neurobiology, diagnosis, genetics, and clinical cases.


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**Toxic environments and human development**

**INTRODUCTION**

Every year, an alarmingly high number of children in the United States are exposed to toxic environments. This term, alongside others such as ‘childhood adversity’ and ‘early life stress,’ refers to a constellation of negative exposures that are associated with an elevated lifetime risk for physical and mental illness, cognitive impairment, and decreased labor market performance. Government statistics indicate that as many as 1 in 7 children experience a form of maltreatment, and many more experience chronic poverty, domestic violence, the loss of a parent, or other factors known to compromise development. Overall, the likelihood that a child will be exposed to at least one of these adversities during development in the United States is about 58%. Decades of research in social and behavioral science have documented the impact of toxic environments on numerous aspects of functioning including anxiety and mood disorders, conduct disorders, substance-use disorders, obesity, hypertension, and heart disease.

Many theoretical models posit that toxic environments expose children to high levels of chronic stress, and that this stress can shape psychological and biological development in ways that predispose them to later poor outcomes. Certainly, everyone experiences some stress in his or her life. For the most part, the sorts of stressors encountered by children everyday – such as entering into a new social environment, or negotiating with a sibling – may actually have a positive impact on development. British child psychiatrist, Michael Rutter, describes this as the ‘steeling effect.’ Exposure to stress that is mild and tolerable, especially in the presence of a supportive caregiver, can build coping ability that can be marshaled toward future environmental challenges, in much the same way that an immunization inoculates against future infection.

However, toxic stress is different in that it is severe or frequent, can chronically activates the body’s stress response systems, and may overwhelm the child’s capacity to thrive. Toxic stressors are typically uncontrollable and experienced without the buffering effect of adult support, and introduce an immediate or chronic fear in the child for their physical or mental integrity. That is, children fear—often rightly—that they will be hurt or even killed. This fear can result from a direct threat or because they lack adult protection, and are vulnerable to potential threats. These experiences, particularly during sensitive periods in early life, can derail normal brain
development, and can lead to heightened vulnerability to mental and physical illness.

ASSOCIATIONS BETWEEN TOXIC ENVIRONMENTS AND DEVELOPMENTAL OUTCOMES
Childhood adversities are one of the most consistently documented and robust risk factors for psychiatric disorders across the lifespan. Epidemiological studies, such as those commissioned by the World Health Organization, indicate that these experiences account for over 30% of the variance in adult mental disorders. Toxic experiences rarely occur in isolation. For example, a child who experiences neglect is also more likely to live in poverty, or experience physical or sexual abuse. Recent data, such as that from the Adverse Childhood Experiences ("ACEs") study, has found that the accumulation of numerous risk factors seems to substantially increase the likelihood of later negative outcomes in a 'dose-response' relationship (i.e., the more risk factors you acquire, the greater the risk).

THE BIOLOGY OF TOXIC STRESS
Theoretically, exposure to toxic environments, such as those characterized by adversity exposure in childhood, results in the body being exposed to toxic stress. A number of coordinated biological systems govern the body's response to stress. First, the autonomic nervous system (so named because it is activated automatically and involuntarily) provides a rapid response by activating its sympathetic and parasympathetic branches. The sympathetic nervous system, providing what the physiologist Walter Cannon coined the 'fight or flight' response, releases epinephrine and norepinephrine from the adrenal glands to accelerate heart rate, divert blood flow toward skeletal muscles and increase the production of glucose. The parasympathetic system, sometimes known as the 'rest and digest' system, in contrast helps put a brake on sympathetic reactivity by slowing the heart and promoting growth. These two systems generally work in opposition to quickly allow individuals to prepare for and recover from threats in their environment.

A second biological system is known as the hypothalamic-adrenal-pituitary (HPA) axis, and provides a slower, more extended stress response. The HPA axis triggers a chain of chemical events that culminates in cortisol being released by the adrenal cortex in the brain. Cortisol, among other functions, mobilizes the body's stores of stored glucose and allows it to deal with the energy demands required during stressful or threatening events. Numerous studies of human and non-human animals suggest that excessive exposure to stress can disrupt the functioning of the HPA axis, leading to a 'wear and tear' effect on the body.

Finally, a growing number of studies using magnetic resonance imaging (MRI) have shown that chronic stress can negatively impact the developing brain, particularly in neural networks involved in emotion and learning. Two structures located deep in the brain, the amygdala and the hippocampus, are involved in 'fear conditioning' or the ability to predict threats based on past experiences.
Experiments with non-human animals suggest that elevated levels of stress hormones, such as cortisol, can induce functional and structural changes in these regions. Children with experiences of toxic stress may more easily forge new fear memories, or find it harder to unlearn old ones. These processes can trigger anxious behaviors that can result in internalizing disorders.

SENSITIVE PERIODS FOR EXPOSURE TO TOXIC ENVIRONMENTS

Over the last decades, neuroscientists have illuminated how the brain is shaped by experience, and, in doing so, helped explain why toxic environments are so detrimental for the developing child. Studies using human and non-human animals have shown how the brain can be remolded or modified through experience: a phenomenon known as neuroplasticity. Experience alters neural circuits according to the needs of the individual, and this allows us to learn and adapt to our social and physical environments.

