

Exercise-Induced Laryngeal Obstruction and Performance Psychology

Using the Mind as a Diagnostic and Therapeutic Target



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KEYWORDS

- Exercise-induced laryngeal obstruction • Performance psychology • Therapy
- Vocal cord dysfunction • Paradoxical vocal fold motion

KEY POINTS

- Recent literature suggests that patients with exercise-induced laryngeal obstruction do not exhibit the mental health patterns described in seminal literature on inducible laryngeal obstruction, but rather are mentally healthy.
- With the performance psychologist or mental skills coach, it is reasonable to assess and restructure patient belief systems and thought patterns regarding the relationship between exercise and episodes of respiratory distress.
- Moving forward, there is adequate rationale to study the use of performance psychology as an adjunctive therapy for patients with exercise-induced laryngeal obstruction.

INTRODUCTION

Exercise-induced laryngeal obstruction (EILO), previously known as vocal cord dysfunction and paradoxical vocal fold motion, is a condition that causes severe shortness of breath during exercise in patients across a spectrum of athletic levels.^{1,2} The mechanism of disease remains enigmatic, although several investigators have postulated a variety of contributing factors, including anatomic factors (airway size and pliability), upper airway reactivity, extrinsic factors (including postnasal drip and gastroesophageal reflux), and behavioral health factors (such as a stress-prone personality, perfectionistic tendencies, attributional style, and impaired self-efficacy).^{3–9}

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Since the early reports of this condition, clinicians and researchers have documented an observation that behavioral health factors are associated with the pathogenesis of disease.¹⁰ Later reports of cohorts strongly emphasized this possibility although with rare exception,^{11,12} research in the 1990s and 2000s did not routinely stratify patients based on isolation of symptoms to exercise grouping of patients with EILO and inducible laryngeal obstruction (ILO), also known as vocal cord dysfunction, caused by a variety of triggers.^{4,5,13,14} This lack of stratification may be important, because it is possible that the behavioral health features of patients with symptoms limited to exercise differ from those who experience symptoms in response to irritants or overt situational stresses.^{15–18} At the current time, there is no published spectrum of psychiatric and psychological disease, personality disorders, or dysfunctional traits and coping mechanisms in patients with isolated EILO.

Despite the lack of prospective behavioral health assessments that are isolated to patients with EILO, this review aims to achieve a few specific goals. First, we summarize some of the literature that characterizes the behavioral health features of the prototypical patient with EILO, drawing comparisons with the general ILO patient. This discussion will include some of the chronic features of personality documented in the literature as well as descriptions of thoughts verbalized by patients struggling with symptoms. Second, we discuss some of the available assessment tools that can quantify some of the features noted. Finally, we discuss in detail some therapeutic approaches from the perspective of the performance psychology. We will use a few cases to demonstrate key concepts.

CASE 1

A 15-year-old female competitive swimmer presented with several months of exertional dyspnea in the context of asthma. Evaluation before specialty care included spirometry with mild obstruction and a positive response to bronchodilators, as well as a normal computed tomography scan of the sinuses. Therapeutic trials before specialty care included daily fluticasone 100 µg/salmeterol 50 µg, which was escalated to fluticasone 250 µg/salmeterol 50 µg as well as montelukast 10 mg/d, nasal steroids, and oral antihistamines. She was then evaluated by an allergist, who optimized nasal care (with nasal saline washes and improved in nasal steroid technique) and transitioned combination controller therapy to a metered dose inhaler formulation with spacer (of comparable dosage). She was later referred to our exertional dyspnea program for an incomplete response of exertional dyspnea to therapy, described by the patient as “a block near the top of my lungs.” Symptoms only occurred during high-intensity swimming and were not clearly associated with audible stridor, although the patient noted that she was unable to assess her breathing while underwater. Initially, the dyspnea was quite frightening for the patient, although this response had improved somewhat. There was associated cough during and after exercise. There was no associated chest pain, pallor, cyanosis, presyncope, or syncope. Events generally occurred after 7 minutes of intense exercise and returned to baseline after about 10 minutes.

Physical examination was normal. Spirometry demonstrated mildly obstructed airflow (forced expiratory volume in 1 second [FEV₁]/forced vital capacity of 0.78) with an 8% improvement in FEV₁ in response to bronchodilator. Continuous laryngoscopy during exercise testing demonstrated excellent fitness (peak oxygen consumption of 51 mL/kg/min at our altitude of 1600 m above sea level), no desaturation, no postexertional bronchoconstriction (7% increase), and mild inspiratory glottic adduction associated with a faint audible stridor and inspiratory blunting of exercise flow volume loops.

