



Lecture 1

Introduction to ageing

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Gerontology and Geriatrics



Geriatrics – the branch of medicine specializing in the medical care and treatment of the diseases and health problems of older adults (disease related aspects)

Gerontology – the study of biological, behavioural and social phenomena from maturity to old age (healthy related aspects)



Ageing Research



Ageing studies lagged behind other lifespan research because...

Assumption that by the time adulthood is reached, personality is formed and no further developmental change occurs.

Assumed that both physical and psychological functions develop up to the point of maturity – then comes a decline in functioning – so why study this cohort.

The number and proportion of older adults was relatively small



Reasons for studying ageing



Scientific- adult development based on studies with young adults.

- But do the findings apply to older adults?
- If not, the studies may have limited scientific value.
- Different findings for young versus older adults can have significant theoretical implications.

Personal- give us insight into the changes we are experiencing/can experience.

- Help us to plan retirement
- Concern for others –friends and family

Practical- older adults are a rapidly growing cohort

- Health workers can anticipate increased contact
- Medical services to spend much of their time with elderly.
- Education- older adults
- Employers – in work for longer
- Manufacturing – older adult aids

Definitions



Chronological age - most common measure

Measured in units of time (months or years)

Biological age

Where people stand relative to the number of years that they will live (their longevity) E.g. someone lived to chronological age of 70 – considered biologically old at 65, another lives to 90, 65 not considered biologically old.

Social age

The views held by most members of society regarding what individuals in a particular chronological age group should do and behave. E.g. expectation – leave education by early 20s, marry by late 20s, have children in 30s and career by 40. someone who becomes a parent at 42- socially younger than a parent at 28.

Functional age

A person's competence to carry out specific tasks – comparison with peers. E.g. 85 year old still drives in the dark would be considered functionally younger than his chronological peers who have given up driving in the dark. This man might have severe arthritis in his legs and cannot walk around the block – beneath his peers.

Psychological age

How well a person adapts to changing conditions (cog, personal, social skills) those who can adapt are considered psychologically younger than those who find it hard.



Definitions

Subjective age

The chronological age people select to mark the onset of older adulthood is coloured by their own age or stage of adulthood.



Those in 20s think middle age starts in the 30s and older adulthood starts in the 50s but not later than 60s. Whereas, those in their 60s consider themselves to be middle-aged.

As adults become older chronologically, **the gap between their chronological age and their subjective age becomes wider** (Goldsmith & Heiens, 1992) – they feel younger than they are.

Also the gap between subjective age and actual age is **wider for middle-aged and older adult women than it is for middle-aged and older adult men** (Montepare & Lachman, 1989)

Definitions

The magic age of 65



The age 65 has come to signify the official age of entry into older adulthood

Increased to 67 – this may cause an increase in chronological age associated with older adulthood .

This can be traced back as far as the 1940s – the social security - provided economic security for those 65 and over in the form of a pension



Demographics in the UK



In 2017 - 579,776 people aged 90 years and over living in the UK, including 14,430 centenarians.

The 90 years and over population continues to increase despite a decline in births in England and Wales 90 years ago; this reflects improvements in mortality going back many decades.

The number of centenarians has increased by 85% over the last 15 years, although centenarians still make up only 2.5% of those aged 90 years and over.

The sex ratio at older ages continues to narrow, with two women aged 90 to 94 years for every man in that age group, and fewer than five women for every male centenarian.

Across the UK, Wales has the highest proportion of residents aged 90 years and over, and the highest proportion of centenarians.

Successful Ageing

Avoid serious, debilitating diseases and disability.

Maintain cognitive function.



Able to cope with physical, social, and emotional changes

Sense of control of their lives

Engage independently in most normal activities of daily living.





Discussion Questions



What effects do having a purpose and being active have on attitudes toward life, wellness, and aging?



Do your parents intend to retire? Do you think they should?



Should older people be forced to stop working when they reach a certain age?





Theories of Ageing



Biological Theories

address the anatomic and physiologic changes occurring with age.



Psycho-Social Theories

explain the thought processes and behaviours of aging persons.





