Memory Assessment in Older Adults

Lisa Whipple Drozdick, Ph.D.

Agenda

- Older adult population
- Memory functioning
- Memory and aging
- Assessment of memory functions
- Case studies

Older Adult Population
Older Adult Population Demographics

- Defined as 65 years of age and older
- Fastest growing group is over 85
  - Soon will be 65-74 cohort
- 40 Million older adults in US (13% of total population)
- More women than men (58-67%)
- 80% white, 9% African American, 7% Hispanic, 4% Other
- 82% high school graduates; 20% have college degrees
- Around 25% are employed
- 60% married, 30% live alone
- 10% in poverty


Older Adult Population Health Variables

- Highest medical problems are hypertension (55%) and arthritis (48%)
- 36% have hearing difficulties; 17% have visual difficulties
- Over 70% report being in good or excellent health
- 14% report problems in IADL’s only
- 25% report problems with ADL’s and IADL’s
- 4-5% reside in nursing facilities
- 15-20% report symptoms of depression
- One in 3 complain of memory problems (Riedel-Heller et al., 1999)

Memory Processes

- Learning – acquisition of new information
  - Typically an active process
  - Incidental learning is learning without direct effort
- Memory – persistence of learning
  - Retention of learning over time

Stages of Memory

- Registration (Sensory Memory)
  - Selects perceptions to enter into memory
  - Iconic and echoic memory
- Short-term memory
  - Brief, temporary storage
  - Limited capacity
  - Few seconds to a few minutes
  - Can be lengthened through rehearsal

Stages of Memory Continued

- Working memory
  - Considered aspect of short-term memory
  - Limited capacity
  - Temporary storage and manipulation of information
- Long-term memory
  - Permanent or lasting memories
  - Hours to years
**Long-term Memory**

- Implicit Memory
  - Learning from experience
  - Retrieval occurs without conscious awareness
  - Divided into Procedural Memory and Priming

- Procedural Memory
  - Memory for how to do things

- Priming
  - Improvement in performance due to prior exposure to a stimulus

---

**Long-Term Memory**

- Explicit (Declarative) Memory
  - Conscious retrieval of information
  - Divided into Semantic and Episodic memory

- Semantic Memory
  - General knowledge about the world
  - Facts, concepts, and vocabulary
  - Not context specific

- Episodic Memory
  - Personal events
  - Context-specific information
  - Most assessment instruments measure episodic memory
  - Recent vs. Remote memory

---

**Memory**

- Short-Term Memory
- Working Memory
- Long-Term Memory
- Procedural (Implicit) Memory
- Priming
- Semantic Memory
- Episodic Memory
- Explicit (Declarative) Memory
### Processes of memory

- **Encoding**
  - How information is taken in
  - Transformation of external information into memories

- **Consolidation**
  - Process of solidifying information in immediate memory into long term memory

- **Retrieval**
  - Bringing information from long term memory into conscious awareness

### Memory and Aging

### Normal Changes in Aging

- High degree of variability in aging
- Most normal change is small and does not affect daily living to a significant degree
- **Sensory/Motor Changes**
  - Decreased visual acuity, light/dark adaptation, and ability to focus close-up
  - Decreased hearing particularly for high tones
  - Increased dizziness and vertigo with increased risk of falls
Memory and Aging

- Cognitive Changes
  - Decreased reaction time and speed of processing
  - Less efficient attentional processes
    - Particularly if attention is split
    - Decreased memory recall for newly acquired information
  - Retrieval declines not encoding
  - Decreased working memory ability
  - Decreased efficiency of information processing
  - Decreased inhibition or ability to filter out extraneous information

“Pathological” Aging

- Age increases the likelihood of disease but disease is not inherent in aging
- Significant loss of cognitive function is always due to presence of disease process or injury
  - Loss of functional ability (e.g., paying bills)
  - Behavioral or personality changes
  - Significant loss of memory abilities
  - Significant decline in cognitive status

Types of Memory Deficits

- Specific Deficit
  - Material-specific
    - Spatial, semantic, facial, source
  - Modality-specific
    - Auditory, Visual
  - Process-specific
    - Encoding
    - Consolidation
    - Retrieval

- Global Deficit
  - Multiple deficits
Memory and Clinical Diagnoses

- A sampling of conditions involving Memory deficits:
  - Amnesia
  - Dementia
    - Multiple causes
    - Mild Cognitive Impairment
    - Depressive Disorders
    - Traumatic Brain Injury

Amnesia

- Loss of memory
  - Can be a focal point in memory or global

- Anterograde
  - Inability to form new memories
  - May not be able to learn
  - Defective recent memory

- Retrograde
  - Inability to retrieve memories
  - Loss of previous memories
  - TBI can be relatively short
  - Disease process can be extensive
    - Newer memories more susceptible

Dementia

- Memory impairment and at least one of the following:
  - Aphasia
  - Apraxia
  - Agnosia
  - Disturbances in executive functioning.
  - In addition, the cognitive impairments must be severe enough to cause impairment in social and occupational functioning.
  - Importantly, the decline must represent a decline from a previously higher level of functioning.
  - Deficits do NOT occur exclusively during the course of a delirium

Source: DSM IV TR of the American Psychiatric Association
**Dementia of Alzheimer’s Type**

- Insidious onset and gradual course
- Pattern of Deficits
  - Poor ability to recall information
  - Typically first observe problems in delayed recall
  - Flat learning rate
  - Recognition impaired although better than recall
  - Simple motor learning relatively intact
  - Poor visuo-spatial skills
  - Word-finding difficulties (dysnomia)
  - Poor performance on tasks requiring simultaneous attention
  - Later in process almost amnestic

**Vascular Dementia**

- Cognitive deficits due to a stroke or cerebrovascular disease
- Typically sudden onset
- Pattern of Deficits
  - Focal neurological signs
  - Deficits specific to area of infarct
  - Poor ability to recall information
  - Less severe than observed in Alzheimer’s
  - Recognition remains intact

**Mild Cognitive Impairment-Amnestic Type**

- Pattern of Deficits
  - Mildly impaired ability to recall information
    - Typically in delayed memory; short-term intact
    - Remote memory intact
    - Learning is intact
    - Recognition remains stable
  - Tend to see deficits in other areas as well, particularly executive functions
Depressive Disorders

- Pattern of Deficits
  - Significant memory complaints
  - Low effort and motivation
  - Orientation intact
  - Poor attention and concentration
  - Intact incidental learning
  - Low performance on learning and recall
    - Poor rates of learning
    - Retention good
    - Recognition remains stable
  - Lower scores than controls but higher than dementia
  - Important to retest

Assessment of Memory Functions

Purpose of Memory Assessment

- Diagnostic
  - Part of Battery of Tests
  - Specific Memory Assessment
  - Evaluation of Current Functioning
  - Comparison to Estimated Premorbid Functioning

- Monitoring
  - Follow-up to Previous Evaluation
  - Practice effects
Memory Assessment Issues

- Sensory Deficits
- Demographic Considerations
- Attention Problems
- Fatigue
- Need for Caregiver/ Informant History
- Current and Premorbid Ability

Additional Areas to Consider in Memory

- Recall vs. Recognition
- Meaningfulness/Organization of information
  - Prose vs. Words
- Serial Order effects
  - Primacy
  - Recency
- Forgetting

Comprehensive Diagnostic Memory Evaluation

- Memory assessment begins before formal memory testing
  - Personal memories during interview
- Orientation and Attention assessment
  - Brief cognitive assessment
  - Time and place
  - Simple verbal retention (Digit Span forward)
  - Simple mental arithmetic (serial 3’s or 7’s)
- Remote Memory
  - Fund of information
Comprehensive Memory Evaluation

- Short Term memory
  - Verbal and Visual
  - Immediate recall
  - Learning curve

- Long Term Memory
  - Verbal and Visual
  - Delayed Recall, following a distraction task
  - Recall and Recognition trials

