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FROM STRESS TO SEIZURES: PSYCHOSOCIAL CORRELATES OF PSYCHOGENIC NON-EPILEPTIC SEIZURES

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Abstract
Psychogenic Non-Epileptic Seizures (PNES) represent a complex neuropsychiatric condition that mimics epileptic seizures but arises from psychosocial and psychological mechanisms rather than abnormal neuronal activity. Adolescents are particularly vulnerable due to heightened neurodevelopmental sensitivity, emotional volatility, and increased exposure to stressors such as family conflict, peer rejection, and academic pressures. Empirical evidence demonstrates strong associations between PNES and childhood trauma, insecure attachment, emotional dysregulation, dissociative tendencies, and maladaptive coping. Despite advancements in diagnostic tools, PNES is often misdiagnosed as epilepsy, leading to unnecessary medical treatments, stigmatization, and delayed psychological care. Cultural dynamics, particularly in South Asian contexts, further complicate diagnosis as somatization and silence around trauma remain socially sanctioned. This review synthesizes findings from trauma theory, attachment theory, emotion regulation, dissociation frameworks, and the biopsychosocial model to highlight the psychosocial correlates of PNES. The article advocates for trauma-informed, culturally sensitive, interdisciplinary interventions to reduce stigma, improve diagnosis, and promote recovery. Recognizing PNES as an embodied expression of unresolved trauma rather than malingering is crucial for developing compassionate and effective clinical practices.

Keywords:- Psychogenic Non-Epileptic Seizures (PNES), Adolescents, Childhood trauma, Emotional dysregulation, Dissociation, Insecure attachment, Psychosocial factors, Trauma-informed care

Introduction

Psychogenic Non-Epileptic Seizures (PNES) are seizure-like episodes that outwardly resemble epileptic seizures but occur in the absence of abnormal electrographic brain activity (Stone & Carson, 2015). Historically, PNES was often classified as hysteria or conversion disorder, a label that carried substantial stigma, particularly toward women, and reflected a limited understanding of mind-body interactions (Kanaan, 2022). Contemporary diagnostic frameworks, including DSM-5 and ICD-11, classify PNES under Functional Neurological Symptom Disorder (FNSD), reflecting a paradigm shift toward a biopsychosocial understanding that integrates neurological, psychological, and sociocultural factors (Edwards et al., 2020; Puentes, 2023).

Adolescence represents a particularly sensitive developmental period characterized by rapid neurobiological changes, including asynchronous maturation of the limbic system and prefrontal cortex. This asynchrony heightens emotional reactivity and limits regulatory control, increasing susceptibility to environmental stressors such as family conflict, peer rejection, academic pressures, and traumatic experiences (Crone & Dahl, 2012). Early-life trauma—including emotional, physical, or sexual abuse—can disrupt attachment security, promote maladaptive coping, and heighten dissociative tendencies, thereby elevating the risk of PNES during adolescence (Teicher & Samson, 2016).

PNES can be understood as a somatic expression of unresolved psychological stress, where psychosocial factors interact with neurodevelopmental vulnerabilities to produce seizure-like episodes. Trauma exposure is among the most consistent predictors, with affected adolescents frequently reporting histories of abuse, neglect, or significant loss (Brown et al., 2019). Dissociation, often a protective response to overwhelming stress, mediates the translation of psychological distress into somatic symptoms (Reuber et al., 2017). Emotional dysregulation, marked by heightened mood reactivity and difficulties in affect modulation, further contributes to vulnerability, while insecure attachment patterns limit effective emotional processing and social support seeking, reinforcing symptom persistence (Cogan et al., 2019).

Cultural factors further shape the manifestation and recognition of PNES. In many South Asian contexts, somatic expression of psychological distress is socially sanctioned, while open discussion of trauma may be discouraged, complicating diagnosis and delaying psychological intervention (Chakraborty & Basu, 2021). Misdiagnosis as epilepsy is common, often resulting in unnecessary medical treatment, stigmatization, and delayed access to effective psychological care.

