The Developing Person Through the Life Span 8e
by Kathleen Stassen Berger

Chapter 24 – Late Adulthood: Cognitive Development

PowerPoint Slides developed by Martin Wolfger and Michael James
Ivy Tech Community College-Bloomington
Reviewed by Raquel Henry
Lone Star College, Kingwood
The Aging Brain

• Senescence reduces production of neurotransmitters that allow a nerve impulse to jump quickly.
• Results in a brain slowdown, seen in reaction time, talking, and thinking.
• Brain slowdown correlates with slower walking and most other physical disabilities.
Brain Slowdown

- Brain senescence varies markedly from individual to individual.

- The suggested reasons include gender, education, experience, and elders’ assessment of whether their everyday activities are restricted by their health.
Evidence from Neuroscience

- The hypothalamus (memory) and the prefrontal cortex (planning, inhibiting unwanted responses, and coordinating thoughts) shrink faster than other areas.
- Complicated relationship among past education, current mental exercise, and intellectual functioning in late adulthood.
  - Schooling may slow the rate of brain shrinkage.
  - Good health may protect the brain more than education.
  - Education strengthens inhibition, the ability to say no or keep quiet
    - This masks impairment when the prefrontal cortex shrinks.
Using More of the Brain

Older adults use more of their brains to solve problems. Possibly due to:

• *Compensation:*
  – Using one brain region is inadequate for complex thinking, so older adults automatically use more parts.
  – Intellectual output may be unimpaired, even though the process of thinking has changed.

• *Reduced brain reserves*
  – Insufficient reserves may make challenging tasks too hard.

• *Wandering minds*
  – Brain stops using a focused region for each function, inhibition fails, attention wanders, and thinking becomes diffuse.
Multitasking

- Older adults who were better at working memory and multitasking used their prefrontal cortex, those who were worse did not.
- Multitasking slows down people of every age, but older adults more so.
- Older adults usually need to concentrate on one task at a time.
The Usual: Information Processing After Age 65

Input

- Some information never reaches sensory memory in older people because the senses never detect the stimuli.
- The brain automatically fills in missed sights and sounds.
  - Most older people believe they see and hear whatever is important but vital information may be distorted or lost without the person realizing it.
Interference

• A major block to efficient and effective cognition in the elderly.

• Vital information may be lost because other, less important information captures attention.

• Interference impedes thought, especially if many sensations occur quickly.
Memory

Working Memory

• Brain slowdown reduces working memory
  – Older individuals take longer to perceive and process sensations.

• Reduced working memory inhibits multitasking.
  – When older people can take their time and concentrate, their working memory seems as good as ever.
  – Concentration may crowd out other mental tasks that a younger person could do simultaneously.
Memory

• Long-Term Memory
  – It is difficult to get an accurate assessment of long-term memory.
  – Emotional memories encoded at one point in life tend to endure, without much loss or distortion.

• Recognition
  – At every age, recognition memory is better than recall.
Long-Term Memory

Memory of Young and Old Adults

<table>
<thead>
<tr>
<th>Score</th>
<th>Young</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Recall of 10 words (maximum score = 10)
- Regarding 9/11, soon after event
- Regarding 9/11, 2 years later

Memory for 5 specific details (rated 0, 1, or 2; maximum score = 10)

Source: Kvavilashvili et al., 2010.
Control Processes

• The part of the information-processing system that consists of methods for regulating the analysis and flow of information.

• Useful control processes include memory and retrieval strategies, selective attention, and rules or strategies for problem solving.

• Become less effective with age
Reminding People of What They Know

Priming

• A control strategy where words or ideas are presented in order to make it easier to remember something.
• With proper control processes, cognition in late adulthood can be good.
• Stereotype threat can trigger anxiety, fear, and depression hurt cognition and learning potential.
Output

• Gradual decline in output of primary mental abilities (e.g., verbal meaning, spatial orientation, inductive reasoning, number ability, word fluency) is normal.

• Two important modifiers are health and training
Health and Well-Being

• Health is measured by mortality, morbidity, disability and vitality.
  – A better predictor of cognition than age.

• Terminal decline
  – An overall slowdown of cognitive abilities in the weeks and months before death
  – Those who have many more decades to live experience much less decline.
Training

- Another important modifier of cognitive decline.
- Studies show that training can improve any cognitive ability, even for the very old.
Ecological Validity

• The idea that cognition should be measured in settings that are realistic and that the abilities measured should be those needed in real life.
The Impaired: Diseases that Affect the Brain

• **Dementia**
  – Irreversible loss of intellectual functioning caused by organic brain damage or disease.
  – Becomes more common with age, but it is abnormal and pathological even in the very old.