Biological Theories

http://sureshrattan.com/wp-content/uploads/2015/11/Rattan_Theories_FRR20061.pdf



Explanations of:

- 1) deleterious effects leading to decreasing function of the organism
- 2) gradually occurring age-related changes that are progressive over time
- 3) intrinsic changes that can affect all members of a species because of chronologic age

http://www.azinet.com/aging/aging_theory_introduction.pdf

All organs in any one organism do not age at the same rate

Modern biological theories

Two main categories: programmed and damage or error theories
(Orgel, 1963)



Programmed theories - aging follows a biological timetable, a continuation of the one that regulates childhood growth and development.



This regulation would depend on changes in gene expression that affect the systems responsible for maintenance, repair and defense responses.

The damage or error theories emphasize environmental assaults to living organisms that induce cumulative damage at various levels as the cause of aging.

Modern biological theories

The programmed theory has three sub-categories:

- 1) *Programmed Longevity*. Aging is the result of a sequential switching on and off of certain genes, with senescence being defined as the time when age-associated deficits are manifested.
- 2) *Endocrine Theory*. Biological clocks act through hormones to control the pace of aging.
- 3) *Immunological Theory*. The immune system is programmed to decline over time, which leads to an increased vulnerability to infectious disease and thus aging and death. It is well documented that the effectiveness of the immune system peaks at puberty and gradually declines thereafter with advance in age.

Modern biological theories

The damage or error theory include:

Wear and tear theory.

Cells and tissues have vital parts that wear out resulting in aging. Like components of an aging car, parts of the body eventually wear out from repeated use, killing them and then the body (Weismann, 1882)

Rate of living theory.

The greater an organism's rate of oxygen basal metabolism, the shorter its life span (Brys, Vanfleteren and Braeckman, 2007).

The organs, liver, stomach, kidneys, skin and so on are **worn down by toxins** in our diet and in the environment; by the excessive consumption of fat, sugar, caffeine, alcohol and nicotine; by the ultra-violet rays of the sun and by the many other physical and emotional stresses to which we subject our bodies.

Cells simply wear out over time because of continued use-- rather like a machine

Wear and tear is not confined to our organs, however; it also takes place on the cellular level.

Programmed (Hayflick Limit) Theory



The body's genetic code regulates cellular reproduction, aging, and death.

Aging is based on an internal built-in genetic "clock" and follows a pre-set biological timetable.

..growing old is not a result of a series of random events, but genes program age-related molecular and cellular changes.

<https://www.youtube.com/watch?v=R5YiO6rKr-w>

Based on lab experiments on fetal fibroblastic cells and their reproductive capabilities in 1961

Life expectancies are seen as preprogrammed within a species-specific range

Cells can only reproduce themselves a limited number of times.

Cross-Linkage Theory (Bjorksten, 1942)

Some proteins in the body become cross-linked, thereby not allowing for normal metabolic activities

Waste products accumulate

Result: tissues do not function at optimal efficiency

Some research supports a combination of exercise and dietary restrictions in helping to inhibit the cross-linkage process

Once this binding has occurred the protein becomes impaired and is unable to perform as efficiently.

Living a longer life is going to lead to the increased possibility of oxygen meeting glucose and protein and known cross-linking disorders include senile cataract and the appearance of tough, leathery and yellow skin (e.g., cut apple)

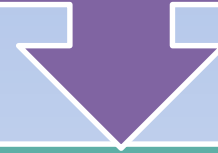




Free Radical Theory



Free radicals are a byproduct of normal cell function. When cells create energy, they also produce **unstable oxygen molecules** = free radicals



Free radicals have a free electron that makes the molecule highly unstable



The free radical **bonds to other molecules** in the body = malfunction in proteins and other essential molecules



<https://www.youtube.com/watch?v=dIZ5ROca0KI>

Harman (1956)

How Free Radicals Cause Aging



Many of the changes that occur as our bodies age are caused by free radicals.

This theory does not fully explain all the changes that occur during aging. It is likely that free radicals are only one part in the aging equation.

Damage to DNA and protein cross-linking and other changes have been attributed to free radicals.

Free radicals are also implicated in the development of plaques associated with Alzheimer's

Over time, this damage accumulates and causes us to experience aging.

