

Epigenetics and Understanding the Impact of Social Determinants of Health



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KEYWORDS

• Epigenetics • Methylation • Health disparity • Social disparity • Telomere • DNA

KEY POINTS

- Epigenetic factors, especially DNA methylation, and telomere length are currently being examined as biological mechanisms linking social factors and health.
- Social deprivation is associated with a wide range of epigenetic change in children and young adults.
- Epigenetic markers are associated with obesity and eating disorders, mental health, and asthma.
- Research is still too new to provide actionable evidence for a causal mechanism linking social experiences and child health through epigenetics and telomere length.
- Research exploring the overlap between social and natural environmental links to epigenetics and health is desperately needed.

SOCIAL DETERMINANTS OF CHILD HEALTH

The health consequences of material deficiency (eg, extreme malnutrition or lack of water or inadequate clothing and shelter) have been long known.¹ However, recently, a new, more broadly applicable research agenda emphasizing social factors and health has emerged.² The term social determinant of health often refers to any nonmedical factor directly influencing health, including values, attitudes, knowledge,

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and behaviors. However, it can also refer to more external sources of influence such as family, neighborhood, and social network context. A large and convincing literature over the last several decades shows that health across the life span is strongly linked to social disadvantage.¹⁻⁴

For example, neighborhoods can influence health through their physical and geographic characteristics, such as air and water quality, lead paint exposure, proximity to both health-promoting and health-suppressing features (ie, hospitals and nutritious food stores vs toxic factories and fast food), access to green space, and so on.^{2,5,6} Additionally, more social aspects of neighborhoods such as strong cohesion are associated with far better health and safety.^{7,8}

Recent evidence demonstrates that the chronic stress of social disadvantage, socioeconomic inequality, and racial discrimination act through a variety of biological pathways to influence health, including neuroendocrine, developmental, immunologic, and vascular mechanisms.^{2,9} In response to stressful events, cortisol, cytokines, and other intermediates are released, and if there is long-term, repetitive or chronic exposure, these substances may damage key physiologic systems.^{9,10} It is thought that this mechanism of physiologic strain accelerates the onset or progression of chronic illnesses.¹¹

One of the largest and most consistently replicated areas of research demonstrates the negative effects of social disadvantage in childhood on later child and adult health, socio-emotional wellbeing, and cognitive ability.¹²⁻¹⁶ This body of work indicates that childhood social disadvantage operates through a variety of complex mechanisms to result in dramatically different developmental outcomes, which are often apparent even in childhood, but which are typically more fully manifest in adulthood. Indeed, there is evidence that early childhood disadvantage appears to leave a biological residue, which in turn has effects on development, health, and wellbeing.^{16,17}

Social Determinants of Child Mental Health

There is strong evidence that the mental health of children, adolescents, and young adults is affected by social factors at personal, family, community, and national levels.^{11,18} In particular, the evidence is good that paired with a safe and supportive social environment, such as family and schools, children need positive peer networks in order to have healthy mental health development. Even national-level social determinants of health such as national wealth, income inequality, and access to education were associated with a range of mental health outcomes in young people.¹⁸

Social Determinants of Asthma

Lung function, allergy, and asthma appear to have a strong links to early life stress and social disadvantage.¹⁹ Due to the large health inequalities in this area, social stressors have been used extensively to explain racial disparities in childhood asthma.²⁰ Indeed, recent research suggests that the social context in which children are raised may be equal to the natural environmental effects in asthma disease risk.²¹

BIOLOGICAL UNDERPINNINGS OF SOCIAL DETERMINANTS

Early life experience gets under the skin in ways that affect the health, wellbeing, and child development. Although the most extensive research shows strong biological effects of physical and emotional abuse (and other similarly extreme childhood events) on health and developmental consequences, more recent research shows that less obvious but more regular adversities of early childhood also have a lasting influence

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