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Educational Neurological Speculation on Neuroplasticity and the Development of Anxiety in High School Students: The Educational Implications of Stressful Life Events for Brain Mechanism Reconstruction

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Abstract

On the basis of the author's in-depth observation of the physical and mental development of adolescents in high school biology teaching practices, the present study integrates the perspective of educational neurology to explore the key role and educational implications of neuroplasticity as the core biological mechanism in the formation and development of anxiety in high school students. This article first elaborates on the particularity of neuroplasticity in adolescence and analyzes the multidimensional manifestation and biological basis of anxiety in high school students. We then focused on typical stressful life events such as academic stress and interpersonal conflicts, we analyze how they induce or exacerbate anxiety by activating the hypothalamic-pituitary-adrenal (HPA) axis, triggering neurotransmitter imbalances, and remodeling plasticity in specific brain regions (e.g., the amygdala, prefrontal cortex, and hippocampus). The core goal of this article is to reveal that the remodeling of the brain mechanism in this process has the characteristics of a “double-edged sword”—it can not only relieve anxiety through adaptive optimization but also form pathological neural circuits to cure anxiety. This study contributes to educational practice, emphasizes an in-depth understanding of neuroplasticity mechanisms, has fundamental guiding significance for the development of neuroscience-based anxiety prevention and intervention strategies (such as cognitive training, stress management, and environment optimization) for high school students and provides some suggestions for the frontline of high school students. Educators and parents provide a scientific guidance framework for action.

Keywords

neuroplasticity, high school student anxiety, stressful life events, neural reorganization, educational neuroscience, HPA axis, prefrontal–amygdala circuit

1. Introduction

In high school biology teaching, when the modules “nervous system”, “endocrine regulation” and “human health” are involved, a prominent phenomenon is that contemporary high school students generally face the burdens of fierce academic competition, complicated social relationships, and high family expectations. The multiple pressures and anxieties posed by students are no longer an exception but rather a group challenge that profoundly affects their learning performance and physical and mental health. This type of anxiety manifests as irritability and low mood, impaired cognitive function (short attention, difficulty in memory), and behavioral problems such as avoidance and compulsion. The biological basis of its dynamic development remains to be investigated urgently.

Neuroplasticity reveals that the brain has the ability to dynamically adjust its structure and function on the basis of experience, learning and environmental stimuli throughout its lifetime. This characteristic is particularly significant in high school students, who are in the critical window of brain development. High school is a critical period for the refinement of the connection between the prefrontal cortex (responsible for executive function and emotion regulation) and the limbic system (such as the amygdala, which is responsible for emotional response), with extremely high neuroplasticity. This means that the stressful life events experienced in this stage not only cause immediate psychological shock but also may have long-term effects on brain neural circuits through neuroplasticity and are closely related to the development of mood disorders such as anxiety.

However, based on the pedagogical field, especially in the light of the unique academic ecology, physical and mental development of high schools, and teaching observations, there is still insufficient research on the pathway of “stressful life events→neuroplasticity changes→reconstruction of brain mechanisms→anxiety symptoms”. The logic of this paper is rooted in pedagogical practice: students' anxiety when learning about neuronal signaling and hormone regulation (e.g., describing physiological responses to test anxiety, discussing cognitive biases in stressful situations) prompts us to ask about their neurobiological mechanisms and to consider how education can utilize neuroplasticity to effectively intervene. This prompts us to ask about the neurobiological mechanisms involved, and to consider how education can utilize neuroplasticity for effective intervention.

