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COMPLEX MEDICAL-PSYCHIATRIC ISSUES (MB RIBA, SECTION EDITOR)

# Pediatric Somatic Symptom Disorders

**Nasuh Malas**[1] · **Roberto Ortiz-Aguayo**[2] · **Lisa Giles**[3,4] · **Patricia Ibeziako**[5]

**Abstract** Somatic symptom disorder (SSD) is a common disorder encountered in pediatric medicine. It involves the presentation of physical symptoms that are either disproportionate or inconsistent with history, physical examination, laboratory, and other investigative findings. SSDs result in significant impairment with considerable increase in healthcare utilization, school absenteeism, and the potential for unnecessary diagnostic evaluation and treatment intervention. Patients and families often feel dismissed and may worry that a serious condition has been missed. Primary care providers are frequently frustrated due to a lack of a successful approach to patients and families impacted by SSD. The result is often a cycle of disability, frustration and missed opportunities for collaboration towards enhanced patient functionality. This review summarizes the current evidence-based understanding, as well as insights from clinician experience, on the evaluation and management of pediatric SSD.

**Keywords** Somatic symptom disorder · Somatization · Somatoform · Conversion · Functional · Pediatric · Medically unexplained symptoms

## Case Example

A 16-year-old female presents for outpatient evaluation due to intractable migraine. Over the course of the last 5 months, she has had 12 emergency room visits for management of her headache, 6 of which have resulted in inpatient admission. Extensive neurological work up, including imaging and lumbar puncture have been negative. She is on topiramate, atenolol, and amitriptyline for headache prophylaxis and sumatriptan for abortive treatment. The patient endorses decreased energy and difficulty falling asleep. She reports she frequently feels irritable and anxious at home, at school, or when visiting friends. Parents report she is often irritable and can become highly argumentative and verbally aggressive when trying to get her to school or setting limits. Past medical history is significant for history of recurrent abdominal pain between ages 8 and 12 years old and chronic daily headache. Birth and developmental history is unremarkable.

She was previously diagnosed with oppositional defiant disorder and school avoidance several years ago. Family underwent two courses of parent management training and family therapy with some reported success. The patient has been resistant to attending psychotherapy as she reports worsening headaches and not wanting to leave the house. Family history is significant for generalized anxiety and post-traumatic stress disorder in mother, who is currently physically disabled. Father recently suffered a stroke and was forced to

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✉ Nasuh Malas
nmalas@med.umich.edu

[1] Department of Psychiatry and Pediatrics, University of Michigan Medical School, 1500 East Medical Center Drive, L5023, SPC 5277, Ann Arbor, MI 48109, USA

[2] Department of Psychiatry and Pediatrics, Children's Hospital of Pittsburgh of UPMC, University of Pittsburgh School of Medicine, Pittsburgh, USA

[3] Department of Pediatrics and Psychiatry, University of Utah School of Medicine, Salt Lake City, USA

[4] Department of Psychiatry and Behavioral Health, Primary Children's Hospital, Salt Lake City, USA

[5] Department of Psychiatry, Boston Children's Hospital, Harvard Medical School, Boston, USA

retire after a 30-year successful career as a surgeon. An older brother has a history of oppositional defiant disorder and postural orthostatic tachycardia syndrome. The patient currently lives with her biological mother and father in a suburban community. She denies a history of physical or sexual abuse. She attends the 10th grade and denies bullying. She has missed considerable school due to headaches and school refusal. As a result, her academic performance is declining.

The patient's headaches have progressed to the point where she is requesting to participate in cyber school. There is often high expressed emotion in the home related to argumentation between the patient and parents about her headache. The parents are frustrated and state "no one has been able to give us any answers about our daughter's headache, we feel like we are losing her…".

## Introduction

The case presentation above highlights some of the common themes seen in pediatric somatization and somatic symptom disorder (SSD). Somatization is common and occurs when a patient's subjective report of a physical symptom or symptoms is inconsistent with clear physical illness or etiology and results in functional impairment [1, 2]. Somatization lies along a spectrum of severity and can manifest in different ways depending on patient development [2]. Often, somatic symptoms are transient and resolve with minimal intervention [3•]. However, somatization can persist, particularly when predisposing or perpetuating factors influence continued symptom presentation. Somatization can occur in the setting of physical illness, mental illness, or independently [1]. The prevalence of somatization in primary care pediatric settings has been estimated to be 25–50% of visits, although data on prevalence is limited, particularly in non-primary care settings [6, 19–21]. Abdominal pain and headache are the most common presenting symptoms, followed by back pain, limb pain, other neurologic symptoms, and fatigue [2, 6, 7•, 18, 21].

