60)	25.96	(11.47)	2.07	0.13	0.04	1 > 2,3
HC	37.94	(9.31)	36.97	(9.67)	34.03	(9.42)	1.27	0.28	0.73	1 > 2,3
Maladaptive domain										
CS	23.65	(6.08)	23.23	(6.26)	23.34	(7.16)	0.041	0.96	< 0.01	1 > 2,3
DP	28.92	(10.91)	21.25	(7.50)	21.85	(7.95)	8.07	< 0.01	0.13	1 > 2,3*
DSS	14.48	(4.70)	13.44	(5.19)	11.53	(4.58)	2.54	0.08	0.07	1 > 2,3
SA	34.44	(9.18)	32.48	(9.77)	29.00	(9.05)	2.36	0.09	0.07	1 > 2,3
BA	29.48	(8.94)	24.47	(6.30)	22.23	(7.01)	7.58	< 0.01	0.13	1 > 2,3
Parent domains										
PP	29.38	(10.67)	23.68	(8.84)	23.53	(8.75)	4.08	0.02	0.07	1 > 2,3
DPa	34.52	(8.83)	35.12	(9.94)	33.13	(10.71)	0.35	0.70	0.07	1 > 2,3
Healthy adult	36.78	(10.53)	37.30	(10.19)	35.17	(10.88)	0.36	0.69	0.08	2 > 1,3
Clinical symptoms										
Hostility	12.96	(5.58)	9.82	(5.07)	9.14	(6.03)	4.28	0.02	0.08	1 > 2,3*
Somatisation	21.46	(10.45)	19.21	(9.13)	18.41	(8.57)	0.80	0.45	0.02	1 > 2,3
Interpersonal Sensitivity	17.73	(7.50)	14.61	(7.32)	14.69	(9.47)	1.64	0.20	0.03	1 > 2,3
Obsessive-Compulsive	20.30	(7.32)	17.70	(6.99)	18.82	(8.57)	1.15	0.32	0.02	1 > 2,3
Depression	25.21	(11.27)	20.71	(10.78)	23.50	(14.02)	1.48	0.23	0.03	1 > 2,3
Anxiety	19.24	(9.34)	15.88	(7.93)	16.45	(8.77)	1.49	0.23	0.03	1 > 2,3
Phobias	11.76	(7.75)	8.95	(6.03)	10.08	(5.85)	1.77	0.18	0.03	1 > 2,3
Paranoid	10.83	(5.54)	8.38	(4.97)	9.47	(5.78)	2.01	0.14	0.04	1 > 2,3
Psychoticism	16.69	(9.55)	12.76	(8.17)	13.23	(7.86)	2.15	0.12	0.04	1 > 2,3

*1 = Lower SEC, 2 = Middle SEC, 3 = Upper SEC.

M = Mean, SD = Standard deviation, η^2 = eta squared.

DP = Detached Protector, CS = Compliant Surrender, DSS = Detached Self-soother, SA = Self-aggrandiser, BA = Bully and Attack, VC = Vulnerable child, AC = Angry child, EC = Enraged Child, IC = Impulsive child, UC = Undisciplined child. PP = Punishing Parent, DPa = Demanding Parent, HA = Happy Adult, HC = Happy Child.

$p < 0.05$ indicates statistical significance.

Schema modes and comorbidity of psychiatric symptoms utilising the SCL-90

Predictive values for schema modes relating to each of the nine symptoms on the SCL-90 are presented in Table 4. DP, VC, and PP were the dominant modes that contributed positively ($p < 0.01$) to the prediction of Somatisation, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, and Paranoid Ideation. HC was found to be the inverse predictor of these schema modes ($p < 0.05$). EC significantly predicted hostility ($p < 0.001$) and BA predicted phobia ($p < 0.05$).