Based on the constellation of findings, she was diagnosed with EILO in addition to her asthma and referred to a speech-language pathologist. Given an incomplete response to therapy to basic respiratory retraining, she performed 2 sessions of therapeutic laryngoscopy during exercise, which greatly improved her symptoms over a few weeks. However, several weeks after this improvement, the patient, the patient's mother, and the patient's swimming coach all noted a trend in which the patient seemed to struggle mainly during high-stakes competitions, remaining relatively symptom free during training and other competitions. For this reason, she was referred to a mental skills coach.

CASE 2

A 17-year-old male competitive swimmer was referred to our exertional dyspnea program for clinical suspicion of EILO despite a negative preexercise and postexercise laryngoscopy. He described the symptom of interest as a complete inability to inhale, primarily during races, but did not note audible stridor. Symptoms often occurred in less than 1 minute and almost immediately resolved upon exercise cessation. Previous asthma therapy was ineffective in terms of the symptom of interest.

The patient's physical examination was normal. Spirometry demonstrated mildly obstructed airflow (FEV₁/forced vital capacity of 0.74) with FEV₁ improvement of 8% with albuterol. A methacholine challenge was negative. Continuous laryngoscopy during exercise demonstrated normal fitness (peak oxygen consumption of 42 mL/kg/min), no desaturation or airflow decrease after exercise, and mild inspiratory glottic adduction with moderate inspiratory arytenoid prolapse and inspiratory blunting of exercise flow volume loops at peak work capacity. In addition to respiratory retraining directed by a speech-language pathologist, the patient performed 2 sessions of therapeutic laryngoscopy during exercise.

This patient also initially improved, but later struggled in a high-stakes competition. During a 100-m butterfly race, the patient experienced dyspnea so profound that he stopped swimming after roughly 60 m (roughly 30 seconds). The results of this event were highly discouraging and carried over to a later inability to complete entire practices. After discussions of pre-race anxiety, the patient was referred to a mental skills coach.

BEHAVIORAL HEALTH DOMAINS AND EXERCISE-INDUCED LARYNGEAL OBSTRUCTION

Examining the interactions between behavioral health and EILO, and recognizing that the identification of potential problems may lead to differential therapeutic approaches across domain, we consider different domains of behavioral health. Specifically, we briefly reflect on the literature devoted to psychopathology (defined as the study of mental disorders), personality types (defined as a group of personality traits that exist together), and belief systems and attributional styles (defined as the manner in which people explain experiences) that may affect the response to stress.

MENTAL HEALTH CONCERNS: DID EARLY LITERATURE MISREPRESENT PATIENTS WITH EXERCISE-INDUCED LARYNGEAL OBSTRUCTION?

A number of mental health disorders have been associated with ILO and this association may be somewhat misleading when considering patients with isolated EILO. Early descriptions of ILO conveyed the impression of a strong perceived link between the condition and psychopathology, as evidenced by names for the condition including Munchausen's stridor, psychogenic stridor, and factitious asthma.^{19–21}

The first retrospective reviews of a large cohort supported this initial impression; Newman and colleagues¹⁷ reported a very high prevalence of mental health diagnoses in an unstratified ILO cohort.

More systematic approaches emerged in the decades that followed. In 2008, in a series of 30 patients with unspecified ILO, roughly one-half of the study population were noted via the Hospital Anxiety and Depression scale to demonstrate abnormally high levels of anxiety.⁵ Another cohort of unstratified ILO patients with a notable age skew toward patients in their 50s and 60s, assessed with the Minnesota Multiphasic Personality Inventory-2, demonstrated elevated scores on the hypochondriasis scale, mildly elevated on the depression scale, highly elevated on the hysteria scale, without elevation on the anxiety scale, demonstrating a pattern referred to as the “conversion V” profile.¹³

In contrast, case series and case reports of patients with symptoms isolated to exercise paint a different picture than the initial description of patients struggling with factitious stridor, conversion disorder, sexual abuse, and hypochondriasis. To this day, although large series are not available, characteristic patients described in the literature are noted to be anxious.²² However, Lakin and associates,¹ in what may have been the first description of EILO, acknowledged a contrast between the index patient and those patients with symptoms described outside of exercise previously. Later, a series of adolescent patients with symptoms largely localized to exercise was described in which 55% acknowledged “important social stresses,” although the authors do not note the type or degree of psychological symptomatology present in general ILO reports.²³ Some other series have also reported decreased frequencies of psychiatric illness in athletic populations, without quantifying the frequencies of specific disorders.^{11,12} In a recent review, authors describe a clinical perception that the majority of patients with EILO do not exhibit psychopathology, but rather an appropriate behavioral response to severe respiratory distress.²⁴

