Cognition Through the Lifespan

Cognitive Functions

• Orientation
  – Ability to know one’s self, time and place
• Attention
  – Ability to concentrate
• Memory
  – Immediate recall
  – Short-term memory
  – Remote or long-term memory
• Judgment
• Perception
• Language

Individual- Developmental Stage - Environment

• The interrelationships between the individual, the developmental stage and the environment are extremely important.
  – Decreased levels of cognition or perception require increased levels of environmental control.
  – Developmental stages play a significant role.
• Cognitive functioning of the individual must be evaluated within the context of the environment.

Cognition

• Process with which one learns about the world and the objects in it and to understand the relationship between objects, between themselves and their world
• Cognition is the ability to learn and understand from experience, to acquire and retain knowledge, to respond to a new situation and to solve problems
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Cognitive Theorists

• Beck’s Cognitive Theory
• Behavioral-cognitive theorists
  – Ellis: Rational Emotive Therapy
  – Glasser: Reality Therapy
• Social Learning Theorists
  – Bandura
• Cognitive development Theorists
  – Piaget

Cognitive Development in Children

• Children are born with inherent potential for intellectual growth
• Develop that potential by interacting with the environment
• Assimilating information through the senses, processing it
• Language, morals and spiritual development emerge as cognitive abilities advance
Cognitive Development in Children

- Progressive acquisition of higher levels of cognitive skills
- Natural unfolding of ability
- Each stage is a foundation on the next
- Sequentially predictable cognitive abilities
- Given adequate stimulation and an intact neurological system, the child gradually matures to be able to fully conceptualize
- Proceeds from motor activity to social interaction and finally abstract thought

Piaget

- Piaget viewed the child as a biological organism acting on the environment
- Child’s goal is to master the environment or to establish harmony or equilibrium between the self and the environment
- Piaget’s cognitive theory focuses on how the mind works rather than what it does

Piaget Concepts

- Assimilation
  - Taking in new information
- Accommodation
  - Revise and readjust the cognitive structure for the new content
- Adaptation
  - Change that results from assimilation and accommodation
- Schema
  - A cognitive structure
  - Pattern of action or thought
  - A complex concept of motor and internalized thought process

A scheme is used to assimilate (take in) new experiences or a scheme can be accommodated (modified) by new experiences

Piaget’s Stages

- Sensorimotor
- Preoperational
- Concrete operations
- Formal operations

AVAILABILITY OF PLAY AND THE QUALITY OF THE PARENTAL INVOLVEMENT ARE THE 2 MOST IMPORTANT VARIABLES RELATED TO COGNITIVE DEVELOPMENT DURING INFANCY AND PRESCHOOL
Infancy
0-12 months
Cognitive Development

Early Sensorimotor Phase
Infancy
• Birth to 24 months
• Progress from reflexes to simple repetitive acts to intentional and imitative behavior
• Learns through motor activity without the use of symbols.
• Knowledge of the world is limited (but developing) because its based on physical interactions / experiences
• Hand-mouath and ear-eye
• Recognize new experiences and repeat pleasurable ones
• Grasping, reaching, listening

• 3 crucial events occur during this stage
  – separation,
  – object permanence and
  – ability to use symbols and mental representation

Separation
• Separate themselves from other objects in the environment
• Understand that others control the environment
• Must make adjustments for mutual satisfaction to occur
• Body image
  – Child is separate and distinct from parents
  – Motor skills help child to explore themselves
  – Transmit messages about themselves

Separation anxiety
• Separation anxiety (4-9 months)
• Stranger fear: recognize the difference between familiar and unfamiliar
• Parent returns to work
• Introduction of child care

Object permanence
• Objects that leave the visual field still exist
• Acquired at about 9-10 months
• Peek a boo
• Highchair play
Symbols and Mental Representations

• Use of symbols
  – Beginning of communication
  – Associates symbols with events
• Child is able to think of an object or situation without actually experiencing it
  – Based on own experience
  – Beginning to understand time
  – Before and after

Symbols and Communication

• Language moves from reflex–crying
• Syllables and words–mama,
• 3-4 mo coo, gurgle and laugh
• 9-10–comprehension of NO
• 10-11 mo–meaning attaches to words
• 12 mo–3-5 meaningful words