Discussion

The study examined for the first time in a large cohort the utilisation of dysfunctional schema modes and their association

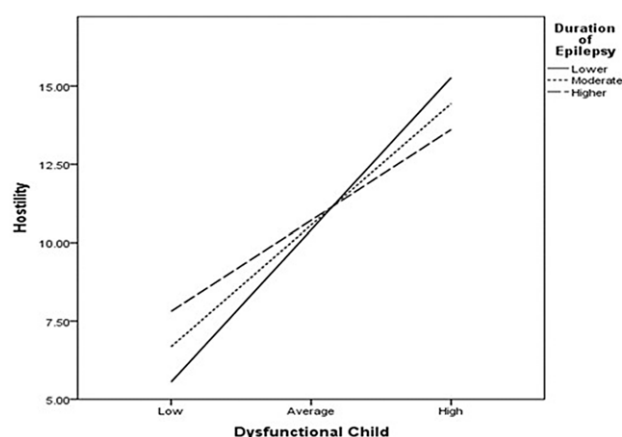
with psychiatric comorbidity among people of PWE. Lower socio-economic class and male gender were associated with increased utilisation of maladaptive schema modes. A shorter duration of illness had a modest impact on the relationship between the utilisation of dysfunctional child modes (in general) and increased hostility. Schema modes contributed significantly to predicting the nine symptoms of the SCL-90, with DP, VC, and PP modes predictive of several symptoms.

Schema modes reflect an individual's current dominant emotional state and are commonly activated by life situations or scenarios with dysfunctional coping modes employed often as protection of self from strong emotions. Of note the presence of punishing or demanding parent modes does not infer any attribution of blame for the utilisation of such schema modes to parents or other parental figures. PWE from lower socio-economic classes were more likely to use several maladaptive coping schemas

Table 3. Gender and schema modes

	Males (<i>n</i> = 50)		Females (<i>n</i> = 58)		Statistics			
	Mean	(SD)	Mean	(SD)	<i>t</i>	<i>p</i>	95% CI	Hedges G
Child domain								
AC	30.63	(9.78)	27.82	(9.60)	1.50	0.14	−0.90, 5.51	0.29
EC	31.17	(13.26)	26.78	(11.15)	1.87	0.06	−0.27, 9.05	0.36
IC	30.38	(10.16)	25.63	(8.69)	2.62	0.01	1.15, 8.35	0.50
UC	19.33	(5.41)	16.67	(5.24)	2.59	0.01	0.62, 4.69	0.46
VC	28.77	(10.62)	25.87	(10.26)	1.44	0.15	−1.09, 4.92	0.28
HC	39.34	(10.82)	34.33	(9.51)	2.56	0.01	1.13, 8.88	0.49
Maladaptive domain								
CS	24.90	(6.69)	22.06	(5.85)	2.35	0.02	0.44, 5.22	0.45
DP	25.04	(10.54)	22.22	(7.80)	1.59	0.12	−0.78, 6.41	0.35
DSS	14.83	(5.21)	11.93	(4.41)	3.13	<0.01	1.06, 4.74	0.60
SA	35.07	(9.71)	29.71	(8.78)	3.01	<0.01	1.83, 8.88	0.58
BA	26.39	(8.42)	24.40	(7.01)	1.34	0.12	−0.95, 4.92	0.25
Parent domain								
PP	27.65	(10.99)	23.15	(7.69)	2.48	0.02	0.90, 8.10	0.47
DPa	36.81	(10.28)	32.47	(8.95)	2.34	0.02	0.67, 8.00	0.45
Healthy adult	38.64	(8.64)	34.73	(9.98)	2.16	0.03	0.32, 7.50	0.42
Clinical symptoms								
Hostility	10.75	(5.77)	10.32	(5.52)	0.42	0.67	−1.70, 2.61	0.07
Somatisation	19.12	(9.99)	20.09	(9.38)	−0.51	0.60	−4.67, 2.73	0.10
Interpersonal Sensitivity	15.45	(8.36)	15.53	(7.71)	−0.54	0.95	−3.15, 2.98	0.01
Obsessive-Compulsive	19.31	(7.66)	18.16	(7.38)	0.79	0.43	−1.72, 4.02	0.15
Depression	23.04	(12.01)	22.28	(11.71)	0.33	0.74	−3.78, 5.30	0.06
Anxiety	16.90	(8.95)	16.96	(8.30)	−0.03	0.97	−3.36, 3.25	0.01
Phobias	10.56	(7.28)	9.53	(5.89)	0.81	0.42	−1.49, 3.54	0.15
Paranoid	9.90	(8.83)	5.76	(5.03)	1.03	0.30	−0.98, 3.13	0.57
Psychoticism	14.93	(9.05)	13.13	(8.17)	1.08	0.28	−1.19, 5.08	0.21