Given the stigma associated with some of the mental health conditions associated with general ILO, including malingering, conversion disorder, and a history of sexual abuse, there is value in clearly distinguishing patients with symptoms of isolated EILO as potential behavioral health assessments and therapies could vastly differ across the 2 populations.^{14,16,25–27}

PERSONALITY TYPES

Independent of mental health disorders, it is possible that personality features have a relation to the presence or absence of EILO symptoms or the severity of symptoms when present. True personality disorders are different than other mental health diagnoses in that they represent entrenched behavior patterns, defined during childhood and the adolescent years, that are somewhat less responsive to intervention than other mental health diagnoses.

Multiple authors have noticed personality features that stand out in prototypical patients with EILO, including the type A or hurried (high-stress) personality.²⁸ In one of the initial series devoted to adolescent patients with EILO, Landwehr and colleagues³ discussed a notable trend of patients demonstrating excellent academic performance, despite the fact that the case series was devoted to exercise-induced symptoms, an observation atypical for case series descriptions of most diseases. Common characteristics of patients with type A personalities include time urgency, multitasking, ultracompetitiveness, rapid speech patterns, manipulative control, hyperaggressiveness, and free-floating hostility. There may be relevance in this observation given

the long, documented relationship between behavior traits of the type A personality and the stress response.

In our local experience, another prominent stress-prone personality feature often seen in the EILO athlete population is perfectionism. The prototypical perfectionist strives to avoid failure and please those close to them by imposing unreasonably challenging self-standards.

There has never been a spectrum of personality traits and types published specifically in a population of patients with EILO. However, work in the area may provide therapeutic benefit in terms of identifying modifiable features within patients that have an effect on breathing. It is possible that the true disease mechanism may be related, causally or in association. It is possible that the identification of personality features could help to identify EILO from a diagnostic perspective. It is also possible that treatment could target specific personality features with the global goal of affecting EILO symptoms or that treatment or communication styles could be stratified based on personality features.

BELIEFS, ATTRIBUTIONAL STYLES, AND THE RESPONSE TO STRESS

Beliefs, independent of true psychopathology or personality traits, are important drivers of behavior, and may have relevance to a patient's ability to deal with the situational stress that is present during EILO.²⁴ Especially for otherwise mentally healthy athletes, it may be important to examine how existing beliefs may be shaping coping behavior before and during stressful events. There are a few specific models for thinking about these concepts for all individuals, including athletes.

Clinically, we have noticed multiple instances of disruptive thinking. One type of sentiment that is commonly expressed is a decreased willingness to participate in sport or high-intensity exercise owing to EILO, which is perceived by the patient to be a permanent, unchanging entity. A second type of sentiment that is commonly expressed at our center relates to a belief that EILO is not, and cannot be, independently controllable by a patient.

These specific sentiments are specifically addressed by prominent theoretic work in the field of performance psychology. In 1 model of belief systems relevant to performance psychology, now known as the social cognitive model of achievement motivation, there is a clear distinction drawn between incremental beliefs (which are viewed as malleable or controllable) and entity beliefs (which are viewed as fixed). This model is the theoretic foundation of the growth and fixed mindsets, and is based in the theory that core cognitive processing and situational appraisals lead to the anxiety response.^{29–31} In the context of EILO, a theoretic example of an entity belief is thought such as, "EILO is stopping me from playing, I can't do it." The theoretic example of an incremental belief is, "I have allowed EILO to take over, and can take control back." It is possible that these hypothetical beliefs could be shaped by factors such as delayed time to diagnosis or poor response to the initial asthma or EILO therapy, features that have been noted in the literature for decades.¹⁷ Entity beliefs have been linked to maladaptive cognitive, behavioral, and affective outcomes, such as decreased motivation and withdrawal from tasks. Conversely, incremental beliefs are associated with more positive outcomes, such as greater motivation and task persistence, and lower anxiety.^{32,33}

A second explanatory model deals with the concept of self-efficacy, defined as the set of beliefs in one's capabilities to organize and execute courses of action required to generate desired results.³⁴ Work in self-efficacy was foundational to linking self-beliefs with behavioral responses. It is possible that patients with robust perceptions

of self-efficacy are more resilient to stress, which may have relevance to EILO occurrences and treatment.