Somatization frequently results in a change in lifestyle, increased physician visits and/or increased medication use [1, 3•, 4–6, 7•, 8]. Presentations are similar across settings although medically hospitalized patients often have increased symptom quantity and severity [7•, 8]. Somatization accounts for 15–20% of yearly healthcare expenditures in the United States [5, 9]. This includes frequent emergency room visits, hospitalizations, excess diagnostic evaluation, and invasive procedures [2, 9, 10]. Somatization itself results in significant disability even when accounting for comorbid psychopathology, individual health factors, and demographics [11]. Similar frequencies of somatization exist regardless of region, country, or culture [6].

Somatization can be a normative part of development and coping. Somatization becomes a disorder when it is impairing and meets specific criteria outlined by the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (Table 1) [12]. By definition, SSD develops as a result of somatization that is either disproportionate to or incongruent with clinical findings. The diagnosis of SSD does not require identification of additional comorbid psychopathology, or the identification of a particular stressor or triggering event [12, 13]. SSD can also occur in the presence of a known physical health condition

Individual, family, cultural, and environmental factors can significantly influence symptom presentation. Patients and their families are often frustrated by a lack of a conceptual framework to understand symptomatology. Caregivers may be heavily invested in identifying "something serious" or "something being missed" [14]. Caregiver anxiety about their child's decline in function can significantly influence care and management including increased demands for testing and intervention. Patients and families can feel dismissed, unheard, and devalued. Furthermore, patients may receive implicit or explicit messages that their symptoms are "all in my head", which can disrupt the patient-clinician relationship so crucial to managing SSD [2].

Patients with SSD tend to present to medical rather than mental healthcare settings. Primary care providers (PCPs) are at the frontline of the assessment and management of SSD. Barriers to collaboration between PCPs and mental health clinicians, as well as inadequate training in SSD, often results in poor recognition, and missed opportunities for early intervention and standardization of care, and at times unnecessary invasive interventions [3•, 7•, 10, 14]. Often it is only after repeated emergency room visits, hospitalizations, consultations, and investigations that SSD is considered [3•, 7•].

Currently, there is a significant mismatch between patient needs and the systems of care servicing patients with SSD [2]. PCPs and mental health clinicians are frequently frustrated due to a lack of knowledge and skills to address SSD [9, 10, 15]. Providers can become dismissive, avoidant, or anxious about "missing something" or alienating the patient and family. This can foster the unintended perception of the patient or family as being "needy" and "not really sick" [2, 7•, 10, 14, 15–17]. Without a clear roadmap for evaluation and management, conflict occurs with either care strategies that may perpetuate the cycle of disability, mistrust, frustration, and somatization or the dissolution of the therapeutic relationship [2].

## Risk Factors

Youth with SSD have been shown to have a variety of biopsychosocial risk factors that are key for successful identification, evaluation, and management. Below we review several risk factors that are important in the assessment and care of youth with SSD.

**Table 1** DSM 5 Diagnostic Criteria [12]

| Somatic symptom disorders and related disorders |
|---|
| 1)Somatic symptom disorder |
| i)One or more somatic symptoms |
| ii)Excessive thoughts, feelings, or behaviors related to the somatic symptoms or other associated symptoms such as excessive thoughts regarding the seriousness of symptoms, anxiety about the symptoms, or excess time and energy devoted toward the symptoms |
| iii)The patient is persistently symptomatic, and the somatic symptoms may change over time (typical duration of 6 months) |
| iv)Specifiers: with predominant pain, persistent, mild, moderate, severe |
| 2)Illness anxiety disorder |
| a)Preoccupation with having or acquiring illness |
| b)Somatic symptoms are either mild or not present |
| i)If a medical condition is present or there is a high risk of a medical condition, the preoccupation is excessive and disproportionate to the risk of illness |
| ii)High level of anxiety about health |
| iii)Performs excessive health-related behaviors or maladaptive avoidance |
| iv)Preoccupation with illness lasting at least 6 months, although the specific illness that is feared may change over that time |
| v)Specifiers: care-seeking type, care-avoidant type |
| 3)Functional neurologic symptom disorder (conversion disorder) |
| a)At least one symptom of altered voluntary motor or sensory function |
| b)Clinical findings are incompatible with patient clinical presentation |
| c)Specifiers: with weakness/paralysis, with abnormal movement, with swallowing symptoms, with speech symptom, with attacks/seizures, with anesthesia/sensory loss, with special sensory symptom, with mixed symptom, acute episode (<6 months), persistent (>6 months), with psychological stressor, without psychological stressor |
| 4)Psychological factors affecting general medical condition |
| a)Presence of medical condition |
| b)Psychological or behavioral factors adversely affect the medical condition by potentially (1) interfering with treatment, (2) increasing health risk, (3) influencing underlying pathophysiology, and/or (4) close temporal association between these factors and exacerbation of illness |
| c)Specifiers: mild, moderate, severe, extreme |
| 5)Factitious disorder |
| a)Falsification of physical or psychological signs or symptoms associated with identified deception |
| b)Presents self to others as ill |
| c)Deceptive behavior can be present without identified external gains |
| d)Specifiers: single episode, recurrent episode, imposed on self, or imposed on other |
| Shared features: |
| •Not better explained by another mental disorder or physical health condition |
| •Symptoms cause significant impairment and/or distress |