This review synthesizes evidence from trauma theory, attachment frameworks, emotion regulation research, and the biopsychosocial model to elucidate the psychosocial correlates of PNES in adolescents. By tracing the pathway "from stress to seizures," it emphasizes the importance of trauma-informed, culturally sensitive, and interdisciplinary approaches in improving diagnosis, reducing stigma, and promoting recovery.

Adolescence as a Developmental Risk Window

Adolescence is a critical period for neurodevelopment and psychosocial maturation, during which rapid brain remodeling, social reorientation, and identity consolidation intersect with heightened vulnerability to stress. Structural and functional changes in the adolescent brain, particularly in regions governing emotion regulation, executive function, and social cognition, create a neurodevelopmental landscape susceptible to dysregulation. The limbic system, which modulates emotional processing and reward sensitivity, exhibits hyper-reactivity, whereas the prefrontal cortex, responsible for impulse control, decision-making, and self-regulation, matures more gradually (Crone & Dahl, 2012). This developmental imbalance contributes to heightened emotional reactivity, impulsivity, and stress sensitivity, forming a neurobiological basis for susceptibility to psychosocial stressors.

The hypothalamic-pituitary-adrenal (HPA) axis, central to stress regulation, is particularly sensitive during adolescence. Dysregulation of this system in response to chronic or acute stress can trigger maladaptive physiological and psychological responses, facilitating the conversion of stress into somatic manifestations such as PNES (Powers & Casey, 2015). Psychosocial adversities—including peer rejection, bullying, family conflict, parental neglect, and academic pressures—can overwhelm adolescents' coping capacities, creating fertile ground for the emergence of PNES as a stress-related condition.

From a psychosocial perspective, PNES in adolescents can be conceptualized as a dissociative or somatoform response to unresolved emotional distress. These seizure-like episodes may serve intrapsychic functions, temporarily relieving overwhelming affect, and interpersonal functions, signaling distress in environments where verbal expression of emotions is limited or discouraged (Kozlowska et al., 2018). Importantly, these episodes are involuntary expressions of underlying

vulnerabilities shaped by neurodevelopmental, psychological, and social factors rather than deliberate behavior.

Thus, adolescence represents both a window of heightened risk for PNES and a critical opportunity for early identification and intervention. Recognizing early psychosocial correlates—emotional dysregulation, dissociative tendencies, maladaptive coping strategies, and somatic complaints—enables clinicians, educators, and caregivers to implement trauma-informed, developmentally sensitive interventions. Early psychosocial support, psychoeducation, and targeted therapeutic engagement not only reduce the risk of chronic PNES but also foster resilience, adaptive coping, and healthy emotional development, effectively tracing the pathway "from stress to seizures."

Childhood Trauma and PNES

Childhood trauma represents one of the most potent psychosocial risk factors in the development of Psychogenic Non-Epileptic Seizures (PNES), forming a critical link in the pathway from stress to seizures. Adverse childhood experiences (ACEs)—including physical, emotional, and sexual abuse, emotional neglect, caregiver loss, household dysfunction, and exposure to domestic violence—can profoundly disrupt the development of neural systems responsible for stress regulation, emotion processing, and attachment formation (Ford et al., 2015; Teicher & Samson, 2016). These early adversities shape the structural and functional architecture of the brain, increasing stress sensitivity, impairing emotion regulation, and predisposing individuals to functional neurological symptoms such as PNES.

Neurobiological research provides compelling evidence of trauma-related alterations in key brain regions among adolescents with PNES. Neuroimaging studies reveal hyperactivity of the amygdala, responsible for fear and emotional processing; reduced hippocampal volume, impacting memory and contextual integration; and functional impairments in the prefrontal cortex, which limit top-down regulation of emotions and behavior (Kozlowska et al., 2018). Collectively, these changes create a neurobiological environment in which stress is amplified, adaptive coping is compromised, and dissociative mechanisms are more likely to emerge.

