EVALUATING CANDIDATES FOR SPINE SURGERY AND SPINAL CORD STIMULATION USING THE MMPI-2-RF

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Disclosure

Andrew R Block received research funding support from University of Minnesota Press for many of the studies cited in this presentation. As co-author of the MMPI-2-RF Spine Surgery Candidate (Spine-CIR) and Spinal Cord Stimulator Candidate (Stim-CIR) Interpretive Reports he receives royalties on sales of the reports.
Participants

• Experience with presurgical psychological evaluation of spinal cord stimulator or spine surgery candidates
• Experience with use of the MMPI-2-RF

Spine Surgeries (Spine-CIR)

• Goals
  • Repair or mitigate physical condition in order to reduce pain and improve function
• Major Spine Surgeries
  • Laminectomy/Discectomy
    • Removal of herniated portion of intervertebral disc, also may require removal of portion of vertebra to gain access to the disc.
  • Spinal fusion
    • Removal of disc, replacement of disc with material that solidifies to fuse together adjacent vertebrae while restoring normal disc height
    • May involve hardware to stabilize fusion
  • Artificial Disc Replacement
    • Removal of disc and replacement with appliance that both restores normal disc height and allows movement.
Spinal Cord Stimulation (Stim-CIR)

• Goal is to reduce perceived pain and improve function without addressing any underlying cause of pain
• Implantation of leads containing electrodes into the epidural space along spinal cord. Deliver electrical stimulation along ascending nerve pathways, thereby reducing pain
• Two-step process
  • Stimulator trial: 3 to 7 day implantation of electrodes with external stimulator device, determines best stimulation pattern
  • If 50% or greater reduction in pain is achieved during trial stimulator device is permanently implanted. If not, leads are removed.

Agenda

- Introduction: Psychosocial factors impacting surgery results—previous studies
- Research on MMPI-2-RF in Spine Surgery and Spinal Cord Stimulator Candidates
- Spine-CIR and Stim-CIR components
- Case Example
- Q&A
Spine Surgery is Not Always Effective in Reducing Pain and Improving Function, Even If Pathology is Corrected

Discectomy

Recent analysis of insurance claims on 494 discectomy patients:

- 28% unfavorable outcome (80% of whom had additional surgery)
  (Sherman et al, 2010)
Spinal Fusion

In recent study of surgery (mostly fusion) outcome, using 4 measures of Health-Related Quality of Life:

- 47%-61% clinically sig improvement
- 27% clinically sig improvement on all 4 measures

...Copay et al, 2010

Consequences of Failed Back Surgery

- Majority never return to work
- Anger, depression
- Iatrogenic problems
- Financial disincentives to recovery increase
- Total cost of case rises dramatically
- Drug addiction
- Additional surgery or spinal cord stimulation
Spinal Cord Stimulation

• Candidates for Spinal Cord Stimulation
  § Failed Spine Surgery Syndrome
  § Avoid major spine surgery
  § Complex Regional Pain Syndrome or other conditions not amendable to surgery

• Results are variable
  § 64% achieve > 50% reduction in pain (Eldabe et al, 2010)

• Costs are high
  § > $52,000 in first 24 months post implant (Hollingsworth et al, 2011)

Psychosocial factors are associated with reduced effectiveness of both spine surgery and spinal cord stimulation
Presurgical Psychological Evaluation
MMPI & MMPI-2 studies

<table>
<thead>
<tr>
<th>Description</th>
<th>Scale</th>
<th># Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Sensitivity</td>
<td>Hs &amp; Hy</td>
<td>11</td>
</tr>
<tr>
<td>Depression</td>
<td>D</td>
<td>9</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Pt</td>
<td>5</td>
</tr>
<tr>
<td>Anger</td>
<td>Pd</td>
<td>5</td>
</tr>
</tbody>
</table>

MMPI-2-RF in Evaluation of Spine Surgery and Spinal Cord Stimulator Candidates
### Key Differences Between MMPI-2-RF and MMPI-2

- Significantly reduces shared variance between scales
- Captures common factor between scales—Demoralization
- After removing shared variance identifies core constructs of MMPI-2 scales
- 338 items rather than 567 items

### MMPI-2-RF Scales

- 51 Scales
  - 9 Validity Scales
  - 3 Higher-Order Scales
  - 9 RC Scales
  - 23 Specific Problems Scales
    - 5 Somatic/Cognitive
    - 9 Internalizing
    - 4 Externalizing
    - 5 Interpersonal
  - 2 Interest Scales
  - 5 PSY-5 Scales
Psychosocial Factors Increase Risk for Poor Spine Surgery Results (2017)

- 344 patients (all had surgery)
- Average Follow-up 142 days post-op
- Surgery types
  - Fusion 66.7%
  - ADR 11.5%
  - Lami/Disc 9.1%
  - Other 12.7%
- Not included in analysis 41 pts with fair-poor or poor prognosis who did not have surgery.