Thus, the present study aimed to achieve the following goals: to elucidate the particularity of neuroplasticity in adolescence, to outline the current status and biological correlation of high school students’ anxiety; on the basis of typical stress events in high school (such as high-stakes examinations and peer rejection), to analyze the neuroendocrine pathways (the HPA axis) and synaptic plasticity affect the brain and induce anxiety; to speculate in depth on the dynamics, adaptive and pathological potentials and individual differences in the process of brain mechanism reconstruction; and to reveal the inherent contradiction in exacerbating or alleviating anxiety. Returning to the education-centered approach, we propose feasible education strategies and future research directions on the basis of the neuroplasticity principle. The purpose of this study is to deepen the interdisciplinary theory of neuroscience and pedagogy and to provide a biopsychosocial integration perspective for understanding adolescent anxiety. The thinking process and conclusions directly come from and serve the high school education scenario, providing guidance for educators to integrate neuroscience literacy into the design. The mental health courses, the optimization of the teaching environment, the implementation of individualized support and the guidance of parents in scientific parenting provide a scientific basis and practice path.

2. Neuroplasticity: The Cornerstone of the Brain Development of High School Students and Its Biological Connection with Anxiety

2.1 Neuroplasticity and Special Plasticity of the Adolescent Brain

Far from being a fixed circuit board, our brain is more like a vibrant mass of organisms that are constantly remodeling themselves—this is the charm of neuroplasticity. This means that, under the continuous interweaving influence of innate genes and acquired experience, our brain’s internal structure (such as neurons, the bridge “synapses” that communicate with each other, and the glial cells that provide support) and methods of operation (e.g., the connection mode of neural circuits and the efficiency of information processing) are born with the ability to continuously adjust and adapt. This remodeling force runs through our entire life course, but during adolescence, especially in high school (approximately 14–18 years of age), it will enter a particularly active “explosive stage”, which can even be said to be a momentary stage. The passing of the particularly critical “golden window period”.

The key to understanding this miraculous process lies in "synaptic plasticity". To put it simply, the connection strength between neurons in the brain is not static but will be dynamically adjusted on the basis of our activities and learning experience—some connections will be strengthened owing to frequent use (this is "long-term potentiation" (LTP)), and some connections will be weakened by less use (i.e., "long-term inhibition" LTD). Moreover, the generation of new neurons in the hippocampus (especially the dentate gyrus region), the "insulation layer" (myelinization) involved in nerve fiber outsourcing, which accelerates signal transmission, and the active changes in glial cells constitute a neurological mechanism. The cornerstone of brain plasticity. The delicate balance between the key chemical messengers (neurotransmitters) in the brain, such as serotonin, dopamine, glutamate, and GABA, and the sensitivity of the brain profoundly affects its ultimate plasticity. Whether to develop in a healthier and more efficient direction, or in the opposite direction.

The brains of people in high school are experiencing profound "optimization and upgrading". Neural connections that are seldom used are gradually "pruned", whereas neural pathways that are used frequently are significantly strengthened and wrapped with a thicker and more efficient "insulation layer" (enhanced myelinization). Notably, the prefrontal cortex (PFC), the "command center" responsible for rational thinking, decision planning and self-control, and the amygdala, the "siren" that controls emotional responses, especially fear, and the amygdala, are still undergoing fine run-in and optimization during this period. This still-improving connection is precisely why high school students sometimes have obvious mood swings or are prone to act impulsively—their "rational regulation system" is still being upgraded and debated. At the same time, the core system in the body responsible for the coordination of the stress response (the hypothalamus–pituitary–adrenal axis, i.e., the HPA axis) is also particularly sensitive at this stage.

This special brain state exhibited very distinctive characteristics. On the one hand, the brain has amazing plasticity and learning ability; on the other hand, the neural mechanisms responsible for overall coordination and emotion regulation are not fully mature. This "developmental imbalance" makes the brains of high school students extremely sensitive to the surrounding environment, especially during stressful events. This sensitivity is similar to a "double-edged sword": it gives teenagers a strong biological base to quickly absorb new knowledge and adapt to the new environment, but it also makes them more likely to be troubled by negative emotions such as anxiety when facing challenges. Recognizing this unique "developmental imbalance" in the adolescent brain may help us better understand their seemingly elusive emotional ups and downs and impulsive behaviors (Casey et al., 2008) (Lupien et al., 2009).