DP = Detached Protector, CS = Compliant Surrender, DSS = Detached Self-soother, SA = Self-aggrandiser, BA = Bully and Attack, VC = Vulnerable child, AC = Angry child, EC = Enraged Child, IC = Impulsive child, UC = Undisciplined child, PP = Punishing Parent, DPa = Demanding Parent, HA = Happy Adult, HC = Happy Child.
 $p < 0.05$ indicates statistical significance.



Predictors of hostility	B	95% CI
DE	0.02	−0.08, 0.11
DC	0.09**	0.07, 0.11
DC X DE	0.01*	−0.01, 0.03
$R^2 = 0.51$		
$\Delta R^2 = 0.03$		
$F = 36.51***$		
$\Delta F = 5.44$		

DE = Duration of Epilepsy, DC = Dysfunctional Child modes

Figure 1. Moderating effect of duration of epilepsy on dysfunctional child and hostility.

Table 4. Summary of the prediction of psychiatric symptoms from the schema modes

SCL-90	Predictors	β	R^2	$F(df)$
Hostility	Detached protector	0.27**	0.48	15.72 (6, 101)
	Vulnerable child	0.24***	0.53	23.28 (5, 102)
	Enraged child	0.45***	0.53	23.28 (5, 102)
	Punishing child	0.56***	0.28	20.53 (2, 105)
Somatisation	Detached protector	0.40***	0.27	6.39 (6, 101)
	Vulnerable child	0.56***	0.30	8.65 (5, 101)
	Punishing parent	0.53***	0.26	19.23 (2, 105)
Interpersonal sensitivity	Detached protector	0.36***	0.32	7.83 (6, 101)
	Vulnerable child	0.68***	0.45	16.54 (5, 102)
	Punishing parent	0.55***	0.29	20.99 (2, 105)
	Happy child	-0.34*	0.05	2.51 (2, 105)
Obsessive-compulsive	Detached protector	0.49**	0.38	10.31 (6, 101)
	Vulnerable child	0.67***	0.48	18.88 (5, 102)
	Punishing parent	0.63***	0.39	34.09 (2, 105)
Depression	Detached protector	0.36***	0.43	12.75 (6, 100)
	Vulnerable child	0.77***	0.57	27.85 (5, 101)
	Punishing parent	0.61***	0.36	30.34 (2, 104)
Anxiety	Detached protector	0.36***	0.36	9.58 (6, 101)
	Vulnerable child	0.65***	0.46	17.28 (5, 102)
	Punishing parent	0.59***	0.32	24.27 (2, 105)
Phobia	Detached protector	0.38***	0.32	7.90 (6, 101)
	Bully and attack	0.24*	0.32	7.90 (6, 101)
	Vulnerable child	0.69***	0.38	12.54 (5, 102)
	Punishing parent	0.63***	0.35	28.78 (2, 105)
Paranoid ideation	Detached protector	0.34***	0.27	6.39 (6, 101)
	Vulnerable child	0.74***	0.39	3.41 (5, 101)
	Punishing parent	0.55***	0.28	20.08 (2, 105)
Psychoticism	Detached protector	0.41***	0.32	8.01 (6, 101)
	Vulnerable child	0.87***	0.49	19.56 (5, 102)
	Punishing parent	0.64***	0.38	32.44 (2, 105)

$n = 108$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

(DP, BA, AP, AC, EC, and IC) in this study. This finding is consistent with previous research that has demonstrated that PWE from lower socio-economic classes experience more significant psychiatric comorbidities, describe and experience higher levels of stigmatisation and sometimes have inadequate treatment resources (Koch *et al.* 2008; Seo *et al.* 2015).