Outcome measures

- Pain rating (0-10)
- Oswestry Disability index
- Negative Affect
  - Combined likert ratings of depression, anxiety, fear & worry
- Outcome satisfaction (0-10)
  - Scale reversed so that higher scores represent greater dissatisfaction

- For all measures except satisfaction, baseline measure was used as covariate.
Correlations of MMPI-2-RF Selected Scales with Post-Surgery Outcome

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pain</th>
<th>ODI</th>
<th>Negative Affect</th>
<th>Dissatisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCd</td>
<td>.26**</td>
<td>.28**</td>
<td>.42**</td>
<td>.26**</td>
</tr>
<tr>
<td>RC1</td>
<td>.28**</td>
<td>.31**</td>
<td>.29**</td>
<td>.20**</td>
</tr>
<tr>
<td>RC2</td>
<td>.18**</td>
<td>.22**</td>
<td>.28**</td>
<td>.13*</td>
</tr>
<tr>
<td>RC7</td>
<td>.14**</td>
<td>.15**</td>
<td>.33**</td>
<td>.19**</td>
</tr>
<tr>
<td>MLS</td>
<td>.29**</td>
<td>.41**</td>
<td>.32**</td>
<td>.21**</td>
</tr>
<tr>
<td>SFD</td>
<td>.23**</td>
<td>.23**</td>
<td>.37**</td>
<td>.22**</td>
</tr>
<tr>
<td>STW</td>
<td>.17**</td>
<td>.22**</td>
<td>.34**</td>
<td>.22**</td>
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<tr>
<td>FML</td>
<td>.13*</td>
<td>.12*</td>
<td>.25**</td>
<td>.14*</td>
</tr>
<tr>
<td>NEGE-r</td>
<td>.18**</td>
<td>.24**</td>
<td>.38**</td>
<td>.24**</td>
</tr>
</tbody>
</table>

Association between pre-implant psychosocial factors and spine cord stimulator outcome (2015)

- 319 subjects (118 men, 201 women)
- Mean age = 53.4
- Average time to follow up 146 days
### Correlations of MMPI-2-RF selected scales with stimulator outcome

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pain</th>
<th>ODI</th>
<th>Negative Affect</th>
<th>Dis-satisfaction</th>
</tr>
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<tbody>
<tr>
<td>RCd</td>
<td>.26**</td>
<td>.29**</td>
<td>.52**</td>
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<td>.23**</td>
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<td>.15</td>
<td>.29**</td>
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<td>.16</td>
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<td>RC7</td>
<td>.21**</td>
<td>.23**</td>
<td>.40**</td>
<td>.23**</td>
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<tr>
<td>MLS</td>
<td>.17*</td>
<td>.37**</td>
<td>.26**</td>
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<td>SFD</td>
<td>.20**</td>
<td>.19*</td>
<td>.37**</td>
<td>.24**</td>
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<tr>
<td>NFC</td>
<td>.21**</td>
<td>.19*</td>
<td>.36**</td>
<td>.08</td>
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<tr>
<td>STW</td>
<td>.23**</td>
<td>.30**</td>
<td>.41**</td>
<td>.30**</td>
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<td>FML</td>
<td>.19*</td>
<td>.20**</td>
<td>.28**</td>
<td>.16</td>
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<tr>
<td>NEGE-r</td>
<td>.19*</td>
<td>.23**</td>
<td>.41**</td>
<td>.24**</td>
</tr>
</tbody>
</table>