Perception in Infancy

• Perception is the recognition of an event within the environment
• From birth the infant possesses sensory capabilities
• Senses become organized neurologically into a pattern of behavior that will influence all subsequent development
• You will use this knowledge to of the infants perception to facilitate parent/child interaction and to guide parental counseling

Vision in Infancy

• Visual impressions are unfocused, strange and without meaning
• Stimuli must be bright, moving or flashing to capture the infant’s attention
• Eyes are well developed but the muscles that move the eyes are not
• Un coordinated until 3-6 months

Hearing in Infancy

• Can hear in utero
• Hearing is acute
• One of the better senses developed at birth
• Can distinguish between frequencies and turn toward a voice or sound
• Sounds gradually gain significance and meaning as they are associated with caregiving, food or pleasure

Smell in Infancy

• Fully developed at birth
• Within 2 weeks the infant can distinguish the odor of mother’s milk
• Association of parents’ body odors is important to the infant/parent bonding
Touch and Motion in Infancy

- Tactile sensation is well developed at birth, especially the lips and tongue
- Perception of motion and touch important
- Rocking and skin to skin touching
- Touch helps to relieve unspent tensions of the infant and accelerates neuromuscular development (Olds, et al, 1996)

Language in the Infant

- Follows a sequence
- Crying is a communication
- 2-3 months cooing
- 6 months babbling
- 9-10 2 syllable sounds
- 12 mama, dada, bye bye

Late Sensorimotor Phase

Young Toddler

- 12-18 months
- Memory beginning
  - Some symbolic (language) abilities are developed at the end of this stage
- Solves problems by trial and error experimentation
- Mobility allows the child to begin developing new intellectual abilities.
- Physically manipulates new object to determine how the new thing works

Older Toddler

- Toddlers imitate living and nonliving objects
- Imitation is an example how the toddler “analyzes” an event before engaging in the activity
- Play takes on an increasingly symbolic meaning in the activity
  - fun and pleasure remains
  - play objects represent another object (block is a bus)
Older Toddler

- Object permanence is achieved
- The object exists and it has permanence even though it can not be seen

Egocentricism

- Egocentric in thinking and behavior
- Things and events are seen from a personal and narrow perspectives and are happening because of self
- Sees everything through their own perspective and not realizing that other points of view exist
- Inability to envision situations from other’s perspective
- Inability to share–only for themselves — not selfish

Temper Tantrums

- Toddlers delight in their own skills and love repeating actions for an appreciative adult
- Verbal praise, smiles or hand clapping are effective reinforces at this age
- Toddlers will often take on tasks which are beyond their abilities—result in frustration and the well known temper tantrum

Preoperational Phase

- 2-4 years
- Increased use of language and symbolic thinking
- A word, gesture or image stands for the and object, person or event
- Memory and imagination are developed
- Thinking is done in a nonlogical, nonreversible manner
- Egocentric thinking predominates

More socialized

- Preconceptual stage goes from purely self satisfying behaviors to early socialized behavior
- Becoming more interested in other children
- Play for the child younger than 3 is rarely shared
  - parallel play is the rule
  - doing a similar thing, but not working together

Play and Symbols

- Symbolic meaning of play
- Child will act out entire scenes of imagined event
- Imaginary companions
- Child gathers facts as they are encountered and neither separate reality from fantasy nor classify or define events systematically
Communication and symbols

- Increase use of language as mental symbol
- Language does not fully represent the thought processes nor does it fully express the symbolism in thought capacity
- Relationships between the representative symbol and the object itself exists internally first, before it can be expressed in language

Vision in Toddler

- Depth perception is poor (clumsy)
- Acuity is improving 20/30
- Recall of images which increasing skill to describe past events
- Strabismus and amblyopia (0-4 years)
- Screen for strabismus, cataracts, light reflex

Language in the Toddler

- Language, memory and decision-making
- 18-24 months
  - short phrases
- 30 months
  - understands up to 2400 words and
  - uses 425 word

Pre-School

3-5 years

Cognitive Development

Preoperational

Preschool

- Egocentrism
- Concrete thinking
- Animism
- Magical thinking
- Fantasy and reality
- Absolute thinking

