

PROMIS-29 V2.0 Physical and Mental Health Summary Scores

Ron D. Hays



Karen L. Spritzer, Ben Schalet, Dave Cella

September 27, 2017, 3:30-4:00pm

HealthMeasures User Conference

Track B: Enhancing Quality Measurement

Prentice Women's Hospital Conference Center

250 E. Superior Street, Chicago, Illinois

PROMIS-29 V 2.0

- 4 items each
 - Ability to participate in social roles and activities
 - Anxiety
 - Depressive symptoms
 - Fatigue
 - Pain interference
 - Physical functioning
 - Sleep disturbance.
- Pain intensity with 0–10 numeric rating item

Preference-Based Scores Estimated from PROMIS-29

- Indirect (mapping to):
 - EQ-5D-3L (Revicki et al., 2009, *Qual Life Res*)
 - HUI-3 (Hays, Revicki et al., 2016, *Qual Life Res*)
- Preference scoring functions
 - Craig et al. (2014, *Value in Health*)
 - Hanmer et al. (2015, *Health Qual Life Outcomes*)

Sample 1: Op4G Panel

- $n = 3,000$
- 51% female
- 60% non-Hispanic White, 17% Hispanic, 14% Black, 9% Asian, 1% other
- Mean age = 46 (range: 18-88 years old)
- 14% less than high school, 31% high school graduates, 28% some college, 47% college degree
- 57% married or living with a partner

Sample 2: Toluna/Greenfield panel

- n = 2,000
- 50% female
- 81% non-Hispanic White, 6% Hispanic, 7% Black, 4% Asian, 2% other
- Mean age = 52 (range: 18-93 years old)
- 3% less than high school, 25% high school graduates, 42% some college, 30% college degree
- 56% married or living with a partner

Analysis Plan

- Exploratory and Confirmatory Factor analyses
- Reliability
 - Coefficient alpha for multi-item scales
 - Mosier's formula for weighted composites
- Product-moment correlations among PROMIS-29 scales
- Associations of PROMIS-29 Summary Scores with:
 - EQ-5D-3L, HUI-3, PROMIS Global Physical and Mental Health, SF-36 PCS and MCS, and number of chronic conditions

Results

Standardized Parameter Estimates from Confirmatory Factor Analysis Model in Sample 1

Item	Physical	Mental
Physical function	0.952	
Pain	-0.416	-.456
Social	0.377	0.556
Fatigue	-.046	-.820
Emotional distress		-.795
Sleep disturbance		-.620

Note: Pain is average of pain intensity item and pain interference scale. Emotional distress is average of anxiety and depressive symptoms.

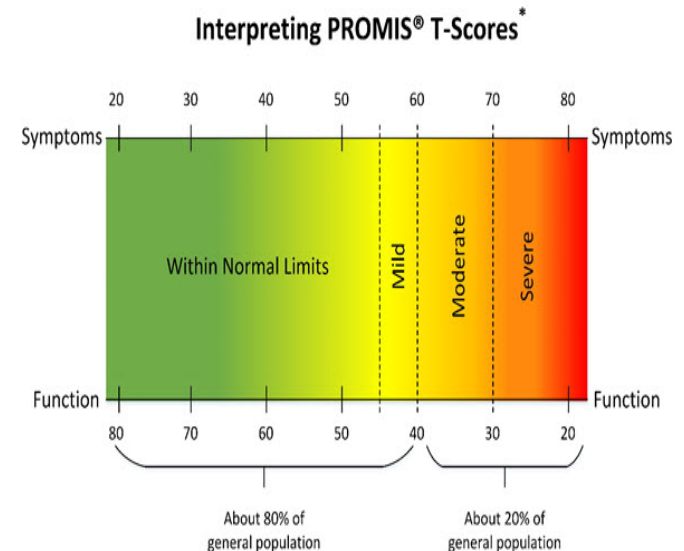
Estimated correlation among physical and mental health factors was 0.694

Reliability Estimates

Measure	Sample 1	Sample 2
Physical Functioning	0.91	0.93
Fatigue	0.91	0.95
Pain Interference	0.94	0.86
Depressive Symptoms	0.93	0.95
Anxiety	0.90	0.91
Ability to Participate in Social Roles and Activities	0.93	0.96
Sleep Disturbance	0.77	0.88
PROMIS-29 Physical Health Summary Score	0.94	0.95
PROMIS-29 Mental Health Summary Score	0.97	0.98

PROMIS Physical and Mental Health T-scores

- $z\text{-scores} = (T\text{-score} - 50)/10$
 - Pain z-score (pain intensity and pain interference)
 - Emotional z-score (anxiety and depressive symptoms)
- Summary health T-scores = $10 * (\text{Sum of } z\text{-scores} * \text{scoring coefficients}) + 50$
- Higher score is better health



*These are general guidelines to aid in interpreting PROMIS® T-scores. Within a given condition or PROMIS domain, thresholds may differ.