## Childhood Temperament and Coping Style

There is evidence suggesting that a child's temperament in the first year of life predicts somatization later in life [20]. Coping behaviors affect emotional regulation and adjustment to stress. Children with heightened somatic complaints use fewer and lesser effective coping strategies [6, 10]. Youth with SSD have been described as insecure, internalizing, perfectionistic, and conscientious [1, 6, 10]. Patients with an internalizing coping styles struggle with expressing emotion and often channel their emotional distress through physical symptoms. [7•] This can occur either due to an acute event or stressor or a learned pattern of coping with chronic stress or life events. Patients often avoid negative effect due to internal discomfort or other familial, cultural, or societal pressures to dampen expression of negative effect [21].

Children who are high achieving or have perfectionistic traits may find subconscious relief from assuming the "sick" role [21]. In this way, the patient may be able to receive respite from the high demands of the home and academics without resulting in distressing effect, behavioral disturbance, or conflict [21]. Other patients may exhibit a shy temperament, pessimistic worry, or passive/avoidant coping style with increased risk of developing SSD and associated disability [14, 22].

## Sex and Age

Younger children and females tend to be at higher risk for somatization [2, 7•]. Rates are equal between genders until puberty, when girls appear to have increased rates of somatization [23, 24]. Girls may be at higher risk due to more internalizing or ruminative coping styles compared with boys, who tend to utilize more externalizing behaviors [25]. There is little existing data on the role of sexuality on SSD, and this is an area of needed future research.

## Cognitive and Learning Difficulties

Children who lack the intellectual ability, social capacity, or emotional language to process severe or ongoing stress are at increased risk of SSD. Cognitive impairments and low academic performance are associated with a higher predisposition for SSD in adolescents, particularly in those who perceive high parental expectations [26]. Recent studies suggest that youth with functional neurological disorders scored lower on full scale IQ, vocabulary, and mathematics testing and had more learning difficulties compared with their siblings [27, 28]. They also performed poorly on attention, executive function, and memory domains than healthy controls [27, 28].

## Childhood Physical Illness

A child's past history of physical illness and treatment, together with current, fearful misinterpretation of physical sensations are related to an increased risk of developing SSD [14]. An illness trigger may set off a cascade of symptoms and lead to prolonged recovery or symptom recurrence after illness resolves. This may be partly due to a conditioned physiologic response to past physical disease. Parental catastrophizing and/or overprotection in response to a child's physical symptoms can reinforce somatization and perpetuate

SSD [3•, 29, 30]. Past healthcare use is also a strong predictor of future healthcare use due to SSD, including utilization related to other non-SSD-related physical conditions [3•]. As the number and severity of somatic symptoms increase, the likelihood of developing SSD, seeking care, being hospitalized, and having persistent symptoms also increases [3•].

### Family Medical and Psychiatric History

Higher rates of physical disease have been demonstrated in the families of children with SSD [31]. In particular, children who are living with a mother with chronic illness or functional symptoms are at greater risk of developing SSD [32]. This can be partly due to genetic predisposition [32]. In addition, social learning theories propose that vulnerable youth may respond to a family model of illness, particularly in the context of certain family health beliefs and practices, familial coping styles, difficulty managing symptoms, and/or sick role behaviors [30].

Studies also show familial links between SSD and familial psychopathology. Specifically, rates of anxiety and depression are higher in family members of youth with SSD [31]. Parental substance use disorders have been identified as a predictor of somatization in their offspring, with SSD clustering in families with alcoholism [33, 34].

### Childhood Psychiatric Disorders

Emotions such as worry, sadness, or fear can significantly influence the processing of physical symptoms and contribute to the development of SSD. Studies comparing youth with SSD to healthy controls demonstrated significantly higher rates of anxiety and depressive disorders in youth with SSD [7•, 24, 35, 36]. Growing literature suggests that this is not solely a consequence of having SSD, but that the relationship is bidirectional.

### Other Biological Factors

Biological vulnerabilities described in patients with SSD include an overactive sympathetic nervous system, hypersensitivity to pain, abnormal modulation of sensory transmissions, altered cortical perceptions, smaller amygdala volumes, and white matter deficiencies [4, 37]. Impairments in brain structures involved in pain registration, perception, and modulation, such as the cingulum, have been demonstrated [4, 38]. Individuals who exhibit hypersensitivity to sensory stimuli are more likely to exhibit somatization,and show increased activation of the prefrontal, anterior cingulate gyrus, insula, and somatosensory cortices [39]. Additionally, reduced glycemic metabolism in the basal ganglia has been associated with severe somatization [40]. Our emerging understanding of the neurobiology of SSD shows that certain patients are more susceptible to somatization and that somatization may influence neurobiology in tangible ways. For example, patients with underlying anxiety, chronic stress, or trauma may be biologically primed to be hypersensitive to somatic stimuli related to the physiologic response to stressors. This primed or conditioned response may then strengthen these underlying neurophysiologic processes that result in somatization.

### Life Adversities

Environmental factors play a significant role in the development of pediatric SSD. Negative life events have been shown to predict SSD in older adolescents [41]. Youth with somatization report significantly more life adversities than their siblings [30]. Common school stressors include beginning of the school year, transitioning to a new grade, and declining grades [42]. High familial expectations and its effects on patient perceptions of academic, athletic, and extracurricular performance can significantly impact vulnerability to somatization [7•]. Bullying has been identified as a major risk factor for the development of SSD in youth [42, 43]. In the home setting, experiences can include frequent family conflicts, family enmeshment, and major life events such as loss or parental divorce. Children are highly attuned to the physical and emotional well being of those close to them, and the emotional distress of a family member can contribute to the somatization.

Childhood trauma (e.g., sexual abuse, physical abuse, emotional abuse, neglect) has long been considered important in the development of SSD. In addition to interpersonal trauma, other environmental events like earthquakes and terrorist attacks have been associated with an increased somatization in youth [44, 45]. Compared to the adult literature, however, trauma is not as frequently endorsed in pediatric SSD [1]. Rates of traumatic experiences in youth with SSD are nearly 30% and similar to the general population [1]. Nevertheless, when trauma is present in pediatric patients with SSD it significantly modulates the patient's clinical course with poorer outcomes. Specifically, youth with trauma and SSD tend to have more psychiatric comorbidity, more extensive psychiatric treatment history, greater familial mental health history, and increased familial conflict [1]. Youth with trauma and SSD who are medically hospitalized due to their symptoms have higher rates of inpatient psychiatric hospitalization following medical discharge, at times at a rate of three times higher than SSD patients without a trauma history [1] Several considerations may influence the greater impairment seen in pediatric patients with SSD and trauma. Trauma induces a state of hyperarousal and heightened awareness of bodily function, which can result in dissociation [46]. Dissociation results in poor insight into physical experiences making it more challenging to engage patients in their treatment [1, 5]. Trauma can fracture development of trusting attachments resulting in increased healthcare seeking behavior [47]. Trauma impacts the hypothalamic-pituitary-adrenal axis, neuronal circuits, and hemodynamics in response to stress, making the patient more vulnerable to future stressors [46]. Repeated trauma reinforces this conditioned response, making the response (i.e., somatization) more severe and entrenched. Therefore, given the impact of trauma in patients with SSD, it is important to routinely screen for trauma as part of the assessment of these patients and, if it exists, address it through evidence-based treatment methods to reduce the effect trauma may have on the patient's SSD course.

## Evaluation

The evaluation of SSD requires a comprehensive, multidisciplinary approach with close monitoring of symptom evolution and engagement of the patient's family, school, and PCP [2, 7•] (Fig. 1). Evaluation involves close assessment of pathophysiology and biological factors, including exclusion of organic disease based on judicious diagnostic evaluation. It also involves assessment of psychiatric, psychological, social, environmental, and familial factors that may predispose, precipitate, or perpetuate a given patient's presentation.

### Medical Evaluation

With SSD physical symptoms and the degree of functional impairment are inconsistent with the historical presentation, physical examination, and diagnostic testing. While SSD is not a diagnosis of exclusion, the evaluation of the patient's physical health must be thorough to rule out both serious and benign factors that may be contributing to the patient's somatic symptoms. [7•, 36] Having a coexisting physical health condition in addition to underlying SSD is common and can make the evaluation process both challenging and nuanced [7•]. A balance must exist between providing needed diagnostic evaluation, while being cautious to not cause undue harm by conducting unnecessary or invasive evaluation. Evaluation should be guided by careful historical information, including collateral information from school, family, and other settings. The PCP should be vigilant of how the patient and family's perceptions of the physical symptoms impact decision-making and avoid being overly influenced by this during the evaluation process. It is important that a broad diagnostic assessment be considered, while attempting to limit reinforcement of further patient disability or familial anxieties.

### Psychosocial Evaluation

As part of the evaluation, there should be an ongoing simultaneous assessment of psychosocial factors influencing or exacerbating the patient's presentation. This includes a thorough assessment of patient and family perception of illness, level of disability, past psychiatric history, past history of physical illness, family history, developmental history, and psychosocial history [7•]. Particular attention should be paid to individual and family characteristics that could influence symptom presentation, as well as reviewing examples of how the patient and family typically cope with strong emotion or stress [7•, 14, 36]. During this process, it is important to also highlight patient and family strengths, past successes, resiliency, and areas of functionality [7•].

Early mental health consultation should be sought and conducted concurrently with ongoing medical evaluation [48]. Early mental health consultation is important for multiple reasons. Firstly, it normalizes the psychological and social factors influencing somatization. Secondly, it identifies the mental health clinician as part of a multidisciplinary team and reduces the perception that the primary medical team is "handing off" the patient to mental health [7•, 48]. Thirdly, it allows ample time for engagement and enhanced communication with the patient and family. Mental health clinicians can begin early psychoeducation and psychotherapeutic intervention to reduce symptom severity until diagnostic evaluation is complete. Mental health consultants can also address comorbid psychopathology, patient coping, and familial factors impacting care. Mental health consultation can result in significant reductions in hospital length of stay and cost. [49] Despite early involvement of mental health services, repeat consultation is common in a small proportion of patients [7•].

## Screening

There is no universally utilized screening tool for pediatric SSD. However, several validated rating scales exist (Table 2). Subscales of widely used comprehensive screening tools, such as the Somatic Complaint Subscale of the Child Behavior Checklist and the Somatisation Subscale of the Survey Diagnostic Instrument, can be used to screen youth for risk of SSD [3•]. Several standardized interviews also exist including the Munich Composite International Diagnostic Interview (M-CIDI), the Child and Adolescent Psychiatry Assessment (CAPA), and the Soma Assessment Interview (SAI) [50]. Poor correlation sometimes exists between parental and youth reports of somatic symptoms when assessing SSD [6]. Therefore, it is critical to obtain patient, family, and other collateral assessments of symptom presentation and severity to gain a fuller picture of the patient's symptomatology [42]. Clinicians can also use screening tools for mood disorders, anxiety disorders, behavioral difficulties, or broader assessments of emotional and behavioral disturbance.

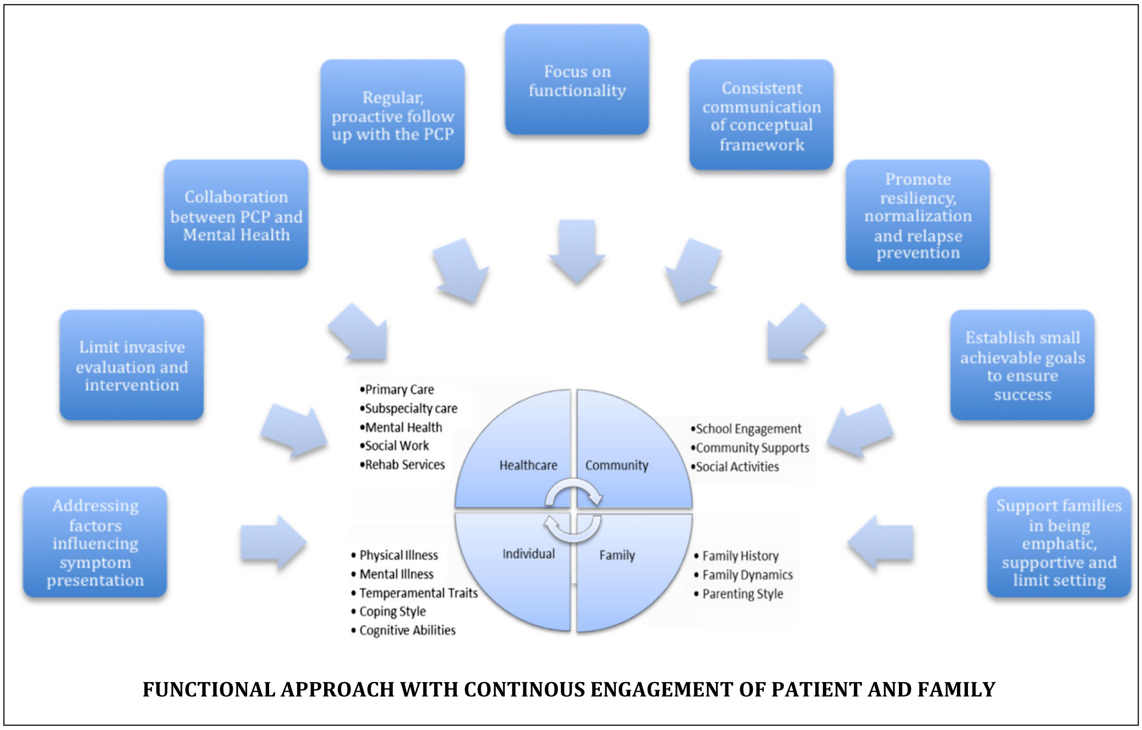

**Fig. 1** Framework for Approaching Pediatric Somatic Symptom Disorder

## Patient and Family Engagement

Throughout the process of evaluation and subsequent management, communication is critical. Close communication should occur between all members of the care team to provide consistent messaging and emphasize the multifactorial nature of SSD [7•]. Engaging patients and their families throughout the evaluation process aids in validating emotions, addressing concerns, and balancing ongoing evaluation with communication that reinforces improved functionality.

Physicians may find themselves easily frustrated in communicating with patients and families during the evaluation process. Patients and families are quick to detect providers' unease and less likely to accept a diagnosis and treatment recommendations [51•]. Physicians may be tempted to focus on the exclusionary diagnoses, negative diagnostic tests, and what is *not* causing the symptoms. Physicians may state "we don't know what is causing this" to avoid attempts to describe the complex physiological and psychological processes at play. However, this approach tends to increase family anxiety and sends a message that additional diagnostic searching is needed [52]. Physicians may also oversimplify the explanation of symptoms and make direct statements of psychological causality. Making a direct link between physical symptoms and psychological causes is not readily acceptable to many patients [52]. Utilizing empathic statements, explicitly acknowledging the difficulty of having a sick loved one, legitimizing patients' suffering, avoiding blame, promoting enhanced patient functionality, and empathizing with the family's efforts to seek treatment for their child can be instrumental in facilitating family satisfaction and receptiveness to the biopsychosocial formulation [53]. Staying focused on the body and the symptoms themselves throughout the process can help align communications with where the patient and family are at in their understanding [27].

Once the diagnostic evaluation is complete, findings should be presented as a multidisciplinary team. The PCP, school, close family members, and other important figures in the patient's life may be invited to participate in a multidisciplinary care meeting to discuss the findings of the evaluation. The diagnosis should be clearly communicated in a non-judgmental fashion with an explanatory model describing how the patient's symptoms evolved. The use of simple analogies, visual diagrams, written materials, and concrete examples can be effective in delivering this message. At times, the patient and family may have very strong emotions about the diagnostic findings and may assume an incomplete evaluation has been conducted. Presenting a conceptual framework for how the symptoms emerged is helpful in strengthening patient and family understanding.

**Table 2** Commonly Used Assessment Tools for Pediatric SSD

| Assessment tool | Age | Items | Child form? | Parent form? | Multiple languages? | Description |
|---|---|---|---|---|---|---|
| Children's Somatization Inventory (CSI) [24] | 8+ | 24 or 35 | Yes | Yes | Yes | Identifies common somatic complaints in the past 2 weeks that occur without clear underlying physical disease. Used in multiple settings and adapted in multiple countries. |
| Somatic Checklist-90 (SCL-90) [58] | 13 | 90 | Yes | No | Yes | Broad evaluation of somatic symptoms across nine primary symptom dimensions and three global scores for distress. Items are rated on a 5-point Likert scale, and the tool also has a specific somatization subscale. |
| Childhood Illness Attitude Scales (CIAS) [59] | 8+ | 35 | Yes | No | No | Reviews fears, beliefs, and attitudes regarding physical symptoms, and the caregiver's role in addressing these physical symptoms. Each item is rated along a 3-point Likert scale. |
| Children's Psychosomatic Symptom Checklist (C-PSC) [60] | 11+ | 12 | Yes | Yes | No | Psychosocial screening tool that evaluates patients along 12 symptoms with each item being rated on a 0–4 Likert scale on both frequency and severity. This tool was modified from the Adult Psychosomatic Symptom Checklist. |
| Somatic Symptom Checklist (SSC) [61] | 11+ | 31 | Yes | No | No | Based on DSM criteria, this tool identifies symptoms on a 2-point Likert scale and evaluates the lifetime prevalence of somatic symptoms rather than acute symptom presentation. |
| Somatic Complaint List (SCL) [62] | 8+ | 11 | Yes | Yes | Yes | Explores the frequency of somatic symptoms in the past month on a 5-point Likert scale from "never" (1) to "quite often" (5). |
| Functional Disability Inventory (FDI) [11, 63, 64] | 8+ | 15 | Yes | No | Yes | Often used in pain disorder assessment, monitoring outcomes, or as an adjunctive tool with other somatization screens, such as the CSI. This tool evaluates the presence and severity of functional disability on a 5-point Likert scale over the past 2 weeks. The scale ranges from "no trouble" (0) to "impossible" (4). Scores range from 0 to 60 and are divided into minimal, mild, moderate, and severe categories of functional disability. |

## Management

Family and patient engagement is crucial to the successful management of pediatric SSD. Treatment begins with the initial assessment, emphasizing the importance of creating an alliance with patient and family. Treatment is centered on shifting patient and family's mindset from searching for the cause of symptoms to focusing on overall functioning. When families and patients understand their diagnosis and are engaged with their physician, they have an easier time making this shift.

### Psychotherapy

Cognitive behavioral therapy (CBT) is the hallmark of treatment for SSD. Current evidence regarding somatization, functional disorders, and pain disorders suggests CBT is effective with moderate effect sizes [10, 54, 55]. CBT can provide active coping strategies while working with thoughts and feelings directly related to the illness experience. Behavioral approaches often included in CBT, such as biofeedback, hypnosis, and relaxation, are effective in reducing somatization [14, 54]. Behavioral interventions can help reinforce health-focused behaviors instead of the sick role. The treatment team works with patients and their families to minimize secondary gains from illness behaviors [2, 14]. CBT with pediatric SSD is most effective if parents are also involved [54]. Although other therapeutic interventions have not been as systematically studied, multiple case examples suggest the value of psychodynamic psychotherapy in understanding the intrapsychic and systemic functions of somatic symptoms. [54] Family therapy has been shown to provide improvements in somatization with a higher rate of symptom elimination, lower levels of relapse, and overall improved functioning [2, 14]. Rehabilitative therapies, such as physical therapy, also play a valuable role in restoring functioning and addressing deconditioning.

### Role of PCP

The PCP plays a crucial role in ongoing recovery. Families need continued education and reassurance. Scheduled and frequent follow-up visits with a PCP are important to maintain alliance and investment in treatment, address fears of abandonment, and prevent "doctor shopping" and "over medicalization". These frequent visits can include ongoing exams to address new symptoms, continued empathetic support, addressing factors perpetuating symptoms, follow-up on functional progress, and continuing avoidance of any unnecessary testing or subspecialty referral [53].

### Collaboration Between Mental Health and Primary Care

Early, frequent, and close communication between the patient's PCP, subspecialty providers, and mental health providers is necessary to provide consistent communication and care. This partnership allows for key exchange of information regarding prior assessment and treatment experience, so as to obviate unneeded evaluation and treatment, as well as to ensure patient and families are "heard" by their providers [56]. Collaboration reduces stigma regarding engagement in mental health services and keeps each member of the care team alert for unrecognized physical, social, or psychological factors impacting care [56]. Mental health providers can assist primary care and subspecialty providers in framing their message to families. A psychiatric consultation letter to the primary care physician containing strategies for managing somatization can significantly improve patient outcomes and primary care-patient relationship [55]. Along the way, functional outcomes can be monitored and shared across disciplines.

### Role of School

Many patients miss school because of SSD, and symptoms may be reinforced by school avoidance. Therefore, having a clear functional plan to return to school is important. Strong channels of communication are needed between clinicians and schools with concrete guidance on how to manage symptoms in the school setting [2]. Patients may need additional accommodations to be successful at school and a plan for gradual reintegration to return. Every attempt should be made to partner with schools to facilitate continued involvement in school with limited disruptions and avoidance of resorting to homebound or online schooling that can perpetuate symptom manifestation.

### Medications

There is a very limited role for psychopharmacology in the direct management of SSD. A systematic Cochrane review in adults found a lack of data supporting the use of any pharmacologic agent specifically for SSD [57]. No such review exists in pediatrics. However, the management of comorbid depression, anxiety, or other associated psychopathology using psychotropic medications can be helpful as adjunctive treatment in the overall management of SSD [57].

### Higher Levels of Care

Children with more profound and pervasive functional impairment may need more intensive treatment. Studies looking at various tertiary multidisciplinary approaches, either with admission to medical-psychiatric units, physical rehabilitation units, or structured day treatment programs, have generally shown symptom reduction, improved quality of life, and decreased healthcare utilization [2, 5].

## Future Directions

Although there has been tremendous growth in clinical interest and research in pediatric SSD over the past 5 years, there is still much that needs to be explored going forward. Greater exploration of the epidemiology of SSD is needed. Given the prevalence of somatization, its varied presentations, and its presentation along a spectrum from normal to pathologic, it is challenging to obtain accurate estimates of the true prevalence of SSD, and further work is needed to elucidate the true extent of SSD in inpatient and outpatient settings. It is unclear to what extent race, sexual orientation, ethnicity, cultural background, and religion may impact manifestations of pediatric SSD. Specific populations, such as youth with developmental delay or intellectual disability, warrant further attention to identify the unique experiences and challenges that exist in identifying and managing SSD in these populations. Greater understanding of the neuroanatomic and neurophysiologic underpinnings of SSD to better identify at-risk populations, enhance diagnostic evaluation, and potentially provide further therapeutic tools to address SSD. Although many screening tools exist, there is a lack of standardized screening in SSD. Furthermore, there is a lack of primary and secondary preventative resources to address high-risk populations to stem progression of somatization and emergence of SSD. Education is lacking among primary care clinicians and mental health professionals. Innovative approaches to education are needed to heighten awareness, enhance collaboration, and increase self-efficacy among clinicians at the front lines of addressing SSD. This includes exploring telemedicine and interactive web-based resources as modalities of disseminating education, outreach, and potentially psychotherapeutic intervention. The mainstay of treatment is psychotherapy and more study is needed to continue to explore the necessary ingredients of successful psychotherapy and enhance existing psychotherapeutic techniques.

## Conclusion

Pediatric SSD is common and places a significant burden on healthcare utilization. Primary care is at the forefront of assessing and managing youth with SSD. There is little standardization or training in practice to address the prevention, communication strategies, evaluation, and management of SSD. Patients and families are often frustrated with inconsistencies in care, lack of an understandable conceptual framework for symptom presentation, feelings of marginalization, and concerns about serious missed pathology. Providers are similarly frustrated by the lack of a consistent assessment and management strategy, unclear etiologic understanding, communication breakdowns, and negative perceptions of patients and families. As a result, there are multiple missed opportunities for partnership between PCPs, patients, families, mental health clinicians, and community supports to address SSD.

A growing literature base exists for the evaluation and management of pediatric SSD. Current data supports enhanced training for PCPs and mental health providers, proactive assessment of both physical and psychological etiologies for SSD, a multidisciplinary approach with early mental health involvement, and a communication strategy that stresses the multifactorial nature of SSD. Treatment should include a focus on enhancing functionality, addressing factors sustaining disability, and collaboration with community supports with the overarching goal of rehabilitation of the physiologic and psychological factors influencing symptom presentation. As this approach continues to gain a greater foundation and adoption into pediatric care settings, the elusive, perplexing, and often frustrating place that SSD holds in pediatric medicine can be ameliorated resulting in improved patient outcomes and greater patient, family, and clinician satisfaction.

Key Clinical Perspectives

- Somatization is common and normative in the pediatric population, but can become a disorder when symptoms are impairing and persistent.
- Currently, SSDs are poorly recognized and frequently mismanaged. This results in disproportionate healthcare utilization, increased risk of unnecessary invasive evaluation and intervention, as well as patient, family, and clinician dissatisfaction.
- There are multiple biological, interpersonal, familial, and environmental risk factors for SSD.
- Multiple risk factors do not necessarily equate to a diagnosis of SSD, but should increase suspicion for SSD and be accounted for in the management of SSD.
- Trauma is not a pre-requisite for SSD and is less frequently associated with pediatric SSD compared to adults. However, it significantly modulates the SSD experience when present and can be a target for intervention.
- Early detection, collaborative communication, and an integrated multidisciplinary approach are important to promoting enhanced patient functionality.
- Diagnostic evaluation should involve a multidisciplinary approach with early and close collaboration with mental health providers.
- Evaluation should include a thorough work up of physical health causes appropriate for the presenting complaints, while avoiding invasive diagnostic testing or intervention.
- Close assessment of psychosocial factors including individual, familial, school, and environmental factors is important to reaching a biopsychosocial formulation of the patient's presentation.
- Communication of the diagnostic evaluation should be completed in a multidisciplinary fashion with involvement of the primary care provider, while providing the patient and family with a conceptual framework to understand symptom presentation.
- Management requires a proactive, multidisciplinary approach focused on improving function.
- Close collaboration between mental health clinicians, primary care providers, schools, and families is a requisite component of comprehensive management of SSD.
- Therapy, especially cognitive behavioral therapy, is the hallmark of treatment for SSD.

Targeted and conservative pharmacologic management can be helpful in some cases, yet there is little evidence for the role of psychotropics in SSD.

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**Compliance with Ethical Standards**

**Conflict of Interest** Nasuh Malas, Roberto Ortiz-Aguayo, Lisa Giles, and Patricia Ibeziako declare that they have no conflict of interest.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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