There has been minimal focus pertaining to the difference in the utilisation of schema modes between genders to date. Here, we

demonstrated that males had increased activation of several maladaptive modes (DSS, SA, CS, IC, UC, DPa) compared to females. The most significant of these was the DSS mode, which has been associated with the utilisation of unhealthy coping styles including excessive use of alcohol, and gambling misuse, both more evident in males (Young *et al.* 2003). One previous study ($n = 16$), noted that males had greater use of the BA schema mode (but not other schema modes), and stated that this might be related to aggression being in general more characteristic of males compared to females or that men more openly display aggressive behaviours (Lobbestael *et al.* 2005), however whilst we demonstrated higher scores in males, our finding was not statistically significant.

Epilepsy duration had a moderating effect pertaining to the use of the dysfunctional child modes and their association with hostility. Early in an illness trajectory, PWE may be more distressed by their diagnosis and the potential implications for their functioning, and symptoms, which often include concerns or the experience of insufficient seizure control, with some PWE experience inter-ictal irritability (Khalily *et al.* 2011). Thus, it is not surprising that a longer duration of illness would be associated with reduced hostility and potentially less use of dysfunctional child schema modes.

In this study, PWE reported that stress, fear, fatigue, and poor adherence were common triggers for seizures. Of particular note, approximately two-thirds of participants were afraid of divulging their illness due to potential stigma from their employers, a finding previously also documented (Khan *et al.* 2004; Aydemir *et al.* 2016). Similarly Rhodes and colleagues' (2008) qualitative study revealed that PWE had concerns regarding discrimination and workplace inequalities if their diagnosis was known and that if it were known that symptoms of epilepsy would not be denoted as a social disability (Rhodes *et al.* 2008). However, when participants shared their epilepsy history with their employers, lower levels of psychopathology across the SCL-90 subscales were demonstrated.

Thus, PWE are more likely to develop psychological symptoms due perceived stigma (Hermann *et al.* 2000), and the stress associated with same increasing the likelihood of utilisation of maladaptive schemas (Camara & Calvete, 2012). Consequently, this study provides preliminary evidence of the benefits of more open-discussion with employers regarding participants' epilepsy diagnosis.

This study has a number of limitations. Most importantly, we were unable to obtain data regarding the frequency of seizures, which prevented us from analysing the utilisation of schema modes across different levels of severity of illness. Secondly, we did not include a control group, to compare the differences in utilisation of schema modes between groups, which we would propose in a future study, where the utilisation of schema modes across genders could be additionally compared in both cohorts. Thirdly, we had minimal information on some potential confounders including psychometric measurements of quality of life, and overall functioning, which we would recommend for inclusion in future studies.

Conclusions

PWE utilise increased maladaptive schema modes if they are from lower socio-economic classes and if of male gender, with some of these schema modes reflective of feelings of increased frustration (UC), and greater impulsivity (UC). Individuals early in their illness experienced increased hostility and utilised maladaptive schema modes to a greater extent, although this was only a modest

finding, with several maladaptive specific schema modes (PP, CS, VC, AC, and EC) making a robust contribution to the prediction of psychiatric symptoms entailed in SCL-90. In particular, utilisation of schema modes associated with self-doubt (VC), detachment from others (VC) and self-blame (PP) were associated with greater symptomatology. Consequently appropriate supports should be routinely considered for PWE; particularly if individuals are from lower socio-economic class, are male or are early in their disease course with schema-focused therapy one such potential therapeutic option. Engagement in therapy would hopefully enable individuals discuss concerns regarding their illness and attain strategies to manage the hostility and frustration they experience.

Supplementary material. For supplementary material accompanying this paper visit <https://doi.org/10.1017/ipm.2023.23>

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Ethical standard. Ethical approval was attained prior to study commencement from the ethics committee of the International Islamic University, Islamabad, with the clinical leads of neurology departments of the included hospitals additionally providing written permission for the study to be undertaken. Informed written consent was attained from each participant prior to study engagement. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committee on human experimentation with the Helsinki Declaration of 1975, as revised in 2008.

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