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Health: an intergenerational process

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Abstract

Almost 35 years ago the so-called Barker's hypothesis showed for the first time the association between maternal nutrition during pregnancy, childbirth weight, and middle-aged cardiac deaths. These studies opened up a new perspective on the emergence of diseases and health promotion. The intergenerational nature of disease and health has been featured in one way or another in the views of individual thinkers for centuries, but it has not been able to challenge the prevailing medical views before moving into the 21st century. Over the last two decades, the 'Life Course Health Development', a vision of life course and health, has brought together numerous research trends from different disciplines, like an umbrella.

Keywords: development, generations, health, life course

Tiivistelmä

Lähes 35 vuotta sitten ns. Barkerin hypoteesi osoitti ensimmäistä kertaa yhteyden äidin raskauden aikana tapahtuvan ravitsemuksen, lapsen syntymäpainon ja keski-ikäisten sydänkuolemien välillä. Nämä tutkimukset avasivat uuden näkökulman sairauksien ilmaantumiseen ja terveyden edistämiseen. Sairauksien ja tervey-

den sukupolvien välinen luonne on ollut tavalla tai toisella esillä yksittäisten ajattelijoiden näkemyksissä vuosisatojen ajan, mutta se ei ole pystynyt kyseenalaistamaan vallitsevia lääketieteellisiä näkemyksiä ennen siirtymistä 2000-luvulle. Viimeisen kahden vuosikymmenen aikana elämänkulun ja terveyden visio "Life Course Health Development" on tuonut yhteen useita sektoreita, kuten sateenvarjo.

Avainsanat: kehitys, sukupolvet, terveys, elämänkulku

Introduction

Life course and health -thinking that goes beyond health promotion is not a new vision. Simply put, it tends toward the intergenerational shaping of disease and health. There is talk in the world of 'Life Course Health Development (LCHD)'. In the background in the late 1980s, the so-called Barker's hypothesis (1986) stated that factors influencing many public diseases are formed at a very early stage of fetal development. The findings of the Barker working group were the impetus for a broad new research trend: 'Developmental Origins of Health and Disease' (DOHaD) (Wadhwa et al. 2009).

Globally, in recent decades, chronic diseases have become leading causes of death and disability. LCHD seems to be a fruitful perspective that expands health promotion to understand the formation of disease and health. It is believed that this new kind of understanding would have the potential to take healthcare to a whole new level, as it e.g. combines different trends in traditional clinical medicine and public health as well as connects numerous research trends in various disciplines, such as psychology, sociology, education, biology, genetic research, etc. (Hafron et al. 2018)

Understanding of diseases and health determinants

The starting point for the activities of health care personnel has always been based on beliefs about the causes of diseases and health determinants. It is possible to show the development of how the foundations of action have expanded from the time of Hippocrates to the present day.

The most common and, depending on the time, the more or less strongest view of the nature of disease in the history of mankind has been related in one way or another to the spirit; to an evil spirit, to the gods, or to God. Because diseases have been understood as anomalies and evils, being able to “communicate with the pathogen” and even “control” the diseases have given the person capable of communication a special unique power and respect in their community.

Another, historically much younger view in the West, only less than 2 500 years old, is based on the idea that diseases are basically somehow material and not driven by any supernatural spirit or sin. Hippocrates (460–377 BC) built the body of the first Western medical theory by Western medical theory by Pythagorean thinking of harmony and Empedocle’s (492–432 BC) conception of the four elements.

Aristotle (384–322 BC) added to it an understanding of the four basic features, and Galenos (c. 201–130 BC) developed the theory in the form in which it moved to the Middle Ages to gradually become the official conception of disease in the Church. (Vuori 1979.) Simplifying the theory, the starting point was four fluids of life – blood, mucus, black bile, and yellow bile. Health was the normal mixture and balance of these life fluids. Fluid imbalances lead to pain and illness.

