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Advanced Clinical Solutions

Pre-morbid Prediction Case Studies



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Pre-morbid Prediction Case Studies

Case Study 1

Client C is a 62-year-old White male with 18 years of education, who was referred by his family physician for neurological evaluation subsequent to complaints of increasing memory loss over the past couple of years. His wife confirms that he seems more forgetful and this has led to missing appointments and failing to pay bills on time. Other family members note that Client C was very intelligent, but his intellectual skills seemed to be declining. He was referred for neuropsychological testing when a neurological evaluation and brain imaging were inconclusive.



Figure 4.1 presents the results of the pre-morbid prediction report for the WAIS[®]-IV and WMS[®]-IV composite scores. Both actual and predicted composite scores are provided in the report. The clinician reported critical values at the .05 level and 95% prediction interval. The age-only adjusted scores indicate that Client C has above average verbal skills compared to age peers. His visual-perceptual and working memory ability are in the average range but are generally consistent with his verbal abilities. Processing speed was in the low

average range and was a relative weakness compared to overall problem solving skills. On the WMS-IV, he had average visual working memory, and his immediate and delayed recall scores were in the low average range.

The profile suggests weaknesses in processing speed and memory, but most of Client C's scores are average, with very few low average. Compared to his age peers, he is functioning within normal limits on most measures, but the processing speed and WMS-IV index scores suggest possible mild cognitive impairment. Since the examinee was noted to have been very high functioning in the past, the current cognitive performance may represent a decline in his abilities. In order to determine if the current test scores suggest a decline in performance compared to pre-morbid predictions, the simple demographics with TOPF predicted scores were generated for the WAIS-IV and WMS-IV composite scores.



Client C's TOPF standard score of 115 was in the high average range. His predicted TOPF score, using the simple demographics predictive model, was 117 and was not significantly different from his actual performance. Therefore, the simple demographics with TOPF score was used to estimate premorbid intellectual functioning.

On the WAIS[®]-IV, Client C's estimated pre-morbid VCI score did not differ significantly from his actual abilities. His predicted PRI and WMI scores were significantly lower than his actual scores; however, the degree of difference was not unusual in the normative sample. Both PSI and FSIQ were significantly lower than the premorbid estimation and had a relatively low base rate. Client C had two scores below the 25% base rate and two below the 15% base rate for the WAIS-IV composites. On the WMS[®]-IV, Client C's IMI, DMI, and VWMI actual scores were all significantly lower than the predicted scores. For each composite, the base rate of the difference was below the 25% base rate and two were below the 10% base rate.

Considering the WAIS-IV and WMS-IV together, Client C had five composite scores at or below the 25% base rate and three at or below the 10% base rate. Reviewing these scores with the diagnostic statistics, there is a high probability that this is an abnormal cognitive profile. The specificity for these scores for the ALZ and MCI groups ranged from .79 to 1.0, with four of the six values over .90 for specificity. Sensitivity values for the Alzheimer's group ranged from .73 to .88 for the number of scores below the different base rates.

The application of the pre-morbid predictions seems to confirm the family's impression that Client C has lost some cognitive functioning. Overall, he is performing similar to other adults his age, with some processing speed and memory weaknesses. However, when pre-morbid predictions were applied, the loss in processing speed, general intellectual functioning, and memory becomes evident. While the resulting profile is likely to be abnormal, it may indicate mild cognitive impairment, Probable Dementia of the Alzheimer's Type-Mild Severity, or some other neurological disorder. The clinician made a diagnosis of mild cognitive impairment to be followed up with additional testing in 6 months.



Test of Pre-morbid Functioning Score Report

Examinee Name Client C Date of Report 11-11-09

Test of Pre-morbid Functioning Score Summary

| | Raw Score | Standard Score | Percentile Rank | SEM | Qualitative Description |
|-------------------------------|-----------|----------------|-----------------|------|-------------------------|
| Test of Premorbid Functioning | 58 | 115 | 84 | 2.12 | High Average |

Analysis

Test of Pre-morbid Functioning Actual–Predicted Comparison

| | Actual Score | Predicted Score | Difference | Critical Value | Significant Difference | Base Rate |
|------------------|--------------|-----------------|------------|----------------|------------------------|-----------|
| Actual–Predicted | 115 | 117 | –2 | 4.16 | N | |

WAIS-IV Actual–Predicted Comparison

| Composite | Actual | Predicted | Difference | Critical Value | Significant Difference | Base Rate |
|-----------|--------|-----------|------------|----------------|------------------------|-----------|
| FSIQ | 103 | 116 | –13 | 5.31 | Y | 11.4 |
| VCI | 110 | 115 | –5 | 6.14 | N | |
| PRI | 104 | 112 | –8 | 7.06 | Y | 26.9 |
| WMI | 105 | 114 | –9 | 7.77 | Y | 25.7 |
| PSI | 86 | 107 | –21 | 9.06 | Y | 5.3 |

WMS-IV Actual–Predicted Comparison

| Index | Actual | Predicted | Difference | Critical Value | Significant Difference | Base Rate |
|-------|--------|-----------|------------|----------------|------------------------|-----------|
| IMI | 86 | 106 | –20 | 7.52 | Y | 6.4 |
| DMI | 82 | 104 | –22 | 7.45 | Y | 5.2 |
| VWMI | 97 | 110 | –13 | 8.11 | Y | 18.0 |

Figure 4.1 Pre-morbid Prediction Scores for Client C



Case Study 2

Client D is a 43-year-old, African American male, with a doctorate degree in economics. He was employed as the vice president of international accounts for a large business consulting firm. Client D is physically healthy and exercises and socializes on a regular basis. He was struck by a motor vehicle while riding his bicycle along the shoulder of the road. He was struck from behind and suffered a severe traumatic brain injury, despite the fact that he was wearing a helmet. He was taken to the hospital in an ambulance with a Glasgow Coma Scale score of 5 at the time of arrival. He was unconscious for a period of 36 hours and had post-traumatic amnesia of 1 week.

