Never Getting a Break: Persistent High Pain Intensity Relationships with Personality in Chronic Pain Sufferers

Karen M. Schmidt, Ph.D.
University of Virginia
IOMW
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Introduction

• Many millions of American adults suffer from chronic pain, with estimates of 2% to 19% reporting chronic pain suffering
  (Harstall, 2003; Verhaak et al., 1998; Stanford University Medical Center Poll)

• Chronic pain annually accounts for:
  – $150 billion + on healthcare and disability costs
  – $61.2 billion due to loss of work productivity
    (U. S. Census Bureau, 1996)
Introduction

• Given its huge impact, clinicians and researchers still struggle with how to best measure pain

• Most commonly used are self-report scales (Melzack, 1975; Kerns, et al., 1985)

• Treatment success is often measured by patients reporting a particular level of pain scale decrease (Farrar et al., 2001)
Some broadly-defined models of pain include:

- **The Biopsychosocial Model**
  Dynamic and reciprocal model incorporating biological, psychological, and sociocultural processes (Gatchel, 2004)

- **Diathesis Stress Model**
  Model in which personality interacts with stress caused by chronic pain (Weisberg & Keefe, 1997)
Big Five Personality Relationships with Pain Intensity

• Emotional Stability
  – Negatively related to psychological distress, pain, and functional impairment
    (BenDabba et al., 1997; Goodwin & Cox, 2006)

• Extraversion
  – More active coping strategies are related to less severe pain
    (Ramirez-Maestre et al., 2004)
Big Five & Pain Relationships

- Openness
  - Positively related to adaptive coping (Nitch & Boone, 2004)

- Conscientiousness
  - Positively related to stress coping skills (Bolger, 1990)

- Agreeableness
  - Negatively related to somatic distress (Ode & Robinson, 2007)
Our Concerns & Goals

• Many pain studies focus on small samples suffering from one condition, and do not consider personality dimensions

• We asked:
  – How do Big Five dimensions correlate with pain intensity in a large, heterogeneous chronic pain sample?

• We used Winsteps on pain intensity and Big Five personality items, and EQS to explore their relationships
Participants

• $N = 985$ chronic pain sufferers responded to an invitation to complete our 170 questions on Survey Monkey

• Participants were invited from about 100 Internet pain support groups, and The American Pain Foundation
Participants

- 92% white
- 82% female
- 58% married; 13% in committed relationship
- 84% live with others
- 85% medical insurance
- 97% access to medical care
- 34% work full-time; 41% not working due to health
- 52% college-degree and above
- Age $M = 48; SD = 12$
- Pain length $M = 116$ months; $SD = 112$
- Pain began for many reasons for many body locations
Pain and Personality Scales
Pain Intensity Numerical Rating Scale
(PI-NRS; Turk, Rudy, & Sorkin, 1993)

• 4 items
• If “0” means no pain, and “5” means the worst pain you can imagine, what is your pain on:
  – Good Days
  – Bad Days
  – Average Days
  – Today
• We reduced the original 0-10 scale to 0-5
PI-NRS Research

• PI-NRS is the most commonly-used intensity scale in pain clinics and research
  
  – Used to assess meaningful clinical pain reductions (Farrar et al., 2001; Salaffi et al., 2004)

  – Sometimes compared with other scales, such as VAS or NRSs of greater lengths (Jensen et al., 1994; Brevik, et al., 2000)
The Big Five
(McCrae & Costa, 1987; IPIP, Goldberg et al., 2006)

- Openness (7 items, 1 reverse-scored)
- Conscientiousness (6 items)
- Extraversion (5 items)
- Agreeableness (6 items)
- Emotional Stability (8 items, 6 reverse-scored)*

1=Very inaccurate; 2=Moderately inaccurate; 3=Neither inaccurate nor accurate; 4=Moderately accurate; 5=Very accurate
Partial Credit Model
(Masters, 1982)

Numerator sums up to the current category

Denominator is sum of all of the categories

$r$ is the current step
$x$ is the current step
$m$ is the full set of steps
# PI-NRS Summary Statistics

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Days</td>
<td>930</td>
<td>1.89</td>
<td>1.12</td>
</tr>
<tr>
<td>Bad Days</td>
<td>936</td>
<td>4.43</td>
<td>0.72</td>
</tr>
<tr>
<td>Avg Days</td>
<td>930</td>
<td>2.84</td>
<td>0.95</td>
</tr>
<tr>
<td>Today</td>
<td>936</td>
<td>2.83</td>
<td>1.28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Raw Score</th>
<th>Person Measure</th>
<th>Model S.E.</th>
<th>Item Infit MNSQ Max, Min</th>
<th>Item Outfit MNSQ Max, Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>15.7</td>
<td>.76</td>
<td>.98</td>
<td>1.38</td>
<td>1.54</td>
</tr>
<tr>
<td>S.D.</td>
<td>3.4</td>
<td>2.95</td>
<td>.22</td>
<td>.71</td>
<td>.69</td>
</tr>
</tbody>
</table>
PI-NRS Person-Item Map

EACH '#' IS 9
PI-NRS CRCs

Good Days

Bad Days

Average Days

Today
Big Five “Big” Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Raw Score</th>
<th>Person Measure</th>
<th>Model S.E.</th>
<th>Item Infit MNSQ Max, Min</th>
<th>Item Outfit MNSQ Max, Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>108.7</td>
<td>.42</td>
<td>.98</td>
<td>1.27</td>
<td>1.41</td>
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<tr>
<td>S.D.</td>
<td>16.0</td>
<td>.51</td>
<td>.22</td>
<td>.81</td>
<td>.79</td>
</tr>
</tbody>
</table>

