

# WAIS-5 & WMS-5 Advanced Clinical Solutions

## Demographically Referenced Scores

### Background History & Referral Question

Client C is a 51-year-old White female presenting for neuropsychological evaluation because of cerebral hypoxia caused by carbon monoxide poisoning. Client C was sleeping when a fire started in her home due to an electrical malfunction. A neighbor saw smoke coming from the home and notified the fire department, who arrived five minutes after the call and found Client C unconscious. The paramedics resuscitated her after 2 minutes; however, it is unknown how long she was unconscious. While she did not have any significant burns, she did experience significant smoke inhalation and carbon monoxide poisoning. She experienced multiple seizures, and neuroimaging revealed minor abnormal signal intensities in the hippocampus, basal ganglia, and possible diffuse cortical atrophy. Client C was referred to a neurologist post-hospitalization for follow-up care. The neurologist referred Client C for a neuropsychological evaluation to determine the extent of her cognitive difficulties.

Client C was brought to her appointment by her oldest daughter, with whom she has been living since she was released from the rehabilitation hospital. Client C is divorced and was living alone at the time of the fire. She has two daughters ages 23 and 26. Her younger daughter lives in another state and does not have routine contact with Client C. The oldest daughter reported concerns with her mother living independently due to ongoing cognitive difficulties. She observed that her mother has difficulties with attention and memory and does not seem to think as well as she did in the past.

Client C reports that she has noticed a change in her thinking and does not feel that she can concentrate as well as she did before the fire. She reported problems remembering recent events and some difficulty remembering appointments, which is inconsistent with her previous level of functioning. She is not concerned with managing her finances because she has most of her payments set to autopayment; however, she is concerned about her ability to return to work. Client C is an associate professor of history at a small, private university. She holds a Ph.D. in ancient history from a large state university. She was raised in an affluent, educated family. Her father was the CEO of a mid-sized financial corporation, and her mother was a CFO of a local mining company. Client C attended private schools from elementary to secondary school. While not a top student, she reported doing well. She attended a small private college majoring in history with minors in Latin and Greek. She struggled at times in graduate school but did well overall, getting mostly B's in her classes. She reported that she does not need the money but that she really likes teaching and would like to return to her faculty position when she has recovered.

Observationally, Client C exhibited minor issues with word finding, distractibility, and remembering details from recent events. She frequently asked her daughter about what her neurologist and pulmonologist had told her in her most recent appointments. Client C is considering moving out of her daughter's apartment, but she is not certain if she can manage on her own. The family is exploring in-home aides to help her manage her activities.

### Client C: Profile



**Sex:** Female

**Marital status:** Divorced

**Age:** 51 years old

**Children:** Two adult daughters

**Race/Ethnicity:** White

**Living situation:** Previously lived independently

**Occupation:** History professor

**Reason for Consultation:** Cerebral hypoxia caused by carbon monoxide poisoning

**Education:** PhD in Ancient History

# Assessment Results

The examiner administered the WAIS-5 and the WMS-5 Standard Form. Given the examinee's high level of educational attainment and affluent upbringing, the examiner determined that the demographically referenced scores would be the most sensitive to possible cognitive impairment in this examinee. The tables below present the age-referenced and demographically referenced scores obtained by Client C on WAIS-5 and WMS-5 respectively.

