



ADVANCING HEALTH EDUCATION &amp; RESEARCH

AVA Research Reviews provides AVA members with recent published, peer-reviewed articles in a broad array of violence and abuse topics. The goal is to highlight and disseminate violence and abuse research in a timely fashion, and to enhance healthcare providers' practice by fostering the educational mission of AVA

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# AVA Research Review

## ADVANCING HEALTH EDUCATION & RESEARCH

**Review Title:** Childhood Roots of Health Disparities- the Role of Trauma as an Important Stressor

**Reviewer:** Philip V. Scribano, DO, MSCE, Department of Pediatrics, Perelman School of Medicine at the University of Pennsylvania

**Article:** Shonkoff JP, Boyce T, McEwen BS. Neuroscience, Molecular Biology, and the Childhood Roots of Health Disparities: Building a New Framework for Health Promotion and Disease Prevention. *JAMA* 2009; 301 (21): 2252-2259.

### Article Summary:

Shonkoff and his collaborators have provided a stellar review of the science pertaining to the origins of adult disease. This "holy grail" pursuit has generated much research more recently, and has identified significant and reproducible developmental and biological disruptions in the early years

of life, beginning in the prenatal period. This article provides an overview of the phenomenon of either: cumulative damage over time or biological embedding of adverse experiences during sensitive developmental periods. The authors translate the basic science research of these important mechanisms to the policy realm, and discuss the possible approaches to modifying the outcomes through health-related behaviors and improved access to care.

### *Brief overview*

It has been well documented that there are disparities in health outcomes that are related to social disadvantage, regardless of culture and health care systems. For clinicians, the application of biomedical science to provide treatment to patients is paramount; for policy makers, efforts to better understand the impact of biology and early adversity to patient populations is

important to address these health disparities. Yet, throughout most of the last century, health care has been focused on the treatment of disease, rather than an exploration of the underlying basis for disease onset.

#### *Aims/ goal of the article*

The purpose of the article was to provide readers with an empirical framework to understand the scientific realities that health promotion and disease prevention begins in the early years of life. As such, efforts to address factors that reduce health promotion and disease prevention should be enhanced through public policy.

#### *Relevant findings*

The authors begin by discussing the cumulative exposures to stressful experiences and reporting the science demonstrating strong associations between adult reports of adverse childhood experiences with a myriad of health problems such as: coronary artery disease, chronic pulmonary disease, alcoholism, depression, and substance abuse, mental health problems, teen pregnancy, obesity and cigarette smoking. These studies are well known as the ACES studies by Anda and Felitti and have provided an epidemiologic backdrop for the basic sciences research when evaluating the impact of

trauma experiences and health outcomes. Additionally, research evaluating depressed adults who experienced child maltreatment, demonstrated elevated C-reactive protein levels, a biomarker for cardiovascular disease risk. The concept of “weathering”, a phenomenon which results in dysregulated pathways from chronic adversity resulting in adverse health outcomes is discussed. There is evidence to support the “cumulative exposure hypothesis” for chronic adult disease which results in activation of the neuro-endocrine stress response. Under normal circumstances, this response is protective; however, when chronically activated, can become pathogenic.

A review of the literature pertaining to the effects of adversity during certain vulnerable periods of life when the developing brain is more susceptible to a variety of signals, some of which can be negative is provided. The importance of this neonatal and early childhood period is highlighted by associations observed between infant low birth weight and heart disease, hypertension, insulin resistance, and a heightened immune response in adulthood. The role of stress, and the brain’s ability to adapt to that stress is manifest through the behavioral, neuroendocrine,

autonomic and immune responses. These data provide a backdrop to offer a biologic explanation for the manifestations of violence and abuse that are compelling when one seeks to understand the clinical manifestations of trauma experiences.

The authors provide a discussion of the concept of epigenetic pathways which provides the gateway for adverse experiences to influence protein synthesis resulting in disease risk. They describe several studies which demonstrate the role of environment to the fetus, or child which makes them vulnerable to biologic embedding of disease risk due to the high exposure to these toxic environmental influences including child maltreatment, neighborhood violence and chaotic homes. DNA methylation, and modifications of chromatin histones are two of the known biologic alterations that influence how the next generation’s genes are expressed, thus perpetuating the poor health outcomes.

Lastly, the authors provide a framework of stress as either positive, tolerable, or toxic, to understand how to develop strategies to improve health promotion and disease prevention through targeted efforts to reduce significant stressors. They offer this

framework to provide a means to address childhood stress experiences from a public health policy perspective.

The authors bridge science to the policy realm by describing current efforts on health promotion and disease prevention, followed by a focused discussion on the issue of child maltreatment as a “public health issue with lifelong consequences”. Policy decisions which support lifelong health as well as efforts within the child protective services system to promote health in maltreated children can address the short and long term consequences of severe stress during the vulnerable, early childhood period.

#### *Authors' conclusions*

A new paradigm is emerging with regard to health promotion and disease prevention based upon our scientific understanding of adult diseases and their genesis, at least in part, related to the adverse experiences during the early years of life when biological vulnerability is at its greatest in setting the stage for disease onset later in life. Additionally, if we tackle the issue early on, we will find a much better return on investment with these childhood roots of disparities, than if we simply provide care once medical conditions

develop. The authors point to the investment in home visiting and early intervention service programs over the past decade is due to the mounting evidence that effective, early life interventions will produce great benefits to individuals and society.

#### **Reviewer's Comment:**

This is a must read article (I recommend reading it at least a few times for all the scientific content in this article) for any clinician or researcher who has an interest in understanding a body of science which supports an understanding of the impact of violence and abuse on the biology and subsequent health of individuals. Additionally, the article provides a compelling case for public policy decisions to be focused on violence and abuse, among other adverse experiences, to improve health outcomes. It is a timely piece in light of our nation's health care reform discussion. Can we shift the focus from “disease” to “disease prevention”? Can we afford not to?