### Selected MMPI-2-RF Relative Risk Ratios (RRRs): Post-Implant Oswestry > 40

<table>
<thead>
<tr>
<th>Scale</th>
<th>Cut Off</th>
<th>Risk if Elevated</th>
<th>Risk if not Elevated</th>
<th>RRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCd</td>
<td>60</td>
<td>79.3%</td>
<td>55.8%</td>
<td>1.42</td>
</tr>
<tr>
<td>RC2</td>
<td>65</td>
<td>84.4%</td>
<td>53.8%</td>
<td>1.56</td>
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<tr>
<td>MLS</td>
<td>80</td>
<td>85.3%</td>
<td>53.0%</td>
<td>1.61</td>
</tr>
<tr>
<td>COG</td>
<td>75</td>
<td>92.3%</td>
<td>57.4%</td>
<td>1.61</td>
</tr>
<tr>
<td>STW</td>
<td>55</td>
<td>80.6%</td>
<td>54.0%</td>
<td>1.49</td>
</tr>
<tr>
<td>ANP</td>
<td>55</td>
<td>88.2%</td>
<td>56.8%</td>
<td>1.55</td>
</tr>
<tr>
<td>NEGE-r</td>
<td>65</td>
<td>92.9%</td>
<td>57.0%</td>
<td>1.63</td>
</tr>
</tbody>
</table>
RC Scales most strongly correlated with spine surgery & stimulator outcome

• RCd: Demoralization – General unhappiness and dissatisfaction
• RC1: Somatic Complaints – Diffuse physical health complaints
• RC2: Low Positive Emotions – Lack of positive emotional responsiveness
• RC7: Dysfunctional Negative Emotions – Maladaptive anxiety, anger, irritability

Supplemental and PSY-5 Scales Strongly Correlated with Surgery & Stim Outcome

• MLS: Malaise – Overall sense of physical debilitation, poor health
• SFD: Self-Doubt – Lack of self-confidence, uselessness
• NFC: Inefficacy – Belief one is indecisive and inefficacious
• STW: Stress/Worry – Preoccupation with disappointments, difficulty with time pressure
• AXY: Anxiety – Pervasive anxiety, frights, nightmares
• FML: Family Problems – Conflictual family relationships
• NEGE-r: Negative Emotionality/Neuroticism-Revised – Anxiety, insecurity, worry, and fear
Spine Surgery Candidate Interpretive Report (Spine-CIR)

Spinal Cord Stimulator Candidate Interpretive Report (Stim-CIR)

SPINE-CIR & STIM-CIR

Provides all information of the General MMPI-2-RF Interpretive Report
PLUS
Information specific to spine surgery and spinal cord stimulator candidates
SPINE-CIR & STIM-CIR

Report Structure

MMPI-2-RF Spine-CIR
and Stim-CIR:

Profile
MMPI-2-RF Higher-Order (H-O) and Restructured Clinical (RC) Scales

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>T Score</th>
<th>Response %</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 1 9 16 7 9 2 11 0 4 1 11</td>
<td>66 48 57 71 61 69 41 68 43 46 47 48</td>
<td>100 100 100 96 100 100 100 100 100 100 100 100</td>
</tr>
</tbody>
</table>

Comparison Group Data: Spine Surgery Candidate (Women), N = 662

Mean Score (−1 SD): 51 48 43 52 64 53 46 45 49 46 47 42

Standard Dev (−1 SD): 11 9 8 11 11 10 10 8 9 10 9 8

Percent scoring at or below patient: 90 67 96 95 49 94 39 99 61 58 68 84
MMPI-2-RF Spine-CIR and Stim-CIR: Comparison Groups

- Two separate comparison groups generate report-specific interpretive statements
  - Spine Surgery Candidates (662 women, 590 men)
  - Spinal Cord Stimulator Candidates (336 women, 218 men)

MMPI-2-RF Spine-CIR and Stim-CIR: Scores by Domain

- Provides T-Scores for all scales, by Domain
- Interpreted scores are listed in bold
**MMPI-2-RF T Scores (By Domain)**

### Protocol Validity

<table>
<thead>
<tr>
<th>Content Non-Responsiveness</th>
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<th>57F</th>
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<tbody>
<tr>
<td>CNS</td>
<td>VRIN-r</td>
<td>TRIN-r</td>
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<tr>
<td>Over-Reporting</td>
<td>65</td>
<td>51</td>
<td>58</td>
</tr>
<tr>
<td>E-r</td>
<td>Tp-r</td>
<td>Ps</td>
<td>FBS-r</td>
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<tr>
<td>Under-Reporting</td>
<td>57</td>
<td>69</td>
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<tr>
<td>L-r</td>
<td>K-r</td>
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### Substantive Scales