Egocentrism

- Unable to envision situations from perspectives other than one’s own
- Cannot take into account more that one factor in solving a simple problem
- Visual limitations, one perspective only
- Explanations of “hurting”
Concrete Thinking

• Ability to function symbolically using language
• Child runs through the mental representations as if he/she were participating in the event
• The real event is necessary

Animism

• Endowing all things will qualities of life
• Preschooler fluctuate between reality and fantasy and
• Fluctuate between materialistic and animistic point of view
• When injured, the toy hurt him/her

Magical Thinking

• Believes that thoughts are all powerful and can cause events
• Wishes bad for someone and it happens
• Someone gets sick, divorce or death

More Preschool Cognition

• Absolute thinking
  – all or nothing)
• Centrism
  – Thoughts are centered
  – focused on a single aspect of an object
  – distorted thinking
• Concepts of time
  – child can differentiate today, yesterday, tomorrow

Role of Play

• Exploration and manipulation, children learn the significance of objects, associate words with objects, develop and understanding of abstract concepts and spatial relations (up, down)
• Puzzles–problem solving
• Books, stories–expand knowledge
• Opportunities to practice and expand language
• Relive past experiences and incorporate them into new perceptions and relationships
• Comprehend the world they live in
• Distinguish between fantasy and reality

Play and the Preschooler

• Play becomes more orderly, incorporate more reality into play, increasingly imitate the social rules of society
• More social interactive play
• Imaginary friends
  – totally controlled by the preschooler
  – practice social interactions with IF
  – control a friend or fear
  – blame someone for mishaps
Vision in the preschoo ler

- Maximal vision is achieved by end of preschool years
- Deteriorates from here on
- Screen for all previous and acuity

Hearing in the preschoo ler

- Reaches maturity between 3-4 years
- Critical to development of speech and language
- Seek repetition of auditory input and so may endlessly repeat a combination of sounds or words
- Otitis media
- Screen
  - gross, play audiometry
  - receptive language and expressive language

Language in the Preschooler

- 3 years
  - Uses plurals
  - Knows name
  - Know prepositions
- 4 years
  - Uses longer phrases and sentences
  - Understood by others
  - Asks many questions

School Age 5-11 years

Cognitive Development

School age and Concrete Operations

- Based on the child’s mental action
- Depend on the ability to perceive concretely what has happened
- Child moves from egocentric interactions to more cooperative interactions
- Logical and systematic manipulation of symbols related to concrete objects.
- Mental actions that are reversible

Cognitive Accomplishments School age

- Conservation of matter
- Concept of time matures
- Classifies and groups
- Moves from intuitive to logic or rational operations
- Orders
- Nesting
- Reversibility
Conservation of Matter

• Certain properties of an object remain the same, in spite of changes in other properties

Concept of Time

• Past and present
  – history
• Young and old person

School Age Cognition

• Sorting
  – objects in groups according to specific and multiple attributes
• Ordering
  – objects according to decreasing or increasing measure
• Nesting
  – understanding how a sub concept fits into a larger concept
• Reversibility
  – returning to a starting point or performing opposite actions

Vision in the Schoolager

• 20-30% of this age group do not have normal vision
• 75% are not detected for a long period
• Myopia (nearsightedness) caused by an elongated eyeball
• Astigmatism blurred vision caused by poorly focused image on the retina
• Screen

Hearing in the Schoolagers

• Hearing deficits are less common
  – 3-5% have hearing deficits
• Language
  – can understand and speak, begin to read and write
• Screen hearing regularly
  – audiometry and tympanogram
• Assessment tools for primary care
• Psychoeducational evaluations for learning disabilities

Adolescence

Cognitive Development
Piaget’s Theory

Formal Operations Stage
• Piaget uses the term formal to represent the adolescent’s focus on the “form” of thought, objects, and experiences rather than on the exact content.
• Adolescents have the ability to see new kinds of logical relationships between classes or between and among several different properties.
• Main feature - children can enter into possibilities beyond the world of reality and use hypothetical-deductive reasoning.