Client D made a rapid physical recovery; however, he had significant cognitive deficits that did not readily remit. After 2 weeks, he was released from the hospital to a rehabilitation hospital. He spent 6 months in the rehabilitation hospital, initially on an inpatient basis and then on an outpatient basis. In those 6 months, he made a substantial recovery of his cognitive functions. He reported that he felt almost back to normal but admitted that he still had problems with remembering and concentrating. The driver of the vehicle that struck him worked for a local delivery company and was charged with speeding and reckless driving, which was subsequently dismissed. The family initiated a lawsuit against the delivery company for damages caused by the driver's recklessness.



Client D was referred for neuropsychological assessment after 12 months of recovery. He had attempted to return to work on two occasions; however, he was not able to function at the very high level required of his position. Being a highly respected member of the senior management staff, the company was eager to have him return to work, but they believed he needed more time to recover. The assessment was to be used as part of the lawsuit and to determine if Client D would require long-term disability care until he could return to his former

position.

Client D's background information revealed that he grew up in a wealthy neighborhood, and both his parents held doctorate degrees. His mother was the director of research and development for a large chemical firm. His father was a senior executive with a large biotechnology firm. Client D was educated in exclusive private schools. He currently lived in an upscale community of executives and professionals.

As part of the neuropsychological evaluation, the WAIS[®]-IV, WMS[®]-IV, and TOPF were administered. Because of his background and high level of cognitive reserve activities (e.g., exercise and social activities), the clinician decided to use the complex demographics with TOPF pre-morbid predictions. On the WAIS-IV, Client D's estimated pre-morbid VCI and PRI

scores did not differ significantly from his actual abilities. His predicted FSIQ, WMI, and PSI were significantly lower than his actual scores and had relatively low base rates. Client D had three scores below the 15% base rate and two below the 2% base rate for the WAIS[®]-IV composites. On the WMS[®]-IV, Client D's IMI, DMI, and VWMI were all significantly lower than the predicted score. For the DMI and VWMI, the base rate of the difference was below the 10% base rate.

Considering the WAIS-IV and WMS-IV together, Client D had five composite scores at or below the 10% base rate, three at or below the 5% base rate, and two at or below the 2% base rate. Reviewing these scores with the diagnostic statistics, it would appear that there is a high probability that this is an abnormal cognitive profile. The specificity for these difference scores in the TBI sample ranged from .92 to 1.0. Sensitivity values for the TBI sample ranged from .44 to .56 for the number of scores below the different base rates. The clinician concluded that Client D had experienced a substantial loss in cognitive functioning associated with his severe traumatic brain injury. The company settled the lawsuit after 3 additional months of litigation.

It should be noted that the use of the complex demographics with TOPF yielded much higher predicted scores than the simple demographics, except for VCI. The simple demographics with TOPF predicted PRI as 112, WMI as 123, PSI as 105, IMI as 112, DMI as 109, and VWMI as 113. The differences in prediction related to the use of personal and developmental factors, which are related to these variables. Also, race/ethnicity is not weighted as much in the complex equation, and therefore, the equation reflects the unique aspects of this individual's personal life and development rather than the socioeconomic experiences of a group of people. Additionally, the complex demographics prediction allows for a greater range of prediction, which is particularly helpful in cases where there was very high pre-morbid functioning.



Test of Pre-morbid Functioning Score Report

Examinee Name Client D Date of Report 02-22-10

Test of Pre-morbid Functioning Score Summary

| | Raw Score | Standard Score | Percentile Rank | SEM | Qualitative Description |
|-------------------------------|-----------|----------------|-----------------|------|-------------------------|
| Test of Premorbid Functioning | 70 | 131 | 99 | 2.12 | Very Superior |

Analysis

Test of Pre-morbid Functioning Actual–Predicted Comparison

| | Actual Score | Predicted Score | Difference | Critical Value | Significant Difference | Base Rate |
|------------------|--------------|-----------------|------------|----------------|------------------------|-----------|
| Actual–Predicted | 131 | 118 | 13 | 4.16 | Y | 9.1 |

WAIS-IV Actual–Predicted Comparison

| Composite | Actual | Predicted | Difference | Critical Value | Significant Difference | Base Rate |
|-----------|--------|-----------|------------|----------------|------------------------|-----------|
| FSIQ | 112 | 126 | -14 | 5.28 | Y | 8.7 |
| VCI | 127 | 132 | -5 | 6.79 | N | |
| PRI | 119 | 119 | 0 | 7.03 | N | |
| WMI | 95 | 124 | -29 | 7.18 | Y | 0.5 |
| PSI | 92 | 130 | -38 | 10.79 | Y | 0.0 |

WMS-IV Actual–Predicted Comparison

| Index | Actual | Predicted | Difference | Critical Value | Significant Difference | Base Rate |
|-------|--------|-----------|------------|----------------|------------------------|-----------|
| IMI | 93 | 113 | -20 | 6.91 | Y | 10.9 |
| DMI | 84 | 112 | -28 | 7.44 | Y | 7.3 |
| VWMI | 88 | 117 | -29 | 9.10 | Y | 2.5 |

Figure 4.2 Pre-morbid Prediction Scores for Client D