Immunity Theory

Immunosenescence: Age-related functional diminution of the immune system

Lower rate of T-lymphocyte (“killer cells”) proliferation in response to a stimulus

& therefore a decrease in the body’s defense against foreign pathogens



Changes include a decrease in humoral immune response, often predisposing older adults to:

- 1) decreased resistance to a tumor cell challenge and the development of cancer
- 2) decreased ability to initiate the immune process and mobilize defenses in aggressively attaching pathogens
- 3) increased susceptibility to auto-immune diseases (Celiac, Arthritis, MS, Diabetes)





Metabolic Theory of Aging (Caloric Restriction)

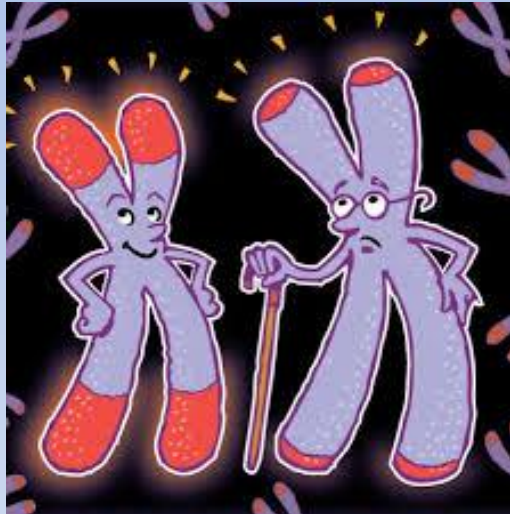
“...proposes that all organisms have a **finite amount of metabolic lifetime** and that organisms with a higher metabolic rate have a shorter lifespan”. (p. 24)

Rodent-based research has demonstrated that caloric restriction increases the lifespan and delays the onset of age-dependent diseases

DNA-Related Research

Major Developments

Mapping the human genome (“...there may be as many as 200 genes responsible for controlling aging in humans”)



Discovery of telomeres

(a region of repetitive nucleotide sequences at each end of a chromosome, which protects the end of the chromosome from deterioration or from fusion with neighbouring chromosomes).



SOCIOLOGICAL THEORIES OF AGING



Disengagement Theory

Activity/Developmental
Task Theory

Continuity Theory

Age Stratification
Theory

Person-Environment Fit
Theory

Changing FOCUS of Sociological considerations of aging:



60's focus on
losses and
adaptation to
them



70's broader
global, societal,
and structural
factors influencing
lives of OA's



80's-90's
exploration of
interrelationships
between OA's and
their physical,
political,
environmental &
socioeconomic
mileau



Disengagement Theory



Cumming & Henry--1961

No longer supported

Aging seen as a developmental task in and of itself, with its own norms & appropriate patterns of behaviour

“appropriate” behaviour patterns involved a mutual agreement between OA’s and society on a reciprocal withdrawal.

Activity Theory (Developmental Task Theory)

Havighurst,
Neugarten, Tobin
~1963

“Activity is viewed
by this theory as
necessary to
maintain a person’s
life satisfaction and
a positive self-
concept”. (p.27)



Activity, cont'd



Theory based on assumptions:

- 1) it's better to be active than inactive
- 2) it is better to be happy than unhappy
- 3) an older individual is the best judge of his or her own success in achieving the first two assumptions

Continuity Theory



How a person has been throughout life is how that person will *continue* through the remainder of life

Old age is *not* a separate phase of life, but rather a continuation and thus an integral component



Age Stratification Theory

Riley--1985

Society consists of groups of *cohorts* that age collectively

The people & Roles in these cohorts change & influence each other, as does society at large

Thus, there is a high degree of interdependence between older adults & society





Person-Environment Fit Theory

Lawton, 1982



As a person ages, there may be changes in competencies & these changes alter the ability to interrelate with the environment

Significant implications in a society that is characterized by constantly changing technology

Individuals have personal competencies that assist in dealing with the environment:

ego strength

level of motor skills

individual biological health

cognitive & sensory-perceptual capacities

PSYCHOLOGICAL THEORIES OF AGING



Maslow's
Hierarchy of
Human Needs

Jung's Theory
of
Individualism

Erikson's Eight
Stages of Life

Peck's
Expansion of
Erikson's
Theory

Selective
Optimization
with
Compensation

What have we learned today...

What is ageing and gerontology?

Attitudes

Ageing demographics

Ageing theories

Homework

- Watch the video on moodle – biological ageing
- Read Chapter 3 on moodle (Lang and Grossman)