2.2 Anxiety of High School Students: Multidimensional Presentation of the Status quo and Its Neuroplastic Basis

The anxiety of high school students is far from simple depression; it is more like a complex "mind-body map" with a clear neurobiological vein behind it. The findings of the teachers in the classroom—the universal and pervasive tension, worry and avoidance behaviors—were highly consistent with the research data, revealing the high incidence of this state and its profound influence on teenagers in multiple aspects.

This type of anxiety leaves its mark at different levels: emotionally, the persistent sense of tension, the irritability at the touch of a button, and the excessive worry about the future often reflect the overactivity of the alarm system deep in the brain (amygdala), whereas the "command center" (prefrontal cortex, PFC), which is responsible for rational analysis and stepping on the brakes, may not be able to do what it wants (LeDoux & Pine, 2016). In terms of thinking, it is like a kite with a broken string that has difficulty concentrating, and it is harder to remember things. It is strenuous, and it is easy to think of things as bad. This is often related to the decreased information processing efficiency of the prefrontal cortex. Moreover, stress hormones such as cortisol released under long-term stress also inhibit the hippocampus, a region critical for learning and memory (McEwen & Morrison, 2013). In terms of action, avoiding difficult situations, making actions that make one feel "safe" but that are actually ineffective, or fidgeting. These behavioral patterns are actually the areas of the brain responsible for motor control (motor cortex) and habit formation (basal ganglia), a chain reaction driven by anxiety; physically, insomnia, headache, stomach upset, palpitation and palpitations. These real feelings are the body's core stress response system (hypothalamic–pituitary–adrenal axis, i.e., HPA axis), which is continuously at "combat readiness" and the direct signal of the loss of balance of the autonomic nervous system (responsible for heartbeat, breathing, etc.).

With respect to the specific environment of the classroom, which factors are most likely to trigger these reactions? Academic challenges (endless exams, pressure of rankings, uncertainty about further education), friction among peers (bullying, isolation), tension with teachers, expectations or pressure from family, and confusion about the future, etc.) are essentially stressors that act on the highly plastic and still developing brain of teenagers, whether it is long-term accumulated chronic stress or sudden acute stimulation. When the teacher explains the "stress response" in class, some students often suddenly realize, "Is not this the feeling of having insomnia all night before the exam? "-this resonance just confirms its universality.

Therefore, an in-depth understanding of the principles of brain plasticity underlying anxiety is critical. This allows us to understand that these bothering symptoms are, to a large extent, an "adaptive reorganization" that the adolescent brain is trying to make in the face of environmental pressure at this special stage of growth. However, sometimes, this reorganization will go astray and become a "maladaptive" state (Davidson & McEwen, 2012). From this perspective, educators have removed the "weak-willed" label of anxiety (destigmatization) and noted a science-based intervention direction. Since the brain is so good at change at this time, creating a supportive environment and providing appropriate guidance and strategies can help it "reshape" it in a healthier and more resilient direction.

3. Stressful Life Events: Catalysts of Neuroplastic Changes and Anxiety Generation

3.1 Spectrum of Typical Stressful Life Events in the High School Environment

Imagine the world in which high school students live—a unique ecosystem consisting of schools, families, peer circles and their own inner world that is constantly exploring. Within this system, there are a variety of unique stressors that act as powerful "external forces" that constantly impact the highly plastic, still-developing brain of the adolescent.

Academic pressure is undoubtedly the most persistent and core force. Students are in it almost every day: high-stakes exams one after another (such as the fate-determining college entrance examination mock exams), the ubiquitous intense ranking competition, the overwhelming course load, and the struggle after failure. A sense of academic frustration and confusion about future education paths. The "lethal power" of this pressure is that it is often protracted, makes teenagers feel difficult to control, and it is closely tied to the evaluation vision of society, so it is especially likely to trigger the "threat alarm system" deep in the brain.