## DEMOGRAPHICALLY REFERENCED SCORE SUMMARY

WAIS®-5 Score Report with Demographically Referenced Scores

Client C

### Subtest Score Summary

|                      |                         | Age-Referenced |                 | Demographically Referenced |                 |                         |
|----------------------|-------------------------|----------------|-----------------|----------------------------|-----------------|-------------------------|
| Domain               | Subtest                 | Scaled Score   | Percentile Rank | T Score                    | Percentile Rank | Qualitative Description |
| Verbal Comprehension | Similarities (SI)       | 8              | 25              | 32                         | 4               | Very low                |
|                      | Vocabulary (VC)         | 13             | 84              | 52                         | 58              | Average                 |
| Visual Spatial       | Block Design (BD)       | 8              | 25              | 40                         | 16              | Below average           |
|                      | Visual Puzzles (VP)     | 7              | 16              | 34                         | 5               | Very low                |
| Fluid Reasoning      | Matrix Reasoning (MR)   | 9              | 37              | 40                         | 16              | Below average           |
|                      | Figure Weights (FW)     | 8              | 25              | 35                         | 7               | Very low                |
| Working Memory       | Digit Sequencing (DQ)   | 8              | 25              | 39                         | 14              | Below average           |
|                      | Running Digits (RD)     | 14             | 91              | 58                         | 79              | Above average           |
|                      | (Symbol Span) (SSP)     | 8              | 25              | 39                         | 14              | Below average           |
|                      | (Spatial Addition) (SA) | 9              | 37              | 40                         | 16              | Below average           |
| Processing Speed     | Coding (CD)             | 9              | 37              | 37                         | 10              | Below average           |
|                      | Symbol Search (SS)      | 9              | 37              | 40                         | 16              | Below average           |

Demographically referenced scores are derived using the following demographics: more than 18 years, female, and White.

### Composite Score Summary

|                              |  | Age-Referenced |                 | Demographically Referenced |                 |                         |
|------------------------------|--|----------------|-----------------|----------------------------|-----------------|-------------------------|
| Composite                    |  | Standard Score | Percentile Rank | T Score                    | Percentile Rank | Qualitative Description |
| Verbal Comprehension (VCI)   |  | 102            | 55              | 41                         | 18              | Below average           |
| Visual Spatial (VSI)         |  | 86             | 18              | 35                         | 7               | Very low                |
| Fluid Reasoning (FRI)        |  | 92             | 30              | 35                         | 7               | Very low                |
| Working Memory (WMI)         |  | 106            | 66              | 48                         | 42              | Average                 |
| Processing Speed (PSI)       |  | 94             | 34              | 37                         | 10              | Below average           |
| Full Scale (FSIQ)            |  | 93             | 32              | 33                         | 4               | Very low                |
| Visual Working Memory (VWMI) |  | 92             | 30              | 38                         | 12              | Below average           |
| General Ability (GAI)        |  | 95             | 37              | 36                         | 8               | Very low                |
| Cognitive Proficiency (CPI)  |  | 100            | 50              | 40                         | 16              | Below average           |

## DEMOGRAPHICALLY REFERENCED SCORE SUMMARY

WMS®-5 Score Report with Demographically Referenced Scores

Client C

### Subtest Score Summary

|                 |                            | Age-Referenced |                 | Demographically Referenced |                 |                         |
|-----------------|----------------------------|----------------|-----------------|----------------------------|-----------------|-------------------------|
| Domain          | Subtest                    | Scaled Score   | Percentile Rank | T Score                    | Percentile Rank | Qualitative Description |
| Auditory Memory | Logical Memory 1           | 9              | 37              | 41                         | 18              | Below average           |
|                 | Logical Memory 2           | 8              | 25              | 39                         | 14              | Below average           |
|                 | Verbal Paired Associates 1 | 11             | 63              | 52                         | 58              | Average                 |
|                 | Verbal Paired Associates 2 | 10             | 50              | 46                         | 34              | Average                 |
| Visual Memory   | Visual Reproduction 1      | 6              | 9               | 32                         | 4               | Very low                |
|                 | Visual Reproduction 2      | 5              | 5               | 29                         | 2               | Extremely low           |
|                 | Designs 1                  | 9              | 37              | 46                         | 34              | Average                 |
|                 | Designs 2                  | 7              | 16              | 37                         | 10              | Below average           |

Demographically referenced scores are derived using the following demographics: more than 18 years, female, and White.