Clinically, adolescents with PNES consistently report higher rates of childhood trauma compared to both healthy controls and individuals with epilepsy (Myers et al., 2019). In this context, PNES episodes can be conceptualized as embodied expressions of unresolved emotional distress. Intrapsychically, seizures provide a temporary dissociative escape from overwhelming affective states, while interpersonally, they may communicate distress to caregivers or peers in environments where verbal or emotional expression is constrained. These dual functions highlight the complex interplay of neurobiological vulnerability, emotional dysregulation, and psychosocial stress in the emergence of PNES.

Recognizing the strong association between childhood trauma and PNES has important implications for clinical care. Trauma-informed assessment protocols, including systematic screening for ACEs and detailed histories of abuse, neglect, and household adversity, are essential. Therapeutic interventions should target both symptom management and processing of traumatic experiences. Evidence-based approaches, such as trauma-focused cognitive-behavioral therapy (TF-CBT), emotion regulation training, and family-centered interventions, can enhance adaptive coping, reduce dissociation, and facilitate recovery. Importantly, clinicians must adopt a compassionate, validating stance, emphasizing that PNES is a meaningful, stress-related manifestation of past trauma rather than intentional or feigned behavior.

Psychosocial Correlates of PNES

Psychogenic Non-Epileptic Seizures (PNES) are optimally understood within a biopsychosocial framework, where biological vulnerabilities interact dynamically with psychosocial stressors to shape the onset, severity, and persistence of symptoms. While neurodevelopmental factors may predispose adolescents to dysregulation, psychosocial correlates often determine how stress is internalized and expressed, ultimately influencing the transition "from stress to seizures."

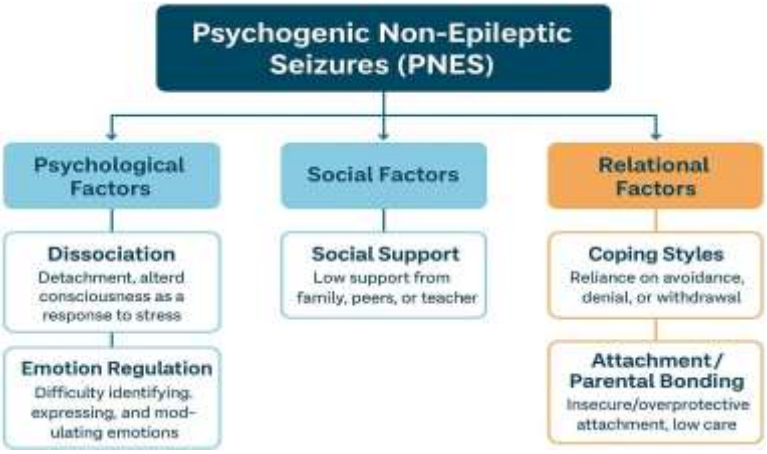

Figure:- Diagram showing the Psychosocial Correlates of PNES.

Dissociation: Dissociation is a central feature of PNES, reflecting the segregation of overwhelming emotions, memories, or experiences from conscious awareness (Brown & Reuber, 2016). In adolescents, dissociative processes may manifest as alterations in consciousness, identity, or bodily control, serving as an adaptive—albeit maladaptive over time—mechanism for coping with intense stress. These processes form a direct pathway by which psychosocial stressors are converted into seizure-like episodes, illustrating the mind-body interface central to PNES.

Emotion Regulation: Difficulties in regulating emotions are a hallmark of PNES in adolescence. Maladaptive strategies such as suppression, avoidance, rumination, or emotional outbursts can amplify stress, precipitating seizures, and creating a feedback loop of distress (Aldao et al., 2010). Ineffective emotion regulation bridges the experience of psychosocial stress with somatic manifestations, highlighting its pivotal role in the stress-to-seizure trajectory.

Coping Styles: Coping strategies significantly influence vulnerability to PNES. Adolescents exposed to chronic stress or trauma often rely on maladaptive methods, including denial, withdrawal, self-isolation, or somatic expression, which may temporarily alleviate distress but fail to resolve underlying stressors (Fobian & Elliott, 2019). Conversely, adaptive coping—through problem-solving, cognitive reframing, or seeking social support—can buffer the impact of stress and reduce seizure frequency, though these strategies are frequently underutilized in trauma-affected youth. **Attachment Patterns:** Attachment security shapes how adolescents perceive and respond to stress. Insecure, ambivalent, or disorganized attachment patterns impair emotional regulation, limit adaptive support-seeking, and heighten susceptibility to dissociation, thereby facilitating the emergence of PNES (Liotti, 2004). Early relational disruptions create internalized models of mistrust or instability, which amplify the psychosocial stress experienced and promote somatic conversion as a means of communicating distress.

Social Support: The availability and quality of social support modulate the impact of psychosocial stress on PNES. Perceived support from family, peers, or community can buffer stress, whereas invalidation, neglect, or lack of support can exacerbate vulnerability, particularly in collectivistic cultures where social connectedness is central to coping (Cohen & Wills, 1985). Social context thus plays a critical role in either mitigating or reinforcing the stress-to-seizure pathway.

Collectively, these psychosocial correlates demonstrate that PNES is not merely a neurological disorder but a complex, stress-responsive condition in which psychological distress, interpersonal factors, and environmental stressors converge to produce somatic seizure-like expressions. Understanding PNES as the dynamic interplay of dissociation, impaired emotion regulation, maladaptive coping, insecure attachment, and social context provides a comprehensive framework for assessment and intervention. Trauma-informed, developmentally sensitive interventions that enhance emotion regulation, address dissociative tendencies, strengthen adaptive coping, and leverage social support are essential for promoting recovery and resilience in adolescents with PNES.

Diagnostic Challenges

Diagnosing Psychogenic Non-Epileptic Seizures (PNES) in adolescents presents significant clinical challenges, largely due to their symptomatic overlap with epileptic seizures. While video-electroencephalography (video-EEG) remains the gold standard for distinguishing PNES from epilepsy, practical limitations—such as restricted access to specialized equipment, intermittent seizure occurrence, and mixed seizure presentations—often impede timely and accurate diagnosis (Myers et al., 2019). Misdiagnosis can have profound consequences. Adolescents may be subjected to unnecessary antiepileptic medications, invasive procedures, or repeated hospitalizations, which not only fail to address the underlying psychosocial stressors but also contribute to stigma, frustration, and reinforcement of maladaptive coping mechanisms. The consequences of misdiagnosis illustrate how unrecognized psychosocial stress can manifest as somatic symptoms, tracing the pathway "from stress to seizures." Another complicating factor is the disciplinary divide between neurology and psychiatry. Neurologists may focus primarily on ruling out epileptic activity, while psychiatrists address emotional and psychosocial factors, often without integrated communication. This fragmentation of care delays identification of the psychosocial correlates of PNES, including trauma history, emotional dysregulation, dissociation, attachment difficulties, and environmental stress, all of which play central roles in the onset and maintenance of seizure-like episodes (LaFrance & Devinsky, 2004). Addressing these diagnostic challenges requires an interdisciplinary, trauma-informed approach. Comprehensive assessment should integrate neurological evaluation with detailed psychosocial history-taking, including screening for adverse childhood experiences, emotional functioning, coping strategies, and family or cultural influences. Clinicians must recognize PNES as a meaningful expression of psychological distress rather than malingering, allowing for timely psychosocial interventions that target the root causes of stress and disrupt the progression from psychological stress to somatic seizure expression.

By framing diagnosis within the stress-to-seizure paradigm, clinicians can move beyond symptom management toward understanding and addressing the psychosocial correlates that underpin PNES, ultimately facilitating early intervention, reducing stigma, and promoting recovery.

Cultural Dimensions of PNES

Cultural context plays a pivotal role in shaping the manifestation, interpretation, and management of Psychogenic Non-Epileptic Seizures (PNES), illustrating how psychosocial stress is filtered through societal norms to produce somatic expressions. In South Asian settings, for example, somatization is often a socially acceptable mode of expressing psychological distress, particularly in environments where verbal disclosure of emotions is discouraged or stigmatized (Mumford, 1993; Grover & Naskar, 2024). Adolescents may thus convert emotional turmoil, trauma, or relational stress into physical symptoms, highlighting a culturally mediated pathway from stress to seizures.

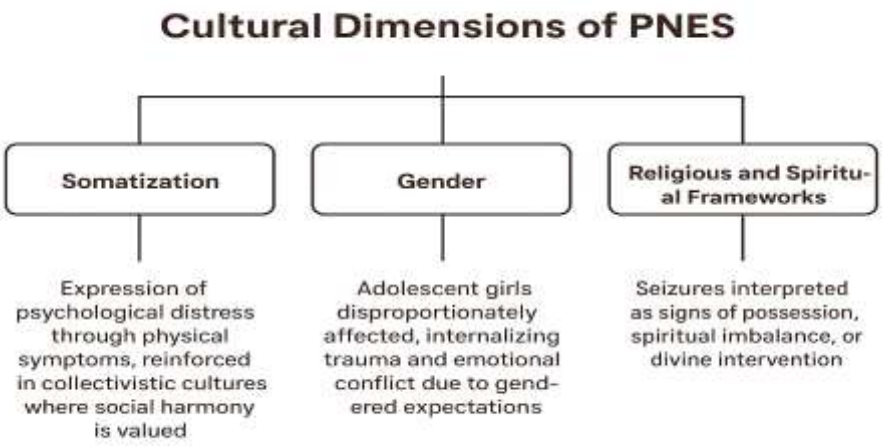

Figure:- Flowchart showing the Cultural Dimensions of PNES.

Gender norms further influence this process. Girls in particular face disproportionate relational stress, including expectations to maintain family harmony and restrictions on expressing negative emotions openly. These sociocultural constraints can exacerbate emotional suppression and increase reliance on somatic channels, such as PNES, to communicate distress (Abraham & Sher, 2019). Additionally, religious or spiritual interpretations of seizure-like episodes—such as beliefs in possession or supernatural influences—may delay medical evaluation and psychosocial intervention, inadvertently reinforcing maladaptive coping mechanisms (Golden, 2012).

The social environment, including family, community, and peer networks, can either buffer or exacerbate the impact of stress on seizure expression. Validation, empathy, and support may mitigate the risk of PNES, whereas stigmatization, disbelief, or punishment can intensify emotional dysregulation and dissociation, perpetuating seizure-like episodes. This cultural lens underscores the importance of contextualizing PNES as a meaningful, stress-driven response rather than a purely medical or neurological phenomenon.

Effective assessment and intervention therefore require culturally sensitive, trauma-informed approaches. Clinicians must recognize how sociocultural norms shape the psychosocial correlates of PNES—trauma, attachment disruptions, dissociation, emotion regulation difficulties, and coping patterns—and tailor interventions accordingly. By integrating cultural understanding into the stress-to-seizure framework, practitioners can improve diagnosis, enhance therapeutic engagement, and promote adaptive coping strategies, ultimately reducing the chronicity and functional impact of PNES in adolescents.