At the beginning of industrialization in the 18th and 18th centuries, another notable theory of medicine prevailed, the Miasma theory. The theory was based on a simple assumption that diseases were caused by changes in air concentration; diseases occur where there is dirt. Thus, all diseases are caused by bad air, which in turn is caused by rotting waste, dirt, etc. The Miasma theory led to effective environmental hygiene measures. It was the “scientific” basis and rationale for the 19th century public health movement.

Towards the end of the 19th century, the theory of the specific etiology of diseases intensified; each disease has its own and only a specific cause. Pasteur (1822–1895) and Koch (1843–1910) identified bacteria as pathogens. Although the Miasma theory and the humoral pathology it represented were a misconception, it emphasized the importance of the individual and his environment in the pathogenesis of disease. The specific etiology changed this perception as well as the research based on it. Despite the fact that, according to Vuori (1979), the theory of specific etiology can be considered perhaps the most important doctrine influencing the development of medicine, it resulted in a biological mindset that forgets social aspects and pushes the sick person into a trivial side role.

The shock of the First World War and the clinical findings of the Second World War e.g. war psychosis led to a reassessment of the origins of the disease, which was crystallized in the WHO definition (1946) “health is the perfect state of physical, mental and social well-being and not merely the absence of disease or infirmity”. Even if the definition were to be agreed upon, there was still controversy as to which health care system or extracurricular activity, e.g. people’s own activities, had a more important part in disease prevention and health determinants.

After the Second World War, health care systems were strongly developed everywhere, but in the 1970s it was possible to show that public health is affected by many factors outside health care and that influencing them is more effective than health care. (Melkas 2013.) Blum (1983) suggested that health is a broad concept understood as a state of balance between all the forces that guide human action and behavior. The key influences, he said, are the environment, heredity, lifestyles and the health care system.

The 1986 WHO Ottawa meeting proclaimed 'Health for All by the Year 2000' and beyond (WHO n.d.). At that time, the main lines of health promotion were defined, one of the main new emphases of which was that health promotion is not just a matter for the individual and the health sector, but for cooperation between different sectors of society as a whole for health. The declaration believed that health promotion is a process that allows people to increase health management and improve their health.

Despite the fact that health, its care and promotion were seen as diverse individual and societal activities, health problems associated with many non-communicable diseases, such as childhood obesity, inevitably increased in the population as we approached the turn of the millennium. Although attention had already been paid to the link between diseases and the life course in the early 20th century, scholars have not been interested in this perspective. Especially after World War II, the weight of adulthood factors such as behavior as an explanatory factor for disease increased. According to Kuh and Smith (1997), research conducted by the Norwegian Forsdahl in the 1970s re-emerged the hypothesis based on life course. His research showed an ecological link between childhood living conditions and deaths related to cardiovascular disease. At the same time, assumptions began to be made that, in the prevention of certain chronic

diseases, influencing lifestyles does not lead to significant results, but the diseases originate from an older period.

As early as the turn of the 1990s, research found new explanations for health formation: “You are not what you eat, but what your parents and grandparents ate.” Robinson (1992) spoke of a paradigm shift from lifestyle to life course. It can be said that the understanding of diseases and health determinants has evolved over the centuries from a simple and mechanistic model through many stages to an increasingly complex and dynamic view. Researchers (European... 2019), however, acknowledge that how to concretize e.g. health care activities on the basis of the life course thinking model is still limited.

In the 2010s, the WHO has begun to pay increasing attention to the life course perspective as a key factor in promoting and strengthening health (e.g. Health 2020; Glossary of life-course terms 2015; The Minsk Declaration 2016; WHO 2018):

Investing in health through a life-course approach and empowering people is the first priority area for policy action in Health 2020. Life-course principles also underpin the other three mutually supportive action areas of Health 2020, which focus on: Non-communicable diseases and communicable diseases; people-centered health systems, public health capacity and emergency preparedness, surveillance and response; and resilient communities and supportive environments. (WHO 2018.)

Life course health development (LCHD) -thinking

Although LCHD -thinking can be considered a relatively new view of health, for example, the titles and contents of various chapters in Bäckman’s (1987) book identify many key research trends in life course thinking such as critical life events, non-specific etiology, life cycle, etc., as early as the 60s. Today, there is a lot of international research on LCHD. Halfon and Forrest (2018)

see LCHD as a synthesis of a biomedical and biopsychosocial model influenced by many research traditions and new research trends, such as epigenetics (= gene readiness / operational readiness).