At the same time, interpersonal storms often catch them by surprise. Being excluded or even bullied by peers, social anxiety when speaking or showing in front of a large group of people, the breakdown of an important relationship, fierce conflicts with teachers, or embarrassment in public… These events hit adolescents particularly hard. Why? Because of this stage, they become more sensitive than ever to the sense of identity of their peers. These setbacks often hit their budding sense of self-worth. Families, which are supposedly safe havens, can sometimes become sources of stress. Parent–child conflicts surround studies and parents, such as experiencing parental divorce or other major changes, overwhelming family financial pressure, witnessing parents' own mental health problems, burdening high or conflicting expectations, and lacking understanding and support, emotional neglect or suffocating overcontrol. These factors often shake the cornerstone of the most fundamental sense of security among teenagers.

Finally, the growth issues of adolescence itself also create unique troubles. Stuck in the self-identity confusion of "Who am I? ", body image concerns self-dissatisfaction in the mirror, and the pressure of career planning concerns "Where should I go in the future? ", and the keen perception of social injustice... Deep anxiety is closely connected with the vigorous awakening of self-awareness and the development of their ability to get better at abstractly thinking about the future (Song et al., 2023).

3.2 Cross-Level Mechanisms of Stress-Induced Neuroplastic Changes and Anxiety: An Educational Neurological Framework

When high school students encounter these breathless stressful events, they not only experience a psychological shock but also trigger a complex "biochemical storm" inside the body, profoundly remodeling their critical developmental period, a brain with extremely high plasticity. To understand how this storm eventually led to the vortex of anxiety, we need to delve into the depths of the brain to see how the changes at multiple levels are interlocking (Jiang, 2024; Lupien et al., 2009; McEwen & Morrison, 2013).

First, the stress alarm goes off, and the hormone torrent strikes. Stressful events are similar to pressing the "emergency button" (HPA axis) deep in the brain, prompting the body to secrete cortisol, the stress hormone, in large quantities. In a short time, this hormone torrent can help mobilize energy and focus, which is necessary for survival. However, the problem is that it is too easy to get caught in a "protracted battle" in high school—the kind of chronic stress day after day that keeps cortisol levels consistently high, turning from a helper to a "brain poison." Then, the memory center (hippocampus) suffers damage. High concentrations of cortisol impair the growth of new neurons here and even harm existing neurons. As a result, it is difficult to remember things. Moreover, it is difficult to accurately determine which neurons to use. The situation was truly dangerous (impaired episodic memory and situational regulation). The rational commander (prefrontal cortex, PFC) subsequently weakened. The function of the "headquarters", which is intended to calmly analyze and control emotions, decreases, and the structure and function of neurons are damaged. The most fatal thing is that it can no longer control the emotional siren (amygdala)—the key "steep on the brakes" function (top-down inhibitory regulation) has failed. In addition, the emotional alarm (amygdala) becomes extremely sensitive. In particular, the response of the basolateral nucleus (BLA) of the amygdala became increasingly intense, with the slightest sign of trouble sounding the highest level of fear and anxiety alarm. The brain chemical messengers (neurotransmitters) take the opportunity to mess up. For example, serotonin (often associated with mood stability) is inhibited, the reward circuit of dopamine (related to pleasure and motivation) is not working well, and the chemicals responsible for excitation (glutamate) and inhibition (GABA) are also out of balance. Second, the "circuits" inside the brain begin to be pathologically remodeled. Long-term hormone bombardment distorted key neural circuits. Emotional and rational "hotlines" can also malfunction. The connections inside the amygdala were overstrengthened (synaptic strengthening), whereas the "calm! The "Don't panic!" signal (inhibitory projections), which should have been sent from the rational control center (especially the vmPFC) to the amygdala, was weakened and even discontinued. The imbalance of this circuit is the "circuit board" problem at the core of generation and the persistent existence of anxiety. Most critically, the pleasure engine (reward system) was turned off. The influence of areas such as the nucleus accumbens (NAc) makes teenagers less excited about the things they were originally interested in (anhedonia), and their motivation to actively do things is greatly reduced (Li, 2024).