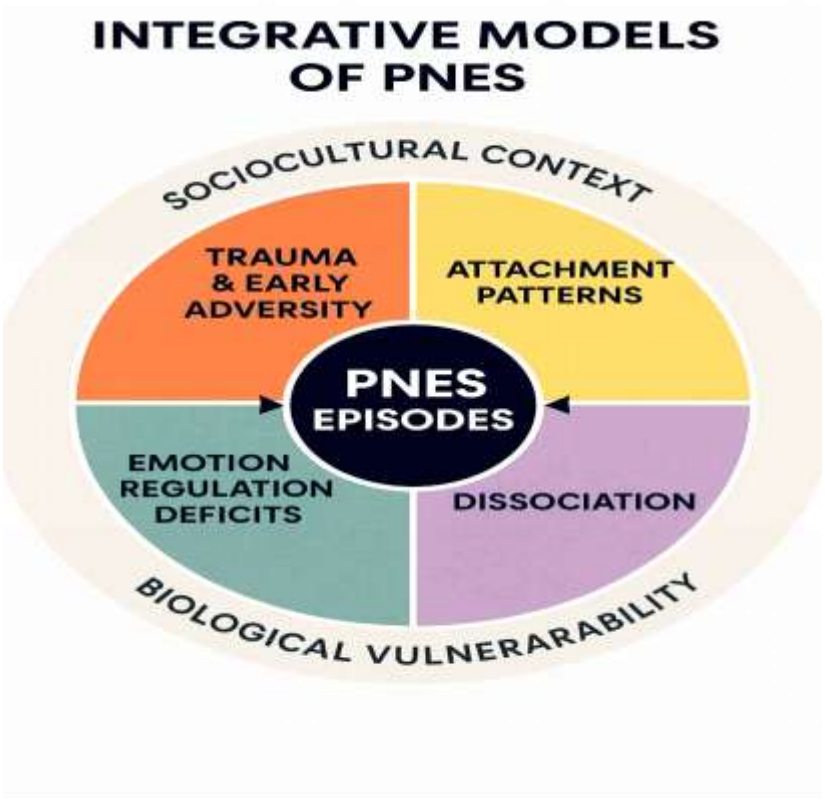

Figure:- Diagram showing the Integrative Models of PNES

Integrative Models of PNES

Understanding Psychogenic Non-Epileptic Seizures (PNES) requires a multifaceted approach that accounts for the complex interplay of psychological, neurobiological, and sociocultural factors, highlighting the pathway from stress to seizures. Multiple theoretical frameworks offer complementary insights into how psychosocial stressors are transformed into somatic seizure-like episodes.

Trauma Theory emphasizes the central role of unresolved adverse experiences in the development of PNES. Early-life trauma—including physical, emotional, or sexual abuse, neglect, and exposure to family dysfunction—can overwhelm a child's regulatory capacities, leading to long-term dysregulation of affect, heightened stress sensitivity, and the development of dissociative mechanisms that manifest as PNES (Van der Kolk, 2014).

Attachment Theory highlights the significance of early relational bonds in shaping emotional regulation and coping strategies. Insecure or disorganized attachment, resulting from inconsistent, neglectful, or abusive caregiving, undermines trust and adaptive stress management. Adolescents with disrupted attachment patterns may be more likely to convert emotional distress into somatic expressions, including PNES, particularly in contexts where verbal expression of emotions is constrained (Bowlby, 1969; Liotti, 2004).

Emotion Regulation Models focus on maladaptive strategies for managing stress and affective arousal. Inefficient regulation—such as suppression, avoidance, or rumination—amplifies the impact of psychosocial stressors, creating conditions in which psychological distress is expressed through somatic channels, including seizure-like episodes (Gross, 1998).

Dissociation Theories trace PNES to fragmented consciousness, where overwhelming emotions or experiences are compartmentalized to protect the individual from intolerable affect. Dissociation serves as a neuropsychological mechanism linking stress to seizure-like presentations, illustrating how emotional overload can manifest physically (Janet, 1907).

The Biopsychosocial Model integrates these perspectives, situating PNES at the intersection of neurodevelopmental vulnerability, psychosocial stress, and sociocultural context (Engel, 1977; Brown & Reuber, 2016). This model underscores that PNES is neither purely neurological nor purely psychological; instead, it is a stress-responsive condition in which childhood adversity, attachment disruptions, impaired emotion regulation, dissociation, and cultural norms collectively shape the emergence and maintenance of seizure-like episodes.

By synthesizing trauma, attachment, emotion regulation, and dissociation frameworks within a biopsychosocial lens, integrative models illuminate the mechanisms through which psychosocial stress is transformed into PNES. This approach provides a theoretical foundation for interventions that target both the underlying stressors and their somatic expressions, reinforcing the pathway from stress to seizures and guiding trauma-informed, developmentally sensitive, and culturally aware clinical care.