• **Delirium**
  • A temporary loss of memory, often accompanied by hallucinations, terror, grandiosity, and irrational behavior.
# The Impaired: Diseases that Affect the Brain

## Table 24.1

<table>
<thead>
<tr>
<th>Age</th>
<th>All Dementia (%)</th>
<th>Alzheimer Disease (%)</th>
<th>Vascular Dementia (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70–79</td>
<td>5</td>
<td>2.3</td>
<td>1</td>
</tr>
<tr>
<td>80–89</td>
<td>24.2</td>
<td>18.2</td>
<td>4.1</td>
</tr>
<tr>
<td>90+</td>
<td>37.4</td>
<td>29.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Overall (70+)</td>
<td>13.9</td>
<td>9.7</td>
<td>2.4</td>
</tr>
</tbody>
</table>

*Source: Plassman et al., 2007.*
Alzheimer Disease

Alzheimer disease (AD)

- The most common cause of dementia, characterized by gradual deterioration of memory and personality and marked by the formation of plaques of beta-amyloid protein and tangles of tau protein in the brain.
- Also called senile dementia of the Alzheimer type (SDAT).
Alzheimer Disease

Genes and Alzheimer Disease

• AD in middle age is rare, usually caused by genes (e.g., Down syndrome), and progresses quickly.
• Most cases begin much later and many genes have some impact (e.g., SORL1 and ApoE4).
• Genetic tests for AD in late adulthood are rarely used before symptoms appear because they might evoke false fear or deceptive reassurance.
Stages: From Confusion to Death

Mild Cognitive Impairment

- Forgetfulness and loss of verbal fluency that often comes before the first stage of AD.
- About half will become demented, but some stabilize with mild impairment and others regain their cognitive abilities.
Stages: From Confusion to Death

Beginning Stages:

- Forgetfulness, personality changes
- Memory loss eventually becomes dangerous

Final stage

- Full-time care is needed, communication ceases
- Identity and personality are lost, death comes 10-15 years after the first signs appear
Vascular Dementia

Vascular dementia (VaD)

• A form of dementia characterized by sporadic and progressive loss of intellectual functioning caused by repeated infarcts, or temporary obstructions of blood vessels, which prevent sufficient blood from reaching the brain.

• Also called multi-infarct dementia.
Frontal lobe dementia

- Characterized by personality changes
- Caused by deterioration of the frontal lobes and the amygdala.
- Also called *frontotemporal lobar degeneration*.
Other Dementias

Parkinson disease

• Does not always lead to dementia

• Starts with rigidity or tremor of the muscles as neurons that produce dopamine degenerate.

• Younger adults with Parkinson disease may avoid dementia for years; older people develop dementia sooner.
Other Dementias

Lewy body dementia

- Named after round deposits of protein (Lewy bodies) in the neuron.
- Numerous and dispersed throughout the brain.
- Motor movements and cognition are impacted.
- The main symptom is loss of inhibition.
Prevention and Treatment

• Regular physical exercise
  – Reduces the incidence of all forms of dementia by half.

• Avoiding the pathogens that cause dementia
  – Testing beef for mad cow disease
  – Using condoms to protect against AIDS
  – Treating syphilis with antibiotics
Prevention and Treatment

Steps:
1. Taking care of the overall health of the person
2. Getting a proper diagnosis
3. Starting appropriate treatment

There is a need for trained professionals who are able to provide individualized medical and psychological care for the patient and the family, who shoulder most of the burden of caring for people with dementia.
Reversible Impairment

• Accurate diagnosis is crucial when a person is wrongly thought to have dementia.
• The most common reversible cause of dementia symptoms is depression.
• Malnutrition, dehydration, brain tumors, physical illness and overmedication can cause dementia-like symptoms.
Reversible Impairment

• With age, bodies become less efficient at digesting food and using its nutrients.

• Polypharmacy
  – When the elderly are prescribed several drugs and the side effects can cause dementia symptoms
  – Some drug combinations can produce confusion and psychotic behavior
The Optimal: New Cognitive Development

Erikson and Maslow

- **Integrity vs. despair**
  - The final stage in Erikson’s model in which older people gain interest in the arts, in children, and in human experience as a whole.

- **Self-actualization**
  - The final stage in Maslow's hierarchy of needs, characterized by aesthetic, creative, philosophical, and spiritual understanding.
The Life Review

Life review

• An examination of one’s own part in life, which often takes the form of stories written or spoken by elderly people who want to share them with younger ones.
Wisdom

- An expert knowledge system dealing with the conduct and understanding of life.
- Life review, self-actualization, and integrity are considered parts of wisdom.
- Some elderly people are unusually wise.