In the end, these deep neural changes directly shape their thoughts and actions. Internal chaos in the brain inevitably manifests as psychological and behavioral changes. For example, we put on a "gray filter" when looking at the world. It is easier to focus and remember negative information, and there is a tendency to have a negative interpretation of neutral or even positive things (negative cognitive bias). The coping style became rigid and rigid. They can either excessively avoid any situation that may cause discomfort or rely on seemingly safe behavior patterns that constrain themselves (rigid coping strategies). This forms a vicious circle: stress changes the brain (neurobiological level), and brain changes distort cognition and behavior (psychological level), and this distortion leads to more frustration and new sources of stress (environmental level). These new pressures once again impact the already fragile brain, pushing it to reshape in a direction that is even more unfavorable for adaptation. The anxiety gears are just bitten tighter.

4. Remodeling of the Brain Mechanism: A Double-Edged Sword in the Dynamic Evolution of Anxiety and the Opportunity for Educational Intervention

4.1 Brain Mechanism Reconstruction: The Dynamic, Adaptive and Individualized Neural Reorganization Process

Our brains are far from static machines. In the face of stress, it has shown an amazing ability to "self-reform"—this is the magnificent picture of neuroplasticity at the macro level (Davidson & McEwen, 2012). The brain tries to adapt (and is sometimes maladaptive) to the pressure exerted by the environment through continuous neural reorganization. There are a few key characteristics of this remodeling journey worthy of our attention:

1) Never-ending "construction." Brain reconstruction projects are continuously and dynamically performed. It is not a one-time treatment but will be continuously adjusted and optimized on the basis of new experiences, effective interventions (such as learning coping skills and psychotherapy) and the passage of time. Like a city that is always upgrading, the blueprint is always fine-tuning.

2) A "double-edged sword". Adaptation or rigidity? This type of reconstruction contains quite different potentials. In the right direction, the brain can forge a stronger and more efficient "stress coping circuit"; for example, the control power of the "rational commander" (prefrontal cortex, PFC) is stronger, and the "emotional siren" (amygdalar) is more flexible and moderate. However, if the pressure is too great or too long, reconstruction may slip into the abyss of morbidity, forming a stubborn and inefficient "anxiety circuit", and the typical manifestations are oversensitivity of "siren" (overresponse of the amygdala) and "anxiety circuit". The vicious circle of "commander" control failure (insufficient PFC inhibition) was tightly welded.

3) The "sculptor" of time and experience. By no means is brain reconstruction accomplished overnight. This requires the accumulation of time and "experience nutrients" in a specific mode. For example, the ultimate effect on the brain of experiencing controllable and eventually surmountable stress (like gradually challenging yourself in a safe environment) and being trapped in an uncontrollable and hopeless stress vortex (such as having suffered bullying for a long time but being unable to fight back) was that the "remolded" morphological effects were worlds apart.

4) A unique "remodeling blueprint." Finally, and most critically, there are enormous individual differences in the paths and efficiencies of brain reconstruction. Different people hold different "construction materials" and "construction drawings." The susceptibility brought about by your genes, the imprints left by early childhood experiences, the original "circuit" foundation of the brain, the solidity of social support around you, and your intrinsic psychological toughness—these factors seem to be invisible to the "engineers" of, together shape where your brain will eventually go under pressure and how well it can be remodeled (Drysdale et al., 2017). This perfectly explains why, when faced with seemingly the same test pressure or interpersonal conflict, some students are able to adjust and recover faster, whereas others are bogged down in anxiety.