<table>
<thead>
<tr>
<th>Somatic/Cognitive Dysfunction</th>
<th>74</th>
<th>81</th>
<th>46</th>
<th>72</th>
<th>86</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC1</td>
<td>MLS</td>
<td>GIC</td>
<td>HPC</td>
<td>NUC</td>
<td>COG</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>EID</td>
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<tr>
<td>RC1</td>
<td>RC2</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>RC2</td>
<td>INTR-r</td>
</tr>
<tr>
<td>38</td>
<td>47</td>
</tr>
<tr>
<td>RC7</td>
<td>STW</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Thought Dysfunction</th>
<th>39</th>
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<tbody>
<tr>
<td>THD</td>
<td>43</td>
</tr>
<tr>
<td>RC6</td>
<td>RC8</td>
</tr>
<tr>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>RC4</td>
<td>JCP</td>
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<table>
<thead>
<tr>
<th>Behavioral Dysfunction</th>
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</thead>
<tbody>
<tr>
<td>BXD</td>
<td>33</td>
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<tr>
<td>RC9</td>
<td>AGG</td>
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<table>
<thead>
<tr>
<th>Interpersonal Functioning</th>
<th>44</th>
<th>43</th>
<th>46</th>
<th>52</th>
<th>37</th>
<th>58</th>
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</thead>
<tbody>
<tr>
<td>FML</td>
<td>RC3</td>
<td>IPP</td>
<td>SAV</td>
<td>SHY</td>
<td>DSF</td>
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</tbody>
</table>
MMPI-2-RF Spine-CIR & Stim-CIR: Intended Use Statement

• Qualifications: User should have experience with evaluation of surgical candidates and MMPI-2-RF
• Consider context of evaluation
• Annotation for each statement indicated by superscript tied to Endnotes and Reference section

MMPI-2-RF Spine-CIR & Stim-CIR: Synopsis

General Overview of:
• Validity Concerns
• Comparison Group Findings
• Presurgical Psychological Risk factors
MMPI-2-RF Spine-CIR & Stim-CIR
Clinical Interpretive Report Sections

Based on T-scores compared to general MMPI-2-RF normative sample

- Protocol Validity
- Substantive Scale Interpretations
- Diagnostic Considerations

MMPI-2-RF Spine-CIR & Stim-CIR:
Comparison Group Findings

Construct-Based Statements
- Based on scale item content
- Clinical Implications of elevated scale scores
- Clinical Implications of uncommonly high scores

EXAMPLE:
“She reports a comparatively low level of positive emotional experiences for a spine surgery candidate. Only 9.5% of comparison group members convey this or a lower level of positive emotions.”
MMPI-2-RF Spine-CIR & Stim-CIR: Presurgical Psychological Risk Factors

- Description of presurgical correlates of test-taker scores associated with reduced outcome
- Divided into 9 domains relevant to outcome of spine surgery and spinal cord stimulation
- Statements fully annotated and linked to studies

- Example:
  - Correlate for the fear-avoidance dimension is FABQ

MMPI-2-RF Spine-CIR & Stim-CIR: Presurgical Psychological Risk Factor Domains

- #1: Depression & Demoralization Problems
  - Unhappiness and Life Dissatisfaction
- #2: Pain & Somatic Sensitivity Problems
  - Heightened awareness of physical problems, esp. pain
- #3: Pain-Coping Problems
  - Maladaptive behaviors and cognitions
- #4: Health Orientation & Medical Adherence Problems
  - Tendency to resist therapeutic recommendations
- #5: Anxiety & Stress Problems
  - Stressful events and chronic anxiety that may impact healing
MMPI-2-RF Spine-CIR & Stim-CIR:
Presurgical Psychological Risk Factor Domains

• #6: Fear-Avoidance Problems
  ▪ Behaviors and thoughts resulting from fear of pain or damage
• #7: Interpersonal Problems
  ▪ Behaviors that limit ability to draw on support systems
• #8: Substance Abuse Problems
  ▪ Inappropriate use of drugs and alcohol
• #9: Recovery Disincentive Problems
  ▪ Reinforcement of disability and excessive pain behavior

MMPI-2-RF Spine-CIR & Stim-CIR:
Surgery Outcome Correlates

Narrative description of specific areas of reduced surgical outcome that have been found to be empirically linked to MMPI-2-RF elevations obtained from the patient’s profile, including

• pain reduction,
• functional ability,
• medication use,
• emotional state,
• return to work,
• and others
MMPI-2-RF Spine-CIR & Stim-CIR: Follow-Up Recommendations

- General treatment guidelines designed to reinforce surgical outcomes, or be alternatives to surgery, based on any major MMPI-2-RF elevations.
- May include:
  - Antidepressant medication,
  - Pain management training such as biofeedback or hypnotherapy,
  - Cognitive-Behavioral techniques,
  - Techniques to assess or test motivation
  - Consideration of a chronic pain management program.