\( N = 884 \) measured respondents; all items summarized for convenience here
Big Five "Big" Person-Item Map

1

PERSONS - MAP - Personality

<more> <rare>

1

. # +T

.## | amlifeof EX

.### | worryabo ES*

.#### | dontmindo EX seldomfe ES stressed ES*

.######## | choresdo C dontmindo EX seldomfe ES stressed ES*

.########### | irritate EX ES*

.############ | talktope EX

.############# | followsc C

.############ | amrelaxo ES

0

.###### | alwayspr C usediffi O

.####### | difficul O feelcomf EX startcon EX

.##### | exacting C

.### | vividim O

.# | excellent O

. | amintere A attentio C likeorde C richvoca O

. | feeloth A makepeop A quicktou O taketime A

. | softhear A

. | sympath A

. | spendtimo O

-1

<less> <frequ>

Each # is 9

*Reverse-scored

1 All items placed on same map for convenience here
Big Five CRCs

Agreeableness

Emotional Stability

Openness

Conscientiousness

Extraversion
Confirmatory Factor Models

- **EQS**
  - Confirmed the Big Five personality dimensions and their relation to Pain Intensity (Bentler, 2007)
  - Satorra-Bentler Robust Chi-Square statistic was used to evaluate model fit to the discrete categorical data with polychoric correlations
Emotional Stability

Pain Intensity

Hostility / Vulnerability

Scattered Optimism

Anxiety

Pain on Good Days

Pain on Bad Days

Pain on Average Days

Pain Today

Get irritated easily

Frequent mood swings

Cry easily

Seldom feel blue

Am relaxed sometimes

Stressed out easily

Worry about things

Easily disturbed

χ²(48) = 80.14
CFI = .99
RMSEA = .03
Openness

- Pain Intensity
  - Pain on Good Days
  - Pain on Bad Days
  - Pain on Average Days
  - Pain Today

- Logical Thought
  - Have excellent ideas
  - Quick to understand things
  - Difficulty with abstract ideas

- Vocabulary Skills
  - Have a rich vocabulary
  - Use difficult words

- Imaginative Thought
  - Have vivid imagination
  - Spend time reflecting

\[ \chi^2(40) = 55.12 \]
CFI = .99
RMSEA = .02
Extraversion

\[ \chi^2(25) = 27.06 \]
\[ CFI = .99 \]
\[ RMSEA = .01 \]
Agreeableness

\[ \chi^2(33) = 42.02 \]
CFI = .99
RMSEA = .02
Conscientiousness

\[ \chi^2(29) = 38.52 \]
\[ \text{CFI} = .99 \]
\[ \text{RMSEA} = .02 \]
CFA Summary

• Pain Intensity was correlated with every Emotional Stability and Conscientiousness factor
• Pain Intensity was correlated with only one factor within each of the other factors:
  – Logical Thought (Openness),
  – Gregariousness (Extraversion), and
  – Empathy/Emotion (Agreeableness)
Differential Relationships for Pain Intensity

- A Differential Item Function (DIF) analysis was performed using the PCM

- An Extreme Pain group and a Less Extreme Pain group were formed, based on responses given on Good Days and Bad Days

- For those *never* dropping below the upper half of the scale (3,4,5), even on Good Days, we denoted them as the “Extreme Pain” group ($N = 280$)

- For those dropping below the upper half of the scale (0,1,2) on Good Days, we denoted them as the “Less Extreme Pain” group ($N = 646$)
Personality DIF by Extreme Pain
Group Summary

• Persons in the Extreme Pain group more readily endorsed:

  – Have a soft heart (Agreeableness) \( (p = .0008) \)
  – Make people feel at ease (Agreeableness) \( (p = .018) \)
  – Take time out for others (Agreeableness) \( (p = .025) \)
  – Feel others emotions (Agreeableness) \( (p = .049) \)
Personality DIF by Extreme Pain Group Summary

• Persons in the **Less Extreme** Pain group *more* readily endorsed:
  - Am relaxed sometimes (*Emotional Stability*) \( (p = .004) \)

And they *less* readily endorsed:
- Frequent mood swings (R) (*Emotional Stability*) \( (p = .013) \)
- Worry about things (R) (*Emotional Stability*) \( (p = .032) \)
- Easily disturbed (R) (*Emotional Stability*) \( (p = .005) \)
- Difficulty understanding abstract ideas (R) (*Open*) \( (p = .003) \)
Overall Conclusions

• PCM analyses showed good overall fit of items to these chronic pain sufferers

• DIF analyses showed consistent patterns of *Agreeableness* (2/3 of the items) and *Emotional Stability* (1/2 of the items) endorsement by persons reporting higher and lower amounts of suffering, suggesting some support for earlier literature (Ode & Robinson, 2007)

• Further biopsychosocial investigations examining multiple psychological dimensions in relationship to pain experience in chronic pain sufferers are warranted
Limitations

• Sample consisted of:
  – mostly women
  – mostly white
  – pain sufferers belonging to pain Internet support groups

• Lack of respondent supervision

• Big Five selected variables may have been too limited; others could be considered
Current & Future Directions

- Expand CFA analyses to include all personality dimensions simultaneously
- Multi-group CFA for Extreme Pain groups
- Extend analyses of Extreme Pain groups to include considerations of catastrophizing, support, affect, locus of control
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