Simply put, LCHD is about intergenerational modification of disease and health. The groundbreaker of this kind of thinking was the so-called Barker's hypothesis (Barker et al. 1986).

According to it, factors influencing many public diseases are formed at a very early stage of fetal development. The first study by Bygren et al. (2001) showed that grandchildren of men, who were malnourished at a young age, die less than others from cardiovascular disease. A further study confirmed the finding that male grandchildren of men who spent their childhood in abundance and female grandchildren of women who lived in similar conditions had a higher-than-normal risk of developing diabetes (Kaati et al. 2002). These results can be interpreted in a way that today's childhood obesity epidemic is not only due to what children eat, but also to what their parents ate in the 1990s and 2000s, but also with what the children's grandparents ate in the 1970s and 1980s.

Another example relates to the fact that the semen quality of European men has deteriorated over the last thirty years. Not all reasons for this are known, but it is known that smoking damages the sperm of the unborn child (Anttila 2008; Li et al. 2011).

The future is 20 to 40 years away, but the previous generation is shaping it in advance. It could be said that the importance of LCHD -perspective to the work of health care actors is fundamental: to realize the intergenerational transformation of disease and health. In this case, the basics of action, such as individual health promotion, are understood not only as affecting the individual, but also as influencing the health of future generations.

Ontologically, the LCHD -perspective is related to human existence, not primarily to chronological age. The possibility to examine chronological age is not prohibited, as e.g. human development and life course are periodized by chronologically with age. Nevertheless, a person's experience of his or her own life is understood to be more meaningful than age rating. When a chronological age review is used, it is done consciously, not as given. From this perspective, basically, human development and aging are continuous processes through life, where the perspective and experiences of the individual operating in the world are at the core of his choices and actions, also in relation to health. In all communities and societies, life course is divided into life stages characterized by transitions, non-continuity, and discontinuity of continuity. These always change in some way, how we experience ourselves and how others experience us.

Halfon and Forrest (2018) summarize the LCHD -framework into seven principles:

1) Development: Health development integrates the concepts of health and developmental processes into a unified whole

Health-related traits can be thought of as “assets” that are desirable, acquired, optimized, and maintained over a lifetime, enabling an individual to grow, survive, and adapt to diverse environments. In this context, development refers to the processes by which health-affecting properties change. If health is understood as a set of characteristics that manifest at the level of the whole individual, development means the evolutionary processes by which these characteristics enable adaptation to changing social and environmental conditions. Health is “what” (what changes) and development is “how” (how health-related characteristics change over time).

2) Unfolding: Health development unfolds continuously over the lifespan, from conception to death, and is shaped by prior experiences and environmental interactions

Adaptation means that health development is neither linear, passive, nor static; rather, it is adaptive, self-organizing, and autocatalytic.

3) Complexity: Health development results from adaptive, multilevel, and reciprocal interactions between individuals and their physical, natural, and social environments

Complexity suggests that health development takes place in living systems that are not only adaptive, self-organizing, and autocatalytic, but also complex and hierarchically organized. The development of health cannot be fully understood from a traditional medical approach. Health development is based on the hierarchical relational relationships of biological and behavioral subsystems and their individual and collective relationships, as well as on various interconnected external systems such as the family, socio-cultural and ecological relationships.

4) Timing: Health development is sensitive to the timing and social structuring of environmental exposures and experiences

Timing means that the development of health is due to nonlinear interactions that are both time-specific and time-dependent. For example, there are sensitive periods in a child's life when the effect of certain exposures may be greater than during other periods.

5) Plasticity: Health development phenotypes are systematically malleable and enabled and constrained by evolution to enhance adaptability to diverse environments

Plasticity suggests that genes do not directly determine health, but that epigenetic processes control gene function.

To put it simply, heredity determines the boundaries within which an individual's traits can change, but the habitat modifies traits within those boundaries.