There is no specific literature relating these relatively new psychological constructs and EILO, although the assessment and manipulation of these areas may prove fruitful from a diagnostic and therapeutic perspective going forward. A need exists to investigate this area in terms of relevance to future therapeutic approaches.

RELATING COGNITIVE-BEHAVIORAL PHENOMENA TO DISEASE MECHANISM

At the current time, it is very challenging to mechanistically relate cognitive-behavioral observations in a variety of domains in patients with EILO to a final common anatomic pathway of upper airway obstruction that occurs during high-intensity exercise. Clearly, some of the pathologic states, personality traits, and belief systems are associated with increased levels of anxiety and perceived situational stress. In accordance with this assumption that increased anxiety and stress levels are present in prototype patients, and observations that these scenarios have been associated with increased sympathetic activity, it is reasonable to hypothesize that a dysregulated sympathetic response could predispose patients with EILO to events.³⁵ Complicating the study of this area is the cyclical nature of the relationship between respiratory distress, anxiety, and stress responses. Debate remains regarding whether symptoms are a result of behavioral makeup and responses, or if EILO shapes the responses. Clearly, there are a variety of opinions related to causation between these entities.²⁴

ASSESSING BEHAVIORAL MAKEUP AND BELIEFS

The performance psychology assessment of patients with EILO is not standardized across centers nor have anecdotal reports or guidelines been published. Based on the domains of anxiety-based or depressive psychopathology, maladaptive personality traits, and disruptive belief systems and attributional styles, we propose considering the following assessments in conjunction with consultation with performance psychology specialists in select patients. Underscoring any recommendations related to assessment is the concept that metrics should only be used by providers that have knowledge of the specific test properties of the metric.

ASSESSMENT OF DEPRESSION AND ANXIETY

The assessment of depression and anxiety is possible via a number of metrics that have been validated in general populations. The Depression Anxiety Stress Scale 21 is one patient-centered outcome that has been validated and is easy to administrate.³⁶ This metric is considered useful because it may identify individuals who fall short of a clinical diagnosis of anxiety, but who present with a high risk of further problems such as moderate, situational stress.³⁶ Another metric, the Hospital Anxiety and Depression Scale, has been used in the context of patients with ILO.⁵ Advantages of this metric include its ability to assess the existence and symptom severity of anxiety disorders and depression in a variety of populations.³⁷

PERSONALITY ASSESSMENT

A number of metrics that quantify domains of personality type exist as well and are available commercially. The assessment of personality has not been related to treatment outcomes in EILO. We hypothesize that an understanding of patient personality may be helpful in the future for diagnostic reasons (in terms of identifying patients with personality traits that predict a response to therapy) and therapeutic reasons (in terms

of identifying patients with needs for specific communication strategies). Further research is needed to identify personality metrics that could benefit care of patients with EILO.

BELIEF SYSTEMS ASSESSMENT

The assessment of belief systems has also not been tied to treatment outcomes in EILO. We hypothesize that a few basic assessments are important based only on our clinical experience. First, it is important to assess the level of patient understanding regarding the physiologic nature of their EILO diagnosis as well as the degree of patient acceptance of the diagnosis. Additionally, we attempt to assess patient perception of the degree of symptom permanence that exists, as well as the degree of perceived control over symptoms, understanding that perceived consequences of symptoms and thoughts may be linked to perceptions of control over symptoms.³⁸ Finally, there may be value in exploring the degree of motivation that exists within a patient. This can include motivations to continue with sport as well as motivation to participate in respiratory retraining and performance psychology intervention.

PERFORMANCE PSYCHOLOGY INTERVENTION AS A THERAPY FOR EXERCISE-INDUCED LARYNGEAL OBSTRUCTION

There are no guidelines or published studies of performance psychology interventions for patients with EILO. The specific place within the spectrum of treatments has yet to be established. Nonetheless, multiple reviews have concluded that potential therapeutic benefit to psychology intervention in EILO may exist.^{39,40} We present an approach overview that could be considered by performance psychologists, working as part of a multidisciplinary team engaging patients with EILO as a primary complaint (**Box 1**). We strongly endorse the medical treatment of behavioral health diagnoses that are amenable to treatment, including major depressive disorder and generalized anxiety disorder. This is consistent with reports back to the initial descriptions of ILO and EILO.^{15,41} This review will not discuss specific approaches to address specific personality types. This section focuses on modifying stress and beliefs as a therapeutic intervention.