MMPI-2-RF Spine-CIR & Stim-CIR: Item Level Information

- From General Interpretive Report
  - Unscorable Responses,
  - Critical Responses,
  - User-Designated Item-Level Information,
- Spine & Stim CIR Critical Follow-up Items,
  - Identified by survey of 10 psychologists experienced in PPS
  - Indicates follow-up questions for clinical interview.
MMPI-2-RF Spine-CIR & Stim-CIR: Annotation and References

- Spine-CIR and Stim-CIR is fully annotated and referenced (as is the clinical report). References will be updated regularly.
- Rollover superscript after a statement to see reference

Case Example: Ms E.
Spine Surgery Candidate

- 56 years old
- Married x2, for 3 years
- Injured on the job as a nursing assistant
- Chronicity: 26 months of low back and left leg pain
- No previous spine surgeries
- Unable to work for 8 months
- History of arrest for shoplifting in distant past
- Candidate for an anterior lumbar interbody fusion at L4-L5 and L5-S1
MMPI-2-RF Validity Scales

---

Raw Score:

- VRIN-r: 3
- TRIN-r: 10
- F-r: 4
- Fp-r: 1
- Fs: 3
- FBS-r: 13
- RBS: 9
- L-r: 0
- K-r: 8

T Score:

- 48
- 57
- 61
- 51
- 66
- 67
- 67
- 37
- 52

Response %:

- 98
- 100
- 100
- 100
- 100
- 100
- 100
- 100
- 100

Cannot Say (Raw): 1

Percent True (of items answered): 38%

Comparison Group Data: Spine Surgery Candidate (Women), N = 662

Mean Score (mean): 47
- 52
- 56
- 49
- 55
- 65
- 58
- 59
- 54

Standard Dev (±1 SD): 10
- 9
- 12
- 9
- 14
- 12
- 12
- 11
- 10

Percent scoring at or below patient:

- 68
- 81
- 77
- 83
- 86
- 64
- 83
- 2
- 46

---
MMPI-2-RF Higher-Order (H-O) and Restructured Clinical (RC) Scales

Raw Score:  
T Score:  
Response %:  

Comparison Group Data: Spine Surgery Candidate (Women), N = 662

Mean Score (+ - - - -):  
Standard Dev (+ + + +):  
Percent scoring at or below patient:
MMPI-2-RF Somatic/Cognitive and Internalizing Scales

**Somatic/Cognitive**

- MLS
- GIC
- HPC
- NUC
- COG
- SUI
- HLP
- SFD
- NFC
- STW
- AXY
- ANP
- BRF
- MSF

**Internalizing**

- MLS
- SUI

**Raw Score:**

- 3
- 0
- 2
- 1
- 5
- 0
- 1
- 2
- 5
- 3
- 0
- 5
- 0
- 1

**T Score:**

- 57
- 46
- 59
- 53
- 69
- 45
- 52
- 56
- 58
- 52
- 44
- 66
- 43
- 42

**Response %:**

- 100
- 100
- 100
- 100
- 100
- 100
- 100
- 100
- 100
- 100
- 100
- 100
- 100

**Comparison Group Data:** Spine Surgery Candidate (Women), N = 662

- Mean Score ( segmentation):
  - MLS: 68
  - GIC: 56
  - HPC: 63
  - NUC: 63
  - COG: 54
  - SUI: 49
  - HLP: 49
  - SFD: 51
  - NFC: 47
  - STW: 50
  - AXY: 52
  - ANP: 48
  - BRF: 50
  - MSF: 51

- Standard Dev ( segmentation):
  - MLS: 12
  - GIC: 15
  - HPC: 9
  - NUC: 14
  - COG: 12
  - SUI: 9
  - HLP: 11
  - SFD: 11
  - NFC: 10
  - STW: 11
  - AXY: 12
  - ANP: 10
  - BRF: 10
  - MSF: 8

- Percent scoring at or below patient:
  - MLS: 27
  - GIC: 62
  - HPC: 56
  - NUC: 32
  - COG: 91
  - SUI: 86
  - HLP: 78
  - SFD: 82
  - NFC: 90
  - STW: 74
  - AXY: 65
  - ANP: 95
  - BRF: 59
  - MSF: 18
MMPI-2-RF Externalizing, Interpersonal, and Interest Scales

Raw Score:  3  2  2  1  2  3  4  1  0  5  7
T Score:  63  55  51  39  49  46  52  44  44  62  69
Response %:  100  100  100  100  100  100  100  100  100  100  100

Comparison Group Data:  Spine Surgery Candidate (Women), N = 662
Mean Score (− − −):  47  45  44  45  47  51  50  46  46  45
Standard Dev (± 1 SD):  9  6  7  10  10  9  10  9  9  7
Percent scoring at or below patient:  95  96  89  42  76  43  71  55  77  96  99.5
MMPI-2-RF PSY-5 Scales

Raw Score:

AGGR-r  PSYC-r  DISC-r  NEGE-r  INTR-r
7       3       13      8       10

T Score:

45       56       69      53       60

Response %:

100      100      100     100      100

Comparison Group Data: Spine Surgery Candidate (Women), N = 662

Mean Score (−−−−−−): 48       47       42      49       53
Standard Dev (±1 SD):  8        8        7       11       11
Percent scoring at or below patient: 44       90       99.8    75       80
SYNOPSIS

• This is a valid MMPI-2-RF protocol…

• Comparison group findings point to possible concerns about cognitive complaints, emotional problems including unhappiness and dissatisfaction, inefficacy, a low level of positive emotions, and anger, odd perceptions and beliefs, and behavioral problems including irresponsible behavior and substance use.

• Possible presurgical risk factors are identified in the Demoralization and Depression, Pain and Somatic Sensitivity, Pain Coping, Health Orientation and Medical Adherence, Fear/Avoidance, Interpersonal, and Substance Abuse domains.

Comparison Group Findings 1

Somatic/Cognitive Complaints
The patient reports a comparatively high level of cognitive complaints for a spine surgery candidate. Only 16.6% of comparison group members convey this or a greater number of cognitive problems.

Emotional/Internalizing Problems
The patient reports a comparatively large number of emotional problems for a spine surgery candidate. Only 11.9% of comparison group members convey this or a greater level of emotional difficulties. More specifically, she reports a relatively high level of unhappiness and dissatisfaction for this population. Only 7.3% of comparison group members convey this or a greater level of poor morale. In particular, she reports a comparatively high level of inefficacious decision making for a spine surgery candidate. Only 16.3% of comparison group members convey this or a greater level of perceived inefficacy.

She reports a comparatively low level of positive emotional experiences for a spine surgery candidate. Only 9.5% of comparison group members convey this or a lower level of positive emotions.

The patient reports a comparatively high level of problems with anger for a spine surgery candidate. Only 11.0% of comparison group members convey this or a greater level of anger proneness.
ENDNOTES

This section lists for each statement in the report the MMPI-2-RF score(s) that triggered it. In addition, each statement is identified as a Test Response, if based on items content, a Correlate, if based on empirical correlates, or an Inference, if based on the report authors' judgment. (This information can also be accessed on-screen by placing the cursor on a given statement.) For correlate-based statements, research references (Ref. No.) are provided, keyed to the consecutively numbered reference list following the endnotes.

1 Test Response: COG=69
2 Correlate: COG=69, Ref. 8, 16, 31, 50
3 Correlate: RCd=71, Ref. 50; COG=69, Ref. 50
4 Correlate: COG=69, Ref. 8, 31, 50
5 Correlate: EID=66, Ref. 22, 34, 50
6 Test Response: RCd=71
7 Correlate: RCd=71, Ref. 1, 3, 4, 5, 8, 9, 10, 11, 13, 14, 18, 19, 30, 31, 35, 38, 41, 45, 46, 47, 49, 50,
51, 52, 55, 56; RC2=69, Ref. 1, 3, 4, 5, 8, 11, 13, 14, 18, 19, 35, 38, 41, 45, 46, 47, 50, 51, 52, 55, 56
8 Test Response: RC2=69
9 Test Response: ANP=66
10 Correlate: ANP=66, Ref. 1, 8, 10, 15, 31, 33, 35, 50
11 Correlate: ANP=66, Ref. 50
12 Correlate: ANP=66, Ref. 31, 50
13 Test Response: RC4=68
14 Correlate: RC4=68, Ref. 1, 10, 12, 13, 14, 32, 35, 37, 39, 40, 42, 47, 50, 56; DISC-r=69, Ref. 50
15 Correlate: RC4=68, Ref. 5, 31, 40, 44, 50
16 Correlate: RC4=68, Ref. 50
17 Correlate: RC4=68, Ref. 5, 50
18 Correlate: RC4=68, Ref. 10, 50
19 Correlate: RC4=68, Ref. 1, 2, 7, 8, 10, 18, 19, 20, 21, 31, 32, 35, 41, 42, 43, 44, 45, 46, 47, 48, 50, 53,
55
20 Test Response: MEC=69
21 Correlate: MEC=69, Ref. 50
22 Test Response: AES=62
23 Correlate: RCd=71, Ref. 17, 23, 29, 36, 47, 50, 54; RC2=69, Ref. 17, 23, 29, 36, 47, 50, 54
24 Inference: ANP=66
25 Correlate: RC4=68, Ref. 2, 19, 42, 47, 50, 54, 55, 57
26 Test Response: EID=66
27 Test Response: NFC=58
28 Test Response: PSYC-r=56
29 Test Response: BXD=57
30 Inference: RC4=68; DISC-r=69
31 Test Response: DISC-r=69
32 Test Response: JCP=63
33 Test Response: SUB=55
34 Correlate: RCd=71, Ref. 5, 29; RC2=69, Ref. 5, 29
Comparison Group Findings 2

Unusual Thoughts, Perceptions, and Beliefs
The patient reports a comparatively high level of eccentric beliefs for a spine surgery candidate\(^2\). Only 18.0% of comparison group members convey this or a greater level of peculiar thinking\(^2\).

Behavioral/Externalizing Problems
The patient reports a comparatively large number of behavioral problems for a spine surgery candidate. Only 6.2% of comparison group members convey this or a greater level of behavioral difficulties\(^2\). More specifically, her responses indicate a level of disconstraint reflecting behavioral control problems that may negatively affect surgical results\(^2\). This level of poor impulse control is very uncommon among this population. Only 0.3% of comparison group members give evidence of this or a greater level of disconstraint\(^2\). In particular, she reports a relatively high level of juvenile conduct problems for a spine surgery candidate. Only 8.8% of comparison group members convey this or a greater level of conduct problems during their teenage years\(^2\). She also reports a comparatively large number of problems with substance use for this population. Only 11.6% of comparison group members convey this or a greater level of misusing substances\(^2\).

Presurgical Psychological Risk Factors

Demoralization and Depression Problems
Compared with other spine surgery candidates, the patient is more likely to be experiencing depressive affect\(^3\) and to have a low energy level and feel exhausted\(^4\).

Pain and Somatic Sensitivity Problems
Compared with other spine surgery candidates, the patient is more likely to perceive herself as deserving and needing assistance from others\(^5\). She is also likely to report greater functional disability associated with pain\(^5\).

Pain Coping Problems
Compared with other spine surgery candidates, the patient is more likely to catastrophize when experiencing pain\(^5\). She is also likely to be less self-reliant\(^5\).

Health Orientation and Medical Adherence Problems
Compared with other spine surgery candidates, the patient is less likely to seek out information about health\(^6\), to feel confident in obtaining information from the physician\(^6\), to be able to continue with exercise/diet recommendations when under stress\(^7\), and to be engaged in overall health maintenance and improvement\(^7\). She is also more likely to smoke\(^7\).
RESEARCH REFERENCE LIST

The following studies are sources for empirical correlates identified in the Endnotes section of this report.


Presurgical Psychological Risk Factors 2

Fear/Avoidance Problems
Compared with other spine surgery candidates, the patient is likely to express higher levels of fear and avoidance of work activities37. She is also more likely to have been out of work for more than 2 months40.

Interpersonal Problems
Compared with other spine surgery candidates, the patient is more likely to have had a chaotic or disrupted childhood41, to have a partner who reinforces pain behavior42, and to report a lack of social support43. She is also likely to report higher levels of anger44.

Substance Abuse Problems
Compared with other spine surgery candidates, the patient is more likely to have a diagnosis of Substance Use Disorder45. She is also likely to be at increased risk for opioid abuse46.

The candidate’s scores are not associated with empirically identified risk factors in the following domains:
- Anxiety and Stress Problems
- Recovery Disincentive Problems

POSTSURGICAL OUTCOMES

The postsurgical outcome statements listed here are based on prospective empirical studies indicating that, relative to other candidates, this patient is at increased risk for these specific adverse results. Inclusion of an adverse outcome does not imply that it will definitely occur, nor can other negative outcomes be definitively ruled out. Specific sources for each statement can be accessed with the annotation features of this report.

Compared to other spine surgery candidates, post-surgery this patient is likely to:
- Report higher levels of pain47
- Report greater levels of disability47
- Experience more negative affect and higher levels of psychological distress47
- Be more likely to take Schedule II opioid medication48
- Be less likely to return to work49
- Have lower levels of satisfaction with the results of surgery50
- Convey stronger feelings that surgical results did not meet expectations50
- Report a more negative overall outcome51

TREATMENT RECOMMENDATIONS

This section contains inferential treatment-focused recommendations specifically for spine surgery candidates, based on the patient’s MMPI-2-RF scores. Sources for each statement can be accessed with the annotation features of this report.
Treatment Recommendations

Recommendations Based on Elevated Emotional Dysfunction Scales
The patient is significantly demoralized, feels overwhelmed, and may be quite dissatisfied with life circumstances. She may have difficulty becoming motivated and following treatment recommendations. Helping the patient recognize positive aspects of her situation, and focusing on each improvement, however small, may help build momentum for recovery52.

The patient may also be experiencing depressive affect, which could impact surgical outcome. Consideration should be given to antidepressant medication, which may also help with pain reduction, as depression can increase pain awareness. Including individual psychotherapy in the overall surgical treatment plan may help the patient identify and experience pleasurable activities while rehabilitating52.

In addition, the patient is prone to experience anger, irritability, and poor frustration tolerance—all of which may impact relationships with the treatment team. It is recommended that providers collaborate with her in developing approaches to prepare for and recover from surgery, and help her anticipate and deal with setbacks in the recovery process52.

Recommendations Based on Elevated Behavioral Dysfunction Scales
Test results indicate possible problems with authority figures. There may be increased risk of non-adherence to post-surgical treatment requirements. Having the patient participate and gain ownership in developing plans for rehabilitation and return to normal activity may reduce this risk52.

Items for Follow-up

23. (True; 16.5%; K-r, RC7, AGG, NEGE-r)
25. (False; 79.2%; VRIN-r, EID, RC2, MLS)
49. (True; 11.2%; BXD, RC4, SUB, DISC-r)
65. (False; 18.6%; RC1)
105. (False; 15.3%; VRIN-r, EID, RCD)
135. (True; 22.1%; HLP)
141. (True; 15.3%; VRIN-r, FBS-r, RC4, SUB)
152. (True; 13.4%; VRIN-r, NFC)
156. (True; 46.5%; VRIN-r, FBS-r, RBS, BXD, RC4, DISC-r)
172. (True; 9.8%; EID, RCD)
246. (False; 3.8%; VRIN-r, TRIN-r, EID, RC2, INTR-r)
261. (True; 29.2%; VRIN-r, TRIN-r, FBS-r, EID, RCD)
331. (True; 10.7%; VRIN-r, EID, RCD)

Special Note: The content of the test items is included in the actual reports. To protect the integrity of the test, the item content does not appear in this sample report.
Spine-CIR and Stim-CIR Interpretive Reports: Final Points

- Only Broadband psychometric test having an empirical base
- Allows for most accurate estimate of the extent to which psychosocial factors are likely to impact outcome of stimulator and spine surgery
- Ties treatment recommendations to identified risk factors

Identifies issues that should be specifically addressed during diagnostic interview, especially by examining the “Items for Follow Up”

The Spine-CIR and Stim-CIR provide the objective cornerstone of a comprehensive presurgical psychological evaluation, which should include:

- Diagnostic Interview
- Medical Records Review
- Psychometric testing
- A comprehensive report integrating all information
DISCUSSION

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