6) Thriving: Optimal health development promotes survival, enhances well-being, and protects against disease

Health modification allows individual resources to pursue goals and success. Thus, the qualities that develop during an individual's life course allow him or her to achieve goals and live a long life.

7) Harmony: Health development results from the balanced interactions of molecular, physiological, behavioral, cultural, and evolutionary processes

The balanced synchronization of human biological and physiological, on the one hand, and social and cultural processes, on the other, produces the "rhythms" and variations that characterize health modification. Loss of coordination of these processes leads to negative consequences in the human system.

In summary, LCHD-perspective combines health and development into a single structure (Principle 1) that opens "agilely" throughout life (Principle 2) according to the principles of complex adaptive systems (Principle 3). The change in health development is due to time-specific processes (Principle 4) that affect different human systems during sensitive periods (Principle 5) and the balance of different processes (Principle 7). Health development provides tools for individuals and populations to achieve desired experiences (Principle 6). Principles should not be understood as static, independent claims, but should be seen as a kind of set of nodes that are closely interconnected. (Halfon & Forrest 2018.)

Health formation over the life course

Perhaps the most attractive and obvious finding in favor of LCHD-perspective is found in epidemiological studies of childhood obesity, which show how childhood growth and obesity can affect many middle-aged health problems such as diabetes and cardiovascular disease outbreaks. On the other hand, it can be shown that the weight of the mother before and during pregnancy affects the course of childbirth, the probability of both infant obesity and lifelong obesity, and the possible consequences of obesity. (Hawkins et al. 2018.) According to Fleur et al. (2016), animal modeling is constantly providing more evidence that epigenetic processes can affect future generations and their health. According to them, there is a lot of evidence that this could also be the case for humans, for example, stressful events may affect childbirth for generations.

The theory of biological “programming”, based on the findings of the Barker group, emphasizes the importance of the fetal stage, while the theory of social “programming” (Kuh et al. 1997) emphasizes the study of biological development, growth and aging with living standards and living conditions, and social hierarchies change over time. Based on the so-called Barker’s hypothesis, fetal “programming” theory, a broader perspective on the emergence of chronic diseases and non-communicable diseases has been developed. It looks at the emergence of diseases against the whole course of life. This perspective combines biological, psychological, and sociological models and theories. In very simple words for example maternal nutritional status and health behaviors both before and during pregnancy affect fetal growth and development, but the contribution of health care workers also has an effect. This entity, in turn, has long-term effects on the health of both mother and child.

WHO sets out the key principles of the life-course approach and an agenda for action according to them in the Minsk Declaration (2016) in the Context of Health 2020. According to it the essentials of life course approach means:

- recognizing that all stages of a person's life are intricately intertwined with each other, with the lives of other people in society, and with past and future generations of their families;
- understanding that health and well-being depend on interactions between risk and protective factors throughout people's lives;
- taking action:
 - early to ensure the best start in life;
 - appropriately to protect and promote health during life's transition periods;
 - together, as a whole society, to create healthy environments, improve conditions of daily life, and strengthen people-centered health systems. (The Minsk Declaration 2016; WHO 2018.)

Acting from life-course perspective is the best way to health promotion

Over the past decade, genetic engineering and health technology have shifted attention to technologically and genetically engineered health. As health determinants, genes (genetic engineering) have begun to become more prominent in health speeches. On the other hand, the impact of environmental factors (eco-social public health paradigm) has, in recent years, brought to the debate the fundamental importance of environmental

factors as health determinants through environmental problems and disasters. LCHD-perspective connects this new mainstream from human behavior and does not forget to promote health. Against the background of LCHD, preconception health and care has taken on a whole new meaning: The roots of risk pregnancy and childbirth and life health status are most often found in the time before pregnancy, and perhaps in the choices of parents or even grandparents. Research is producing ever-increasing information on how and in what way chronic diseases and perhaps many other diseases, as well as health in particular, are intergenerational processes. In health care operations, this means understanding the past of the future: What we do today is the past of the future.

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