GOAL SETTING

Within the field of performance psychology, it is fairly common to initially devote therapeutic time to goal setting, that is, focusing on both measures of performance and measures of process improvement. Goal setting can include patient-derived metrics of breathing improvement in the context of sport performance and stress responses.

Box 1

Proposed framework for performance psychology interventions in exercise-induced laryngeal obstruction

Goal setting

Baseline relaxation

Visualization

Cognitive restructuring

Journaling

Reframing

Examples of such thinking could include patient self-assessment of thought patterns before competition and during respiratory distress as well as self-assessment of respiratory responses to characteristic stress experienced during training and competition.

BASELINE STRESS REDUCTION

Patients may benefit from the acquisition of teachable skills, designed to lower baseline levels of stress. Diaphragmatic breathing is a simple technique that reduces sympathetic drive.⁴² Although challenging to perform during high-intensity exercise, is important to note that this technique may be most beneficial at rest. It may be used as a precursor to progressive relaxation, defined as a technique that relies on repeatedly contracting and relaxing local and regional muscle groups, which also may contribute to physiologic stress reduction.⁴³

VISUALIZATION AND THE USE OF IMAGERY

Visualization, or mental rehearsal, is an approach that may restructure thoughts that occur acutely and chronically. In this technique, patients can imagine imagery, relating to all senses, of commonly encountered situations. The technique, when focused on specifically troublesome situations, may desensitize patients to stressful stimuli, allowing the body to manage stress more effectively. Patients can visualize somewhat longer periods of time that are characterized by success with respect to EILO symptoms. Patients can also, in a time of rest, visualize specific respiratory maneuvers or thoughts that they choose to use therapeutically to build coordination and execution skills. Patients with EILO, thus, can use imagery to both theoretically prevent an episode and to rehearse skills to help them recover from an episode of respiratory distress. Evidence for the use of visualization and sport dates back to the 1980s, when motor skill rehearsal with imagery was shown to reinforce the neural tracts responsible for motor performance, leading to improved coordination results.⁴⁴ Subsequent studies supported these findings and showed that imagery routines full of details about specific skills and patterns were especially beneficial.^{45–47}

COGNITIVE RESTRUCTURING

There are also approaches to restructuring belief systems and thought patterns.⁴⁸ Cognitive restructuring, defined as a coping technique in which patients are guided to substitute negative, self-defeating thoughts with positive, affirming thoughts has been found to be effective as a stress reduction strategy.^{49–51} In this approach, patients change perceptions of stressors from threatening to nonthreatening. This experience can be extrapolated to the treatment of EILO.

One approach to restructuring thoughts includes rationally analyzing situations that have caused specific problems with respect to EILO and specific thoughts that could be classified as negative self-talk. Journaling about these situations and thoughts is a technique that patients can use to gain insight with goals of modifying situations and ultimately restructuring thoughts into more facilitative beliefs. It is fairly straightforward for patients to reflect on experiences with EILO symptoms and situational variables associated with symptoms. These reflections may include factors that are outside of the control of patients (ambient temperature, competitive opposition) and factors that are under the control of patients (hydration status, precompetition routine). With proper reflection, patients also can write about whether or not thoughts represent past observations or predictions of the future. Similarly, patients can self-assess the

degree of rationality behind a thought, the degree of permanence that is associated with that thought, and the relationship between a thought and reality when viewed from a distance. It is felt that journaling may provide awareness into factors that may be better managed before exercise and provide a therapeutic degree of distance between a specific patient and a specific thought.⁵²

Another approach relates to reframing thoughts is related to perceptions of stress. Evidence suggests that there is variability in the perception of the significance of symptoms related situational stress (with some athletes viewing these symptoms as facilitative and others viewing the symptoms as debilitating) and variability in the ability to cope independently with the symptoms, despite the fact that physical description of the symptoms is comparable across groups.⁴⁵ Although individuals who view symptoms as facilitative tend to also be individuals with adaptive coping mechanisms, individuals who perceive symptoms as debilitating often do not have the mental skills set necessary to independently reframe these symptoms as positive.^{53–55} This finding might suggest that specific individuals could notably be targeted and benefit from external intervention via a performance psychologist to improve adaptive mental skills, including reframing.⁵³

In the specific population of patients with EILO, none of these interventions has been tested. There are very notable barriers to study, including the assessment of intervention delivery and the assessment of patient outcomes. However, given the long history of association between behavioral health phenomena and EILO symptoms and impact, there is adequate rationale to study these and other behavioral health interventions in populations with EILO.