Clinical Implications and Future Directions

Effective management of Psychogenic Non-Epileptic Seizures (PNES) in adolescents requires an integrated, trauma-informed, and developmentally sensitive approach that addresses the psychosocial factors underlying the stress-to-seizure pathway. Early identification of psychosocial stressors is critical. Routine screening for childhood trauma, adverse experiences, dissociative tendencies, and maladaptive coping strategies using standardized tools such as the Childhood Trauma Questionnaire (CTQ) or the Dissociative Experiences Scale (DES) can facilitate timely recognition of at-risk adolescents and guide individualized intervention planning (LaFrance et al., 2020).

Therapeutic interventions should target both symptom management and the underlying psychosocial correlates of PNES. Evidence-based approaches—including cognitive-behavioral therapy (CBT), trauma-focused therapies, emotion regulation training, and family-centered interventions—have demonstrated efficacy in reducing seizure frequency, improving emotional regulation, and enhancing coping strategies (LaFrance et al., 2020). Interventions that actively involve caregivers can address disrupted attachment patterns, reinforce adaptive coping, and provide a supportive environment in which adolescents can safely process stress and trauma.

Cultural competence is essential in all aspects of PNES care. Clinicians must recognize how sociocultural norms, gender expectations, and beliefs about mental health influence symptom expression and help-seeking behaviors. Incorporating culturally sensitive psychoeducation, engaging community or religious leaders where appropriate, and validating the adolescent's

experience within their social context can reduce stigma, enhance therapeutic alliance, and improve outcomes.

Interdisciplinary collaboration between neurology, psychiatry, psychology, and social services is vital to ensure comprehensive care. Bridging the divide between medical and psychosocial perspectives allows for accurate diagnosis, holistic understanding of the stress-to-seizure trajectory, and coordinated intervention strategies.

Future research should prioritize longitudinal studies to elucidate the developmental and psychosocial trajectories of PNES, investigate the efficacy of culturally adapted interventions, and explore mechanisms linking psychosocial stress to seizure expression. Greater focus on early detection, integrated care pathways, and trauma-informed frameworks will be crucial in advancing both clinical practice and scientific understanding of PNES in adolescents.

Conclusion

Psychogenic Non-Epileptic Seizures (PNES) in adolescence represent a complex interplay between neurodevelopmental vulnerability and psychosocial stressors, illustrating a clear pathway from stress to seizures. Adolescents are particularly susceptible due to heightened emotional reactivity, immature regulatory systems, and exposure to diverse psychosocial adversities such as trauma, family conflict, peer rejection, and academic pressures. Childhood trauma emerges as a critical predictor, shaping neural circuits involved in stress regulation, emotion processing, and dissociation, and creating a foundation for maladaptive coping and seizure-like symptom expression. Psychosocial correlates—including dissociation, impaired emotion regulation, maladaptive coping, insecure attachment, and social support deficits—serve as key mechanisms through which psychological distress is converted into somatic episodes. Cultural and contextual factors further modulate symptom expression, influencing both recognition and help-seeking behaviors, and highlighting the importance of culturally sensitive, trauma-informed care. Integrative models, encompassing trauma theory, attachment frameworks, emotion regulation perspectives, dissociation theories, and the biopsychosocial approach, provide a comprehensive understanding of PNES and underscore the need to view these seizures as meaningful, stress-driven responses rather than purely neurological phenomena. Clinical management requires early identification of risk factors, trauma-informed assessment, and interdisciplinary collaboration between neurology, psychiatry, psychology, and social services. Evidence-based interventions—including cognitive-behavioral therapy, trauma-focused therapies, emotion regulation training, and family-centered approaches—are most effective when they target both symptom reduction and underlying psychosocial stressors. Emphasizing cultural competence, reducing stigma, and fostering supportive environments are essential for promoting adaptive coping, resilience, and recovery. Future research should focus on longitudinal studies, culturally adapted interventions, and integrated care models to elucidate developmental trajectories and optimize outcomes for adolescents with PNES. Recognizing PNES as an embodied expression of unresolved stress provides both a conceptual and clinical framework for interventions that move beyond symptom management to address the root psychosocial determinants, ultimately improving the well-being and developmental trajectory of affected youth.

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