

EDITORIAL

Biological Determinants of Adolescent Mental Health

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Health is a holistic concept encompassing physical, mental, and social well-being. An individual cannot be deemed truly healthy without mental wellness. According to the World Health Organization (WHO), mental health is not merely the absence of mental disorders; rather, it is a state in which individuals realize their potential, can cope with the normal stresses of life, work productively, and contribute to their community.¹ Good mental health enables individuals to build positive relationships, accept themselves and others, and manage emotional challenges effectively.

In adolescents, mental health is a particularly critical concern. Data from the Indonesian National Adolescent Mental Health Survey (NAMHS) report that approximately one in three adolescents (34.9%) experience mental health problems, while one in ten (5.5%) are affected by a diagnosable mental disorder.² These alarming figures underscore that adolescent mental health is not only a psychological or educational issue but a major public health priority.

The WHO's framework on the social determinants of mental health highlights that risk and protective factors influencing mental health begin before birth and accumulate throughout life. Addressing mental health effectively thus requires a life-course approach. While much emphasis has been placed on social and psychological determinants, biological determinants are equally critical, particularly during adolescence—a period marked by rapid and complex development across multiple domains.³

Adolescence is a transitional stage between childhood and adulthood characterized by biological, psychological, and social changes. The biopsychosocial model emphasizes that biological aspects such as physical health, genetic vulnerability, chronic disease, and cognitive development interact with psychological and social factors to influence mental well-being. This editorial focuses on the biological determinants of adolescent mental health—an area that often receives less attention but plays a foundational role in shaping developmental outcomes.

Physical Activity and Mental Well-being

There is substantial evidence linking physical activity with mental health benefits. Adolescents who engage

in regular physical activity are at lower risk of developing mental health problems, including anxiety and depression. A study by Mailey *et al.* emphasized that physical activity not only improves physical fitness but also enhances emotional regulation and reduces psychological distress.⁴ Similarly, integrating physical activity into mental health services has been shown to improve outcomes in individuals with serious mental illness.⁵ Encouraging adolescents to participate in structured and unstructured physical activities can serve as a preventive strategy for mental health challenges.

Chronic Illness as a Risk Factor

Adolescents with chronic physical conditions are at increased risk for emotional and behavioral issues. The presence of diseases such as asthma, diabetes, or dermatological conditions may lead to social withdrawal, low self-esteem, and emotional distress. Ohrnberger *et al.* highlighted that physical illness is both a direct and indirect stressor, often contributing to depressive and anxiety symptoms.⁶ Adolescents with chronic illnesses report more internalizing (e.g., sadness, anxiety) and externalizing (e.g., aggression, rule-breaking) symptoms than their healthy peers.

Disability and Psychosocial Functioning

Physical and intellectual disabilities significantly increase the risk of mental disorders in adolescents. A study conducted in Aceh, Indonesia, revealed a strong association between disability and emotional disturbances, particularly aggressive behavior and social withdrawal.⁷ In the U.S., adolescents with disabilities exhibited significantly higher rates of conduct disorder, bipolar disorder, and phobias compared to their peers without disabilities.⁸ Limitations in mobility, communication, and self-care can impair daily functioning and contribute to feelings of isolation, helplessness, and stigma—all of which elevate the risk for mental health issues.

Genetic and Hereditary Influences

Genetic predisposition plays a central role in several psychiatric disorders, particularly schizophrenia and mood disorders. Children of parents with schizophrenia are at significantly higher risk of developing similar conditions. For instance, the American Psychiatric

Association notes that individuals with a first-degree relative diagnosed with schizophrenia have a 10-13% lifetime risk, compared to about 1% in the general population.⁹ Moreover, environmental exposures in early childhood-such as emotional neglect or lack of cognitive stimulation-may interact with genetic vulnerabilities to worsen outcomes.¹⁰ Therefore, early identification and monitoring of at-risk adolescents with a family history of psychiatric illness are vital.

Intelligence, Cognitive Functioning, and Emotional Regulation

Intellectual and cognitive capacities also influence how adolescents manage stress, process emotions, and make decisions. High intelligence quotient (IQ), combined with emotional and spiritual intelligence, is associated with better coping mechanisms and reduced vulnerability to stress.¹¹ However, research has also shown that some adolescents with higher cognitive sensitivity may be more prone to anxiety and depressive symptoms due to heightened awareness of internal and external pressures.¹² Thus, while cognitive ability can serve as a protective factor, it may also act as a double-edged sword depending on the individual's environment and coping resources.

CONCLUSION

The adolescent years are a pivotal developmental stage during which biological, psychological, and social factors intersect to shape lifelong mental health trajectories. While psychological and social influences are frequently addressed in public health discourse, biological determinants-such as physical activity, chronic illness, disability, genetic vulnerability, and cognitive functioning-deserve equal attention. Recognizing and addressing these factors early can reduce the burden of adolescent mental health disorders and improve health outcomes across the lifespan. Health professionals, educators, and policy-makers must adopt a holistic, biopsychosocial approach that includes early screening, supportive interventions, and community-based programs targeting biologically vulnerable youth.

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