Descriptive Statistics for PROMIS-29 Physical and Mental Health Summary Scores in Sample 1

Variable	Mean	SD	Minimum	Maximum
PROMIS-29 Physical	46.32	9.23	21.60	62.45
PROMIS-29 Mental	45.66	9.49	19.53	62.34
PROMIS Global Physical	44.84	9.40	16.04	67.69
PROMIS Global Mental	46.55	9.70	21.13	67.64

Note: First two rows are summary scores for PROMIS-29; last two rows are PROMIS global health scale scores.

Descriptive Statistics for PROMIS-29 Physical and Mental Health Summary Scores in Sample 2

Variable	Mean	SD	Minimum	Maximum
PROMIS-29 Physical	48.63	8.95	22.27	61.92
PROMIS-29 Mental	50.20	9.16	20.44	62.24
SF-36 PCS	46.12	11.24	8.27	69.38
SF-36 MCS	47.68	12.34	-3.59	71.70

Note: First two rows are summary scores for PROMIS-29; last two rows are SF-36 physical component summary (PCS) and mental component summary (MCS) scores.

Product-Moment Correlations Among PROMIS-29 Scales (Sample 1)

	Pain interference	Physical function	Pain intensity	Ability to participate in social roles	Anxiety	Depressive symptoms	Fatigue
Pain interference	1.000						
Physical function	-.739	1.000					
Pain intensity	0.673	-.556	1.000				
Ability to participate in social roles	-.747	0.726	-.539	1.000			
Anxiety	0.586	-.504	0.452	-.636	1.000		
Depressive symptoms	0.591	-.504	0.446	-.630	0.819	1.000	
Fatigue	0.670	-.586	0.515	-.710	0.643	0.634	1.000
Sleep disturbance	0.492	-.402	0.415	-.466	0.466	0.476	0.543

Product-Moment Correlations Among PROMIS-29 Scales (Sample 2)

	Pain interference	Physical function	Pain intensity	Satisfaction with participation in social roles	Anxiety	Depressive symptoms	Fatigue
Pain interference	1.000						
Physical function	-.605	1.000					
Pain intensity	0.780	-.631	1.000				
Satisfaction with participation in social roles	-.490	0.620	-.545	1.000			
Anxiety	0.400	-.311	0.434	-.446	1.000		
Depressive symptoms	0.404	-.335	0.436	-.478	0.806	1.000	
Fatigue	0.546	-.547	0.583	-.613	0.580	0.617	1.000
Sleep disturbance	0.428	-.352	0.484	-.516	0.490	0.531	0.618

Correlations of Physical and Mental Health Summary Scores with Other Variables (Sample 1)

	PROMIS-29 Physical Health Summary Score	PROMIS-29 Mental Health Summary Score
EQ-5D-3L (predicted from PROMIS global health items)	<u>0.82</u>	0.73
HUI-3	<u>0.73</u>	0.67
PROMIS Global Physical	<u>0.80</u>	0.66
PROMIS Global Mental	0.58	<u>0.64</u>
Number of Chronic Conditions	<u>-.50</u>	-.45

Hypertension, angina, coronary artery disease, heart failure, heart attack, stroke, liver disease, kidney disease, arthritis, migraines, asthma, chronic lung disease, diabetes, cancer, depression, anxiety, alcohol or drug problem, sleep disorder, HIV/AIDS, spinal cord injury, and multiple sclerosis.

Correlations of Physical and Mental Health Summary Scores with Other Variables (Sample 2)

	PROMIS-29 Physical Health Summary Score	PROMIS-29 Mental Health Summary Score
SF-36 Physical Component Score	<u>0.82</u>	0.38
SF-36 Mental Component Score	0.54	<u>0.82</u>
Number of Chronic Conditions	<u>-.53</u>	-.42

Hypertension, angina, coronary artery disease, heart failure, heart attack, stroke, liver disease, kidney disease, arthritis, migraines, asthma, chronic lung disease, diabetes, cancer, depression, anxiety, alcohol or drug problem, sleep disorder, HIV/AIDS, and multiple sclerosis.

Largest Associations with Chronic Conditions (Sample 1)

- PROMIS-29 Physical Health Means
 - Multiple Sclerosis ($\bar{x} = 36$ vs. 46)
 - Arthritis or Rheumatism ($\bar{x} = 41$ vs. 47)
 - Angina ($\bar{x} = 39$ vs. 47)
 - Heart Failure or CHF ($\bar{x} = 38$ vs. 46)
- PROMIS-29 Mental Health Means
 - Depression ($\bar{x} = 41$ vs 49)
 - Anxiety ($\bar{x} = 41$ vs 48)
 - Sleep disorder ($\bar{x} = 41$ vs 48)
 - Angina ($\bar{x} = 41$ vs. