

Developmental and Life-Course Perspective

Patricia Bolivar

Walden University

Social and Behavioral Epidemiology

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Dr. Ashley Love

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### **Introduction**

The subject of this paper “Developmental and Life-Course Perspective” focuses on early life influences and how it affects the onset of disease in middle, late life and even across generations. The significance of health disparities in childhood such as poverty and social disadvantage of ethnic and racial population’s differences in treatment, health care, and access to resources have a detrimental effect on health and onset of disease in adulthood (Braveman & Barclay, 2009). Early childhood life experiences are focused on the life course perspective (LCP) on shaping the individuals, community and society’s health across a lifetime. The LCP examines early life experiences as it relates social disadvantage and economic adversity in the development of chronic diseases later in life. Birth outcomes disparities are seen as the results of not only as pregnancy’s differential exposures, but life’s span trajectory (Lu, 2009). Scientific studies and research on gene expression shows that early experiences, the environment before and soon after birth in which the individual develops including toxic stress, exposure to various chemicals, drugs, and nutrition, can alter gene expression and consequently affect long-term development (National Scientific Council on the Developing Child (2010)).

President Barak Obama supports for the investment in the health of the nation youngest children (Shonkoff, 2009). Society as a whole can benefit from policies that strengthen and unify efforts to protect pregnant women and young children against toxic stress, the effects of the environment, and adverse experiences in the children’s early years of development to reduce the risks on long term physical and mental health problems (Halfon, 2009). The LCP approach for addressing determinants of health and reduce children health disparities provides a framework for the transformation of the U.S. health system. Provision of not only adequate children’s

healthcare for all young children, but developmental support services, health promotion, and community based prevention demand investment into novel approaches such as children's wellness national trusts that will provide funds for strong and healthy future generations.

### **The Life Course Theory**

The Life Course Theory (LCT) assist in the explanation of the existence of health disparities and patterns of disease over time and across populations (Pies et al., 2009). The LCT proposes a broad view of factors underlying health disparities, and health conditions across a variety of population groups. Factors include social, economic, and environmental which when better understood and addressed can help all individuals attain optimal health over a life time and across generations (U.S. Department of Health and Human Services (2010). The LCT is based on the growing evidence from an interdisciplinary framework on studies and research by psychologists, sociologists, anthropologists, biologists, and demographers (Kuh et al., 2003) on chronic diseases, human development and aging, developmental health, reproductive health, neuroscience, and general health science, and offers key concepts to address questions on the existence of health disparities and factors influencing the capacity and full potential of individuals and populations from reaching better health outcomes and overall well-being (Baltimore Research Center, 2009).

According to the DHHS (2010) key concepts addressed in the LCT are: 1) Trajectories or pathways during the lifetime of experiences, exposures, and interactions; 2) Early programming and experiences before birth and after birth including experiences in utero development during pregnancy related to the health of the mother, birth and childhood which may make the individual more or less susceptible to future health conditions and diseases; 3) Critical or

sensitive periods of development and the existence or lack of adverse events and experiences affect health of the fetus, child, adolescent, and eventually as an adult; 4) Cumulative impact of experiences and stress periods over time may have detrimental effects on health; 5) Risk and protective factors which may either improve health and health development or diminish health and health development potential. Protective factors include positive, nurturing family, friendships, and community relationships, access to education and safe neighborhoods, early health care services and economic security.

In addition to the aforementioned key concepts addressed by the DHHS (2010) on the LTC, Kuh, et al (2003) describe analytical problems associated with repeated observations in modelling, exposures of latent origin, and effects of multiple interactions. Accumulation of risk of what the authors describe as “insult accumulation” takes into account the accumulation of episodes of exposures, injury, illness, adverse damaging behaviors, socioeconomic, and environmental conditions’ severity, number, and duration as they affect the body as it ages and is less able to repair itself. Resilience then comes into play as a “dynamic process of positive adaptation in the face of adversity” which is the focus of research in children’s emotional, educational, and behavioral exposures and long term health outcomes.

The LCT is an evolving theory which addresses the concept of health and health development over a lifetime as an interactive process with changeable pathways. The individual’s health according to the LCT is the result of the interaction throughout life of genes, exposures, experiences, and individual choices which can be intervened throughout life to change the risk factors, reduce health risks, and improve protective factors (DHHS, 2010). Life course epidemiology uses the LCT for the study of the long term effects and disease risks as a result of social, physical, and ecological exposures during life stages from gestation, to childhood,

adolescence, young adult, and adult life (Kuh et al., 2003). Life course epidemiology also uses the fetal origins hypothesis which states that malnutrition and other environmental exposures during fetal development and growth in utero may have long lasting effects and a link exist between those early life events and the occurrence of adulthood chronic diseases (Halfon, 2009). Policy development on protection of the fetus development relate directly to environmental protection including food protection, and quality of the air and water. An example of continuous battles to address serious fetal damage and child development of the brain due to continuous mercury exposure is well described by Shonkoff (2009). Battles over policy on regulations on coal burning plants and mercury emission which have contaminated rivers, streams, and the food supply have not been settled. Provision of accurate levels of mercury for children are in need of review to protect the children from neurotoxic chemicals, levels which seem relatively harmless to adults are neurological damaging to children.

### **The Life Course Perspective Model**

The life Course Perspective model (LCP) serves as an organizing framework for strategic planning to improve mothers, children, family, and community's health and well-being at the national and international level. The LCP model was proposed by Michael Lu and Neal Halfon in 2003 as a new approach which examines birth outcomes not only as the term of pregnancy, but the life course of the mother before pregnancy and across developmental stages during the life span of the individual particularly of outmost importance in ethnic and racial disparities (Fine et al., 2009). According to its proposers the LCP is composed of two biomedical models of longitudinal nature: the early programming model and the cumulative pathway model. Both models of the LCP focuses on health as not just the absence of disease, but on policy development, systems, and the proper environment that nurture children's capability to reach

their full health potential (Fine et al., 2009). Understanding how early child experiences can shape the future health throughout an entire lifetime and possibly across generations entails epidemiological attention to social and physical factors such as racial, ethnic and socioeconomic health disparities and understanding how to address them. Understanding how early childhood experiences related to adversity and socioeconomic disadvantage affect development and consequences of chronic diseases and health risks factors in adulthood is part of the LCP focus (Braveman & Barclay, 2009). The LCP considers not just the social context over time role on child health development and adult health, but takes into account the influence of psychosocial, biological factors, and the physical environment.

Evidence supporting the LCP has been gathered over the past twenty years which confirms exposures of adversity and trauma in early life affecting health at later stages in life. According to Braveman & Barclay (2009), there are numerous studies and investigations on early life exposures and cardiovascular disease, stroke, hypertension, behavioral risk factors, and biological markers of disease. Socioeconomic disadvantage has been associated with respiratory disease, smoking related and stomach cancer, adult onset and mortality of diabetes mellitus, and other adult health and disease outcomes. The LCP takes into consideration the importance of risk factors and also considers the conventional health risk factors such as smoking, hypertension, or toxic stress which can directly affect physical and mental health. Toxic stress differs from tolerable or positive stress in that toxic stress triggers physiological changes that are not neutralized or buffered by protective relationships and adult support (Shonkoff, 2009).

Childhood risk factors of toxic stress include chronic neglect, deep poverty, family violence, recurrent maltreatment, parental substance abuse, and severe maternal depression (Shonkoff, 2009). Toxic stress affects multiple organ systems due to disruption of the brain architecture

which may lead to cognitive impairment and adult development of chronic diseases related to stress. Therefore, the sooner the aforementioned health risks are addressed the greater benefits are achieved when health promotion, prevention, and early intervention are provided utilizing the LCP framework.

### **Intersection of the Social, Behavioral, Biological Sciences and Policy**

Molecular biology, neuroscience, and genomics progress have provided advanced knowledge on the role of positive or favorable early life experiences strengthening the architecture of the brain, as well as negative or adverse experiences and toxic stress disrupting brain circuits and disrupting the individual from achieving full health potential compromising physical and mental health (Shonkoff, 2009). Environmental influences on children affect the brain architecture, how genes are expressed, and whether or not some genes are expressed at all which in turn affect healthy growth and the future of the child becoming a productive member of the community and society (National Scientific Council of Child Development, 2010). From the 23,000 genes passed from parents to a child the epigenome constitutes the operating system which determines the functions of the genome and what works or not. The epigenome leaves a signature on the genes by positive learning experiences as well as by negative exposures such toxins, in the environmental, under-nutrition, and day to day stressful life and situations. Tear and wear of chronic stress leads to elevated levels basal cortisol and hypothalamic-pituitary-adrenal (HPA) response. Elevated levels of cortisol lead to suppression of an effective immune response and inflammatory reaction and exaggerated HPA alters self-regulation (Lu, 2009).

According to National Scientific Council of Child Development (2010) this explains why genetically identical twins may exhibit different health, skills, behavior, and achieve differently at school, work, and later in life. Despite the scientific research and knowledge on how the gene

structure can be influenced by early prenatal and postnatal experiences by the environment, the long term health outcome both physical and mental remains a subject in need of more research.

The science- policy gap on child welfare and protective services need to be narrowed with the goal to be closed. Policy development geared to provide a supportive family and community environment through assistance, education, appropriate health care, early learning experiences, and positive socio-emotional interactions (Halfon, 2009) may be the answer to reduce the likelihood of negative mutations and modifications that happen at the epigenome. Prevention interventions of exposures affecting epigenetic changes would include reducing with the goal to eliminate exposure of pregnant women, newborns, and children to alcohol, prescription and illicit drugs, and environmental toxins (Halfon, 2009). A much successful and aggressive policy and environmental intervention include lead paint laws, while policies and interventions in need of more attention and aggressive measures are not, such as on the use of insecticides and mercury in the environment (National Scientific Council of Child Development, 2010).

Information on recent advances in science and knowledge on the influence of the environment on the human epigenome during fetal and child development must be made known to the general public knowledge through education campaigns. In addition to the general public, educators, caregivers, lawyer, health practitioners, families, and the community in general need special multifaceted interventions and campaigns in order to develop effective policies.

Many of the U.S. public policy focus expenditures on treating diseases that occur late in life instead of prevention of development of such diseases early in life (Halfon, 2009). Targeting on children's living and learning conditions especially during critical periods of development in which exposures have the most significant effect on later disease risk are in need of investment and support of public policy. According to Braveman (2009) the critical period of child

development refers to “a window of time during the life course when a given exposure has a critical or even permanent influence on later health”. The life course perspective is indeed compatible with the developmental perspective, but it goes further to focus on additional health factors not always taken into consideration in the developmental perspective. Adverse adult health outcomes (cardiovascular disease, hypertension, stroke, and type2 diabetes previously mentioned) have their origins on fetal and infant malnutrition and the accumulation of risks over time leading to altered endocrine and metabolic function which will in turn leads to increased vulnerability and increased disease risk later in life (Braveman, 2009).

### **The Life Course Perspective Present and Future**

Policy makers, health practitioners, research, and academia are shifting their approach towards the LCP to some degree by making a paradigm shift in maternal and child health especially in addressing ethnic and racial disparities in child and family health (Pies et al., 2009). An example of exploration on adaptations of LCP to the field Maternal and Child Care (MCH) took place on June 9-10, 2008 when funding from the California Endowment and Contra Costa Health Services met to in Oakland, California to discuss possible changes. Five domains in MCH were identified by twenty-five national MCH experts and meeting participants in urgent need of review: “theory, research, practice, policy, education, and training” (Pies et al., 2009).

Even though MCH programs have focused on prenatal services followed by pediatric care, environmental determinants of health particularly among racial and ethnic minority groups have not been addressed by current policy. It is a fact that black infants in the United States have definitively worse health outcomes than white infants with an unexplained cause for this persistent racial disparity (Lu & Halfon, 2003). According to Pies et al (2009) “maternal

mortality rate in black women is almost four times that of white women and black infants are more than twice as likely as white infants to die within the first year of life”

Child health disparities are evident in the United States where in 2007 approximately 24% of the population were children accounting for almost 74 million children, 57% of those children were non-Hispanic white compared to 74% in the 1980s (Baltimore Research Center, 2009).

Currently, 44% of the children are from ethnic minorities. It has been projected that by the year 2050 about 62% of U.S. children will be ethnic minorities (Baltimore Research Center, 2009). A significant number of children ethnic minorities live in poverty. According to the Baltimore Research Center (2009) in the year 2006 “whereas only 10% of non-Hispanic white children lived in poverty, 27% of black and 33% of Hispanic children bore this burden”.

The LCP provides an opportunity and encourages integration of environmental factors in addition to already addressed determinants of health as well as protective factors to be incorporated in programs, interventions, and educational campaigns before, during, and after pregnancy and at critical periods of child development (Lu, 2009). Public health and individual health medical practitioners must establish strategic partnerships for education and interventions at schools, community, and clinical settings based on the LCP approach (Pies et al., 2009).

Innovative approaches and policy changes in early childhood such as the initiative proposed by scientists at the Centers for Disease Control and Prevention Division of Violence Prevention to reconsider child abuse and neglect not a social service concern, but a public health issue (Shonkoff, 2009). The LCP approach and research on the extend of childhood maltreatment not only impairment in learning capabilities, but increase health risks of adult chronic diseases have already called the attention of policy makers on medical health care cost reduction alternatives

for the future. Identifying the magnitude of health disparities and its nature would entail identifying risk factors responses differences occurring naturally which would enable tracking and possible solutions that would affect future generations (Baltimore Research Center, 2009). Longitudinal studies designs have provided only limited evidence with respect to the relative importance of childhood versus adult factors for specific disease outcomes (Berman & Kawachi, 2000). Research that translates science into healthcare practice, policy, and practice would definitively make the LCP a realistic solution to health disparities.

### **Conclusion**

The life course theory and its perspective on early life exposure to poverty and social disadvantage and the existence of protective factors as children grow as key factors influencing adult physical and mental health; provide an opportunity to national leadership to institute education, programs, campaigns, and interventions to improve health of mothers, children, families and generations to come. Promoting shift to the life course perspective by incorporating the scientific community, policy makers, national leadership, public health, health care practitioners, and the community at the national level affords an opportunity to constrain child health disparities. Recommendations to reduce child disparities by adopting the life course perspective include: incorporation of mixed methods of qualitative and quantitative methods for research in childhood disparities, better methods for data collection on psychosocial, biological, and environmental factors affecting health outcomes, further study of sensitive and critical periods for interventions that reduce or eliminate particular health risks, and last but not least, education and engagement of the community especially vulnerable population on various descriptive and etiologic interventions and investigations using controlled and randomized trials designs.

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