4.2 The Dual Role of Reconstruction: An Amplifier of Anxiety and A Hopeful Way of Alleviating Anxiety

In the battle of high school students with anxiety, the amazing "self-remodeling" ability (neuroplasticity) of their brains plays a critical and contradictory role. It is the "soil" in which anxiety takes root and germinates, but it also contains the key to break free from the shackles.

When the brain is pushed toward the "pathological reconstruction" bifurcation under pressure, the shackles of anxiety are tightened. Repeated stress shocks completely distort the cooperation mode between the "emotional siren" (amygdala) and the "rational commander" (prefrontal cortex, PFC) deep in the brain—the siren becomes extremely sensitive and arbitrary (the amygdala is dominant), and the commander is weak and cannot apply brakes (insufficient PFC inhibition). As a result, anxiety responses become automatic and flood (generalization), and a little thing can trigger intense panic. Moreover, continuous anxiety can damage key brain networks responsible for the active regulation of thinking (including the dorsolateral prefrontal cortex (DLPFC) and anterior cingulate cortex (ACC)). It is like a mixing console that has failed, causing teenagers to be trapped in a vortex of negative thoughts, unable to extricate themselves, and unable to actively turn their attention to positive or neutral things. The continuous flushing of stress hormones (such as cortisol) prevents the hippocampus from producing new neurons and may even cause the volume of this key region to shrink. This dual effect severely weakens the ability of the hippocampus to accurately differentiate between safe and dangerous situations (situation regulation ability) and greatly reduces its ability to prevent stress shock.

However, this is not the end of despair! This "experience-dependent" plastic nature of the brain suggests that intervention-related neural circuits are not unbreakable and that there is an opportunity for reversal to "adaptive reconstruction." 1. Cognitive reappraisal training aims to guide adolescents to consciously "label" stressful events (e.g., view a scary exam as a challenge to show themselves). In essence, this kind of thinking training involves repeatedly exercising and strengthening the muscles of the "rational commander" (especially the dorsolateral dlPFC and ventromedial vmPFC) so that they can more effectively send strong signals to the "emotional alarm" (limbic system). This is a powerful "calm down" command (inhibitory connection), which has been confirmed by strict high-quality randomized controlled trials. Positive mindfulness meditation, on the other hand, helps to reduce the oversensitivity of the "emotional alarm" (amygdala) by fostering non-judgmental awareness of present-moment experiences and by increasing activity in areas of the brain responsible for sensing the internal state of the body and regulating emotions (e.g., the anterior insula and the ACC of the anterior cingulate cortex) (Tang et al., 2015). 2. A positive and warm teacher–student relationship, a supportive and understanding peer atmosphere, and a stable and reliable family environment provide the brain with a piece of fertile "neural soil". They can effectively reduce the baseline tension of the HPA axis, reduce the toxic erosion of the brain by stress hormones (glucocorticoids), and create an essential physiological basis for benign neural remodeling. 3. Encouraging participation in positive activities and the setting and achieving of small goals (behavioral activation) can reignite the brain's "reward circuit" (involving the pathway from the ventral tegmental area (VTA) to the nucleus accumbens (NAc)) and fight against the tendency to be interested in anything. The "anhedonic" state involves being unable to arouse energy. Every small successful experience engraves positive and beneficial new connections in the brain. 4. In a supportive environment, facing challenges gradually and in a controlled manner (such as step-by-step lecture practice in class) is similar to "stress immunization" to the brain. This helps form a healthy and effective coping mode under the effective regulation of the "rational commander" (PFC) and a moderate "emotional siren" (amygdala) response, thereby continuously enhancing psychological toughness. 5. Regular aerobic exercise is a good medicine for the brain. It promotes the production of new neurons in the hippocampus, a memory center, increases the level of "growth factor" (brain-derived neurotrophic factor BDNF), which nourishes nerve cells, and helps to regulate the strength of the HPA axis in response to stress, making it an effective non-pharmacological intervention.

Therefore, it is important to understand this "contradictory" characteristic of brain remodeling. Although the shackles of anxiety have a stubborn neural basis, the key to neuroplasticity is always in our hands—through scientific, warm and long-lasting intervention, we are fully capable of guiding the adolescent brain to break free from the pathology Circulation bondage, remodeling in a healthier and tougher direction.

5. Conclusion

5.1 Toward A Neuroplasticity-Based Education Practice

This study is rooted in the concern about the physical and mental state of teenagers in high school biology teaching, and from the perspective of educational neurology, the pivotal role of neuroplasticity in connecting typical stressful life events and anxiety symptoms of high school students is systematically identified. The core conclusions are as follows:

(1) Neuroplasticity is the key to understanding adolescent anxiety. The high degree of brain plasticity of high school students is the cornerstone of their excellent learning ability, and it also makes them extremely sensitive to stressors such as academic pressure and interpersonal conflict. These events provide the material basis for the generation and maintenance of anxiety by activating the HPA axis, interfering with neurotransmitter balance, and remodeling the structural and functional connectivity of key brain regions (amygdala–prefrontal circuit, hippocampus).

(2) Brain mechanism reconstruction is the neural engine for the dynamic evolution of anxiety. This ongoing process of neural reorganization has a double-edged character: it can either solidify pathological fear circuits and amplify anxiety due to chronic stress, or it can shift in an adaptive direction toward increased emotional regulation and psychological resilience through positive interventions and experiential guidance.

(3) Educational practice is the core field used to guide benign neural remodeling. Understanding the above mechanisms requires education paradigm innovations: a. Go beyond symptom management and focus

on neuroecology: The creation of a campus and classroom environment with low chronic stress and high social support is a top priority. b. neuroscience principles are integrated into mental health education. In biology classes and related activities, age-appropriate and scientifically explained the knowledge of stress, emotion, and brain plasticity (e.g., simplified PFC-amydala “handbrake-throttle” model) to help students understand themselves. In response, self-blame can be reduced, and a sense of control can be enhanced (new education literature). c. Systematic implementation of evidence-based interventions: The integration and promotion of cognitive-behavioral strategies (cognitive reappraisal and problem solving), mindfulness and relaxation training, regular physical activity, and the social-emotional learning (SEL) system. d. Empowering teachers and parents: Provide training to understand the characteristics of adolescent brain development, the identification of stress signals, and communication support strategies based on neuroplasticity (active listening, solution focus, and providing controllable challenges). e. Personalized support: Recognizing the individual differences in neural remodeling, providing targeted support and necessary professional referrals to students at high risk of anxiety.

5.2 Future Research Needs to Focus on Educational Practices

(1) Evaluating the “neureffectiveness” of the educational intervention. The effect of specific strategies (classroom positive thinking, cognitive training) on the improvement of anxiety-related neurological indicators and subjective feelings is assessed in real-life scenarios (e.g., with simple EEG, HRV monitoring, or behavioral experiments).

(2) Exploring differences and individualized plans. The differences in the stress–neural plasticity–anxiety pathway between different groups (gender, temperament, experience, and academic level) were studied to provide a basis for accurate and layered interventions. A study on the integration of neuroscience literacy into the curriculum. To design and evaluate the teaching content and effect of the systematic integration of the “brain, stress and mental health” module into high school biology courses.

(3) Home–school neuroeducation linkage model. The effective transfer of neuroplasticity-based parenting knowledge to parents should be explored, and a supportive environment that is consistent between home and school should be built. Introducing the perspective of neuroplasticity to the field of pedagogy is a scientific way to respond to the mental health challenges of high school students. We call for education researchers, policy-makers, front-line teachers and parents to embrace this perspective and guide the brains of high school students to reconstruct under pressure to be stronger, more flexible, and more effective through scientific understanding of the brain, careful design of the environment, and effective implementation of interventions. This hopeful neural landscape lays a solid biological foundation for lifelong learning and a happy life.(Zhou, J. 2016).

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