- Working memory
  - Verbal and Visual if differences observed

Premorbid Ability in Diagnostic Evaluation

- Previous evaluation
- Demographically adjusted norms
- Premorbid Ability Estimations
  - Demographic
  - Performance Based

Memory Assessment - Monitoring

- Shorter memory measures
- Practice effects
- Multiple forms
- Reliable Change scores
Clinical Assessment Instruments

- Wechsler Memory Scale – Fourth Edition (WMS-IV)
  - Brief Cognitive Status Examination (BCSE)
  - Comprehensive memory battery
  - Older Adult battery for 65-90 (Adult battery 16-69)
  - Visual and Verbal (prose and words) measures
  - Recall, Cued Recall, and Recognition measures
  - Visual Working memory
  - Comparison scores with current ability
  - Advanced Clinical Solutions for WAIS-IV and WMS-IV provides Test of Premorbid Functioning; Demographically-adjusted norms; Reliable Change Scores

- Wide Range Assessment of Memory and Learning (WRAML-II)
  - Comprehensive memory battery
  - Full battery 16-89
  - Visual and Verbal (prose and words) measures
  - Recall, Cued Recall, and Recognition measures
  - Working memory

- California Verbal Learning Test-Second Edition (CVLT-II)
  - Ages 16-89
  - Verbal Memory
  - Learning, Recall, Cued Recall, and Recognition
  - Assesses primacy and recency effects
  - Error analyses
  - 2 forms and short form
Clinical Assessment Instruments

• Rivermead Behavioural Memory Test – Third Edition (RBMT-III)
  - Ages 16-96
  - Tasks tied directly to real world tasks
  - Two parallel forms
  - Prospective memory measure
  - Procedural memory measure

Clinical Assessment Instruments

• Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)
  - Ages 20-89
  - 30 minute administration time
  - Four parallel forms
  - Measures immediate and delayed memory
  - Measures visual and verbal memory
  - Also measures attention, fluency, naming, processing speed, and visuospatial ability

Integrate All Information

• Results from memory measures should always be integrated with other assessment information such as that gathered from measures/techniques such as
  - Cognitive Ability measures
    - WAIS-IV
    - D-KEFS
  - Clinical Interviews
    - Caregiver/family information
  - Psychological Status measures
    - Example = Beck Depression Inventory
  - Thorough history
    - Medical information

• Remember to check for vision, hearing, motor, medication contributions to performance.
Case Study: Mrs. D.

- Mrs. D. is an 82-year old female. She attended college but did not complete her degree. She met her husband during college and dropped out to become a full-time homemaker. She currently lives alone following the death of her husband 2 years ago. She has 2 children who provide support with her IADLs, including shopping and transportation. She was referred for evaluation following family concerns about increasing dependency on her children, declines in her cognitive abilities, and concerns about her continuing to live alone.
- She is relatively physically healthy. She was diagnosed with atrial fibrillation and osteoporosis both being treated with medication
- Prescribed Namenda to treat cognitive decline by her family physician.

Mrs. D.

- Behavioral Observations and Interview
  - Mrs. D. provided a detailed social history. Her reports were relatively consistent but lacked details. She occasionally demonstrated difficulty finding the right words and her responses to questions were sometimes disorganized and rambling. She was oriented to time and place and understood the purposes of the evaluation. She denied significant memory difficulties but reported that she occasionally forgot things and that she needed help to get things done.
- Attention assessment
  - Mrs. D. was able to complete simple attention tasks, including repeating digits forward and serial 7s.
Mrs. D.

- Remote Memory
  - Mrs. D. did well on a task assessing familiar faces and events in history. Her performance on the Information task on WAIS-IV was in the average range.

- Mini-Mental State Examination = 19

- Beck Depression Inventory -II=1 (no indication of depression)

- Administered WAIS-IV, WMS-IV, and Test of Premorbid Functioning
  - WMS-IV first to reduce fatigue effects on memory scores

Mrs. D.

- Cognitive Functioning
  - TOPF Predicted General Ability Index = 103

  - WAIS-IV Results
    - General Ability Index = 95
    - Verbal Comprehension Index = 98
    - Perceptual Reasoning Index = 92
    - Working Memory Index = 97
    - Processing Speed Index = 74
    - Processing speed significantly lower

Mrs. D.