A time of change
• Tend to be extremely idealistic
• Constantly challenge the way things are
• Consider the way things could be or ought to be.
• May totally discard what is.
• Introspective
• Feel they have a special destiny or are immortal

Education of Adolescents in the US
• Emphasis in education and the work world is on logical, analytical, critical and convergent thinking. The goals of this are precision, exactness, consistency, and correctness of response. (left hemisphere)
• Original concepts do not necessarily arise from logical thinking but with newfound ability to have abstract thinking adolescents may have interest in music art etc.
  – Creativity uses the right hemisphere

Gender Differences
• There are no overall differences between female and male adolescents’ intelligence
• Females have shown greater verbal skill and often show a preference for literature, composition, history etc.
• Males show more facility with quantitative and spatial problems and prefer math and science.
• These differences are the result of interest, social expectations, and training rather than different innate mental abilities.

Physical Patterns
• Brain cell development reaches its peak in the twenties.
• Memory is thought to peak at the time when brain weight peaks and then slowly begin to degenerate around age 30.
  – In the 20’s young adults make good use of their “gray cells” trying to learn and do well which enhances their cognitive abilities.
• The physical senses like vision and hearing are at their peak around age 20
**Piaget’s Theory**

*Stage of formal operational thought*
- Allows a person to analyze all combination of possibilities and construct hypotheses that are capable of being tested.
  - Thoughts become more perceptive and insightful
  - Issues therefore are evaluated more realistically and objectively
  - Can contribute to social and occupational decision making
  - Although tend to take greater risks, usually demonstrate the use of appropriate reasoning and analytical approaches.
- Young adults use formal operational reasoning as long as the social environment and acquired experience provide sufficient cognitive and intellectual stimulation.
- Young adult intelligence is an excellent predictor of older adult performance

**Mental Patterns**

- Young adults have an achieving, task-related and more competitive style of cognitive behavior.
- Intellectual maturity is necessary for adult decision making and older adults tend to become more responsible.
- Young adults tend to apply their cognitive skills toward entering the world of work, establishing their own family units and meeting their own personal goals.
- The development of intellectual maturity influences the selection of behaviors and attitudes that affect health and well-being practices.

**Gender Differences**

- Brain structure is the same in men and women.
- The female’s brain matures earlier; thus the two hemispheres are more integrated in the female
- As adults, women are better able to coordinate activities of both hemispheres; thus they can think intuitively and globally.
- Men are better at activities in which the two hemispheres do not compete, such as problem solving and determining spatial relationships.

**Middle Age Adult 30’s and 40’s**

*Cognitive Development*

**Physical Patterns**

- Vision –
  - Presbyopia, or farsightedness, begins and is easily corrected with glasses
- The other senses remain stable until age 45 to 50.

**Mental Patterns**

- Intellectually, the thirties and forties are very good years.
  - The brain weight begins a gradual and progressive shrinking that causes impulses to travel slightly more slowly, and that in turn causes a decrease in reaction time. Mental sharpness is still high.
Fluid and Crystallized Abilities

- Fluid intelligence –
  - Refers to capabilities such as associative memory, abstracting, inductive reasoning and problem solving.
  - Dependent on neurophysiological functioning and intact CNS
  - May diminish slightly following adolescence
- Crystallized intelligence –
  - Refers to skills such as verbal comprehension and handling of word relationships
  - Dependent on learning and experience
  - May increase with advancing years
- The average intelligence may look about the same over the middle years because the increases in crystallized intelligence balance the loss in fluid intelligence.

Cognitive Development

- Reaction time or speed of performance-
  - Is individual and generally stays the same or diminishes during late middle age.
- Time for new learning
  - Decreases with age but ability does not change
- Memory
  - Maintained through young and middle adulthood
  - Some quantitative changes
  - Memorize less readily if material is oral or disorganized
- Learning
  - Capacity of growth is unimpaired and enhanced by interest, motivation, flexibility, humor, confidence and maturity.
- Problem-solving abilities
  - When there is no time limitation, there are no task differences

Beyond Piaget

- Piaget states formal operations is the final period.
- Arlin proposed a problem finding stage or post formal thought characterized by creative thought in the form of discovered problems, use of intuition, insight and development of significant scientific thought.
- Schaie proposed that different experiences provide different stages of cognition based on problems to be solved:
  - Childhood is characterized by achieving
  - Early and middle adulthood characterized by a responsible stage of managing affairs
  - Later adulthood is characterized as reintegrative, selecting which cognitive skills to apply to hosen tasks to achieve a sense of integrity.
- Riegel proposed a period of dialectic operations that are conflict resolution.