However, the degree of plasticity in the brain is not the same across development. Brain plasticity continues through old age, but is typically greatest early in life, when the brain is undergoing rapid growth. Thus, early environments have an exceptionally strong impact on the architecture of the brain. This period of heightened flexibility is known as a ‘sensitive period.’ Once a sensitive period is over and a neural circuit is fully formed, it becomes much harder to change in later life. This is why it is much easier to pick up a foreign language or become proficient at a sport if it is learned in early childhood.

The brain’s sensitivity to environmental inputs in early childhood cuts both ways. On one hand, children exposed to positive and nurturing environments are likely to reap the benefits of these experiences, providing them with a strong foundation for later emotional health. On the other, children exposed to deleterious or toxic environments may be rendered especially vulnerable, as their brain circuits adapt to the kinds of adverse contexts in which they were raised. For example, children experiencing the threat of abuse in early life may develop a heightened sensitivity to threat that persists even when they grow up and leave the environment in which they were maltreated.

An illustrative example of this phenomenon can be found in the Bucharest Early Intervention Project (BEIP), a randomized control trial that took Romanian orphans living in institutions and assigned half of them to high-quality foster care. These children were followed over time to investigate the effects of early deprivation on later cognitive and behavioral outcomes. The findings from this study showed that while exposure to early institutionalization result in lower IQ, increased anxiety and depression, difficulties with language and social functioning, when compared with children who were never institutionalized, it was also the case that placement into a high quality foster care intervention resulted in ‘recovery’ of IQ, mental health, language, and social functioning. Children who were randomly assigned to foster care had a higher IQ, fewer mental health problems, better language, and improved social ability compared to those who remained in the institution. Often recovery was greatest among children who left the institution when they were younger (e.g., 24 vs. 36 months old). This supports the notion that the first years of life represent a period of particular sensitivity for later cognitive development.

IMPLICATIONS FOR PRACTICE AND POLICY

The prevention of toxic childhood environments has proven to be a difficult problem, and will likely require significant public investment in multifaceted intervention strategies working with families and communities. Nevertheless, converging evidence from psychology, neuroscience and genetics has offered promising new ideas for the sorts of interventions that may be most fruitful for ameliorating the effects of disadvantageous environments in early childhood.

One such insight is that improving parents’ ability to support their children is likely to be an important lever for improving child outcomes. Decades of research with human and non-human animals shows that nurturing and supportive relationships in early life are essential to healthy development. In particular, primary caregivers have a particularly important role in buffering children from the toxic environments they may experience. Interactions with caregivers that rely on back-and-forth interactions with adults – what the National Scientific Council on the Developing Child call ‘serve and return’ – are highly important in teaching children to overcome stressful experiences. However, without these kinds of supportive relationships, children may be more vulnerable to the effects of toxic environments. Research has shown, for example, that children are more likely to experience elevated stress hormone activation if they have insecure attachment relationships, or have a depressed parent who is unable to be responsive to their needs.

Accordingly, interventions that focus on improving
parent capacity (e.g., via home visitation programs or greater access to mental health services) may allow parents to be better able to buffer their children from the effects of toxic stressors.

A further insight is that knowledge gleaned from scientific research may help us to improve the developmental timing of interventions. As discussed above, the principles of neuroplasticity suggests that children are more likely to reap the benefits of intervention if it occurs early in life, when their brains are most responsive to environmental input. Enriching and stimulating early experiences lay the foundations for later learning, and so investments at this time will result in the best long-term outcomes. Indeed, economist James Heckman has found that the social programs yield the greatest return on investment when they are implemented early in life, particularly before the start of formal schooling.

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See Also: Dysfunction; Environmental effects; Interpersonal influence; Psychosocial development; Social influence.

Transactional analysis (TA)

Type of psychology: Psychotherapy

Transactional analysis is a school of psychotherapy and personality theory. Many of TA's key concepts, such as therapeutic contracts, games, and life scripts, have been accepted in the general psychotherapy community.

Key Concepts
- Adult
- Child
- Decision
- Ego state
- Games
- Life script
- Parent
- Racket
- Stroke

INTRODUCTION
Transactional analysis (TA) is a theory of personality and social interaction originated by Eric Berne in the mid-1950s. TA's popularity has been primarily as a form of psychotherapy and a method for improving social interactions between people in almost any setting—from the group therapy room to business and industry. Berne rejected psychoanalytic therapy, which he considered a type of game called “archaeology,” in favor of his own short-term, action-oriented, commonsense approach to psychotherapy.

Before entering a group psychotherapy session, Berne would ask himself, “How can I cure everyone in this room today?” In 1964, Berne's book Games People Play created a popular interest in a theory of personality and psychotherapy unequalled in the history of psychology; the book sold more than a million copies.

The basic concepts of transactional analysis describe an individual personality and the individual's repetitive patterns of interacting with others. Three distinct ego states compose the individual personality: “parent,” “adult,” and “child.” Berne observed these as distinct phases in his patients' self-presentation. The child ego state within each individual is defined by the feeling, creative, and intuitive part within the person. The child ego state may be approval-seeking or defiant. The fun-loving