- WMS-IV Results
  - BCSE Classification: Low, Base Rate 5.8%
  - Short Term Memory
    - Immediate Memory (MI=80)
    - Visual Working Memory
      - Symbol Span SS=6

  - Long-Term Memory
    - Delayed Memory (DMI=73)

  - Modality-Specific Memory
    - Auditory Memory (AMI=75)
    - Visual Memory (VMI=66)
Mrs. D.

WMS-IV Results
- Auditory Memory (AMI=75)
  - Logical Memory II SS=2
  - LM II Recognition Percentage 17-25%
- Verbal Paired Associates I SS=7
  - Verbal Paired Associates II SS=9
  - VPA II Word Recall SS=7
  - VPA II Recognition Percentage: 10-16%
- Visual Memory (VMI=66)
  - Visual Reproduction I SS=3
  - VR II Recognition Percentage: 17-25
  - VR Copy Percentage: >75

WAIS-IV / WMS-IV Comparisons
- GAI vs. AMI CSS=5
- GAI vs. VMI CSS=2
- GAI vs. IMI CSS=2
- GAI vs. DMI CSS=4

Summary
- Mrs. D. is in the average range on measures of global cognitive status
- Mrs. D appears to be experiencing a significant memory problem
  - Low immediate and delayed memory
  - Impaired visual memory
  - Low auditory memory
  - Memory is lower than expected given her ability level
- She is also demonstrating slow processing speed
- It is likely that these memory scores represent a decline from previous ability
**Case study: Mr. P.**

- Mr. P. is a 68-year old male with 11 years of formal education. He worked as a plumber for nearly 45 years before he retired 6 months ago. Since his retirement he spends most of his time alone and he reports loss of interest in activities and difficulties remembering things. His wife encouraged him to be evaluated although she indicates that she has not noticed memory problems but has noticed he seems sad and distressed.

- Mr. P. is relatively healthy. He has lost some weight since retiring due to poor appetite and has type 2 diabetes which is well controlled.

---

**Mr. P.**

- Behavioral Observations and Interview
  - Mr. P. provided a detailed social history. He required some prompting to complete responses and to fill in details. However, he was able to provide details when prompted. His responses were consistent and well organized. He was oriented to time and place and understood the purposes of the evaluation. He reported significant difficulties, particularly with memory, but also with motivation and apathy. He was concerned about the affect his memory problems would have on his family. He denied suicidal ideations but a high level of distress.

- Attention assessment
  - Mr. P. was able to complete simple attention tasks, including repeating digits forward and serial 7s. However, he responded slowly and had long pauses between responses.

---

**Mr. P.**

- Remote Memory
  - Mr. P. did well on a task assessing familiar faces and events in history. His performance on the Information task on WAIS-IV was in the average range.

- Mini-Mental State Examination = 23

- Beck Depression Inventory –II = 26 (moderate depression)

- Administered WAIS-IV, BCSE, and RBANS
Mr. P.

- TOPF
  - Predicted General Ability Index = 86

- WAIS-IV Results
  - FSIQ = 71
  - Verbal Comprehension Index = 85
  - Perceptual Reasoning Index = 84
  - Working Memory Index = 79
  - Processing Speed Index = 74
  - General Ability Index = 82

Mr. P.

- BCSE
  - Low Average; Base Rate of 22.1%

- RBANS
  - Immediate Memory = 83
  - Visuospatial/Constructional = 75
  - Language = 85
  - Attention = 82
  - Delayed Memory = 81
  - Total = 77

Summary

- Mr. P appears to be experiencing some difficulties
  - Depression
  - Working memory
  - Processing speed

- RBANS scores seem consistent with his ability scores

- Memory is in the low range but it is not clear if this is a decline for Mr. P.

- Recommend he receive treatment for his depression and be reassessed in 6 months
References

Contact Information

Lisa.Drozdick@Pearson.com

Customer Support
- US: 800-627-7271
- Canada: 866-335-8418