### Index Score Summary

|                        |  | Age-Referenced |                 | Demographically Referenced |                 |                         |
|------------------------|--|----------------|-----------------|----------------------------|-----------------|-------------------------|
| Index                  |  | Standard Score | Percentile Rank | T Score                    | Percentile Rank | Qualitative Description |
| Auditory Memory (AMI)  |  | 96             | 39              | 43                         | 24              | Below average           |
| Visual Memory (VMI)    |  | 80             | 9               | 32                         | 4               | Very low                |
| Immediate Memory (IMI) |  | 90             | 25              | 39                         | 14              | Below average           |
| Delayed Memory (DMI)   |  | 82             | 12              | 32                         | 4               | Very low                |

The age-referenced scores indicate that she is performing in the average range on all WAIS-5 composites except for the Visual Spatial Index, which was below average. Likewise, most WAIS-5 subtests were in the average range, except for Running Digit Span, Vocabulary, and Visual Puzzles. The Vocabulary score appears to be the most consistent with her education level, occupation, and background; however, having a very high or low score is not uncommon in healthy individuals. She had only one subtest at least 1 SD below the mean and no composite scores at that level.

On the WMS-5 age-referenced scores indicate that, she performed in the average range for most subtests except for Visual Reproduction 1 and Designs 2, which were in the below average range, and Visual Reproduction 2, which was in the very low range. Client C performed in the average range on Auditory Memory and Immediate Memory; and in the below average range for Visual Memory and Delayed Memory. Her performance was notable for three subtest scores at or below 1 SD and two index scores below 1 SD.

The overall age-referenced score profile reveals average general cognitive functioning. With some minor weaknesses in visual-spatial processing, visual memory, and delayed memory.

Client C had two index scores and four subtest scores at least 1 SD below the mean, which is not atypical (e.g., low specificity) given the number of tests administered. Based on age-referenced scores alone, it would appear that there is only modest evidence for a change in cognitive status after her injury.

## Summary and Recommendations

Comparing Client C's WAIS-5 performance to individuals of the same level of education, sex, and racial/ethnic background, reveals that she performed in the average range only on Working Memory while her performance was in the very low range for FSIQ, FRI, and VSI. At the subtest level, three scores were very low: Similarities, Visual Puzzles, and Figure Weights. Vocabulary was average, and Running Digit Span was above average. The demographically referenced scores for Client C suggest lower than expected general cognitive functioning, particularly related to visual-spatial and fluid reasoning skills.

The WMS-5 demographically referenced scores indicate very low visual and delayed memory, and auditory memory in the below average range. At the subtest level, she performed in the average range on VPA 1 and 2 and Designs 1. The remaining subtests were below average or lower with VR 2 being extremely low. Memory performance is lower than expected when compared to individuals of similar demographic background.

Overall, demographically referenced scores reveal that she has 14 subtest and 10 index scores at least 1 SD below the mean. Additionally, five subtests and five index scores are at least 1.5 SD below the mean.

The large number of low scores is unusual in healthy individuals and suggests Client C's cognitive functioning is significantly reduced compared to her previous level of functioning.

The neuropsychologist worked with the family to identify a structured living environment for Client C, utilizing trained in-home aides, laundry service, and cleaning help. Client C uses private transportation services to meet her needs. Her oldest daughter moved closer to her mother's new community and checks on how things are going. The university allowed Client C to go on extended sabbatical, and her status will be reconsidered in 1 year.

### Reveal the Interpretive Shift

Based on age-referenced scores alone, this patient showed only modest evidence of cognitive change. Most WAIS®-5 composite and subtest scores fell within the average range, and the initial profile suggested relatively intact functioning overall.

But the examiner looked deeper, using demographically referenced scores. When compared to individuals of similar education, sex, and racial or ethnic background a different clinical picture was revealed, including very low performance across several areas that had appeared less concerning through age-referenced interpretation alone.

For clinicians evaluating complex cognitive and memory concerns, that shift matters. ACS helps provide additional evidence when standard score interpretation may not fully reflect the patient's history, background, or current functioning.