CASE RESOLUTIONS AND REFLECTIONS

The patients described in cases 1 and 2 demonstrated several important concepts at the interface of EILO and performance psychology. First, the patients presented without overt psychopathology. Next, there were initial challenges in terms of establishing acceptance of the diagnosis, despite the incomplete response of symptoms to aggressive asthma therapy, because many of the clinical and physiologic findings were not clearly indicative of EILO, including the patients' inability to detect stridor, the time course of symptoms (in case 1), and mild inspiratory glottic adduction on continuous laryngoscopy during exercise. Finally, although most symptoms resolved in response to behavioral interventions, symptoms isolated to high-stakes competitions persisted.

From a behavioral health and mental skills perspective, patient 1 did not carry formal mental health diagnoses. She was a conscientious student and a very motivated athlete with goals to be a top-ranked swimmer in her state and earn a college scholarship. At baseline, she was extremely frustrated by her breathing symptoms. Before competitions, she struggled with low confidence and notable anxiety, citing her concern for impending EILO symptoms as the source of these feelings. Patient 1 completed a 6-week program to learn, practice, and systematically apply fundamental mental skills, including goal setting, cognitive restructuring, imagery, emotion control strategies, journaling, and accountability tracking (defined as the setting and tracking of preparation goals). The program was designed to help her manage stress-inducing thoughts, behaviors, and emotions before and during strenuous workouts and races. Patient 1 then continued on to an additional 6-week program to fine-tune her skills with coaching support and to practice the skills in a variety of competitive situations ranging from typical team workouts to state-level competition. Patient 1 was highly compliant with her mental skills program, completing nearly 100% of her

assigned tasks throughout the program, and was able to gain a strong sense of confidence and control over her preparation and performance. As her control and confidence grew, EILO symptoms subsided and she was able to consistently perform in practice and competitions to her full potential with no respiratory disruption.

Patient 2 was a diligent high school senior student without a formal mental health diagnosis who had aspirations to win team and individual state championships in swimming. At the time of his presentation for mental skills training, EILO symptoms often prevented completion of practice. At baseline, he was highly frustrated with and discouraged by EILO symptoms, leading to an acknowledgment of a lack of hope for improvement. Before competitions, the patient acknowledged notable anxiety in general, as well as specific concern about EILO episodes. He initially expressed skepticism in the usefulness of mental skills training given an unfruitful prior experience with another provider unfamiliar with EILO. He overcame his skepticism and committed to a 10-week program that was structurally similar in terms of focus and content to the program used by patient 1. Patient 2 was able to find success within a few weeks of applying the mental skills before preseason training sessions and during high-intensity sets. The patient incrementally increased work intensity while maintaining a focus on mental skills as his season started, and noted that he was unable to induce EILO symptoms during training. This progress gave him the confidence to start his season and a sense of control over his symptoms. With use of preworkout, pre-race, and in-race routines, he acknowledged control over his thoughts, behaviors, and emotions in those respective situations. He remained symptom free throughout the season, won a state championship with his team and an individual state championship in the 100-yard backstroke, and committed to swim in college.

These cases demonstrate an observation that patients with EILO can be mentally healthy and yet struggle notably in high-stakes sporting competitions that are increasingly common in some cultures worldwide. Especially for adolescents, it is reasonable to hypothesize that some patients may not have developed the skills to calmly approach competitions, the results of which are linked to important consequences such as college scholarships. Consistent with hypotheses that stress is a factor in EILO and those with stress-prone personality traits may be predisposed to EILO, today's youth sport culture may contribute to the incidence of EILO. In this line of thinking, EILO outcomes for selected individuals may notably improve as a result of partnerships with performance psychologists or mental skills coaches who help these patients to effectively cope with stress they encounter during competition.

SUMMARY

EILO has long been characterized as a condition that is often seen in patients with anxiety-spectrum mental health concerns, type A personality types, and perfectionistic thought patterns. These observations have not been characterized at the level of large populations and the mechanistic significance of these observations is unclear. Several metrics exist for the assessment mental health and personality traits. Negative thought patterns can be assessed through conversational techniques. Moving forward, there is reasonable theoretic and case-based rationale to study performance psychology interventions as a therapeutic modality for EILO.

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