Gender Differences

- Some women’s need to achieve drops far below that of men in adulthood. They seem to prefer maintaining relationship and watching over the psychosocial aspects of living.
- Older women with high achievement needs have been shown to express an even greater independence and self-reliance than achievement-motivated women in their twenties.
- Many women and some men return to school in their thirties and forties.

Physical Patterns

- Vision
  - Decreased peripheral vision and visual sensitivity in the dark due to clouding of the cornea
- Hearing
  - Presbycusis or impaired auditory acuity, lose higher sound frequencies such as a woman’s voice
- Taste
  - Progressive loss of taste buds, first for sweet and salt leaving detection of bitter and sour
Intellectual Skills

- Mature adults can use experience to imagine, anticipate, plan and hope.
- Person develops an inner private world that gives them resources for happiness and potential for anxiety.
- Mature adult is interested in other persons and warm, enduring relationships.
- Adaptable, independent, self-driven, conscientious, enthusiastic and purposeful.
- Struggle with morality, ethics, philosophy, religion and politics.

Why do older adults slow down?

- Decreased visual and auditory acuity
- Slower motor response to sensory stimulation
- Loss of recent memory
- Divided attention
- Greater amount of prior accumulated knowledge and learning that must be scanned and appropriately placed mentally
- Perceived meaninglessness of task
- Changed motivation

Factors affecting Intellectual Functioning

- Overall health status
  - Anemia, lung disease, poor circulation, hypertension, diabetes, thyroid or nutrition imbalance
- Medications
  - Polypharmacy
  - Prescribed and OTC may slow or interfere with cognition based on slower elimination
- Sensory impairments
  - Specially vision and hearing that interfere with integration of sensory input
  - Affects fluid intelligence
- Using more time to do something or deliberate caution
- Adaptive mechanism of conserving time and emotional energy rather than showing assertion.

Aging Effects on Cognition

- Onset, rate and pattern of aging are unique for each person.
- Within an individual, the cognitive functions do not change or decline at the same pace.
- Age alone does not ruin memory
  - Alzheimer’s or other dementia
- Disruption of formation of new memories
  - ETOH
  - Too little sleep
  - Depression
  - Hypothyroid

Intelligence in Older Adults

- Overall, mental ability increases with age.
  - A bright 20 year old will be a bright 70 year old
- Around age 70, the loss of biological potential is evident but offset by acquired wisdom, experience and knowledge (crystallized intelligence).
- There is no uniform pattern of age-related changes for all intellectual abilities, nor is there a consistent decline in all elders.
- Physical fitness, especially cardiovascular fitness, helps maintain intellectual functioning.
- Intellectual exercises (crossword puzzles, writing, continuing education) may also help maintain function.
Differentiating Normal Aging from Dementia

Age-associated memory impairment (AAMI)

- Cognitive changes, such as a general slowing in the speed of thought processing and slight declines in memory and in the ability to manage multiple tasks simultaneously, are considered part of the normal aging process.

Mild Cognitive Impairment (MCI)

- Memory complaint
- Normal activities of daily living
- Normal general cognitive function
- Abnormal memory for age
- Not demented

Definition of Dementia

- Dementia refers to an acquired persistent loss of intellectual functions due to a brain disorder.
- Dementia is really a broad, umbrella term.
  - A medical diagnosis is required to determine the underlying cause or causes of symptoms.
  - In the past, terms like “senility” and “hardening of the arteries” were commonly used.

Warning Signs of Dementia

- Memory loss that affects job skills
- Difficulty performing familiar tasks
- Problems with language
- Disorientation to time and place
- Poor or decreased judgment
- Problems with abstract thinking
- Misplacing things
- Changes in mood and behavior
- Changes in personality
- Loss of initiative

Prevalence of Alzheimer’s Disease


Why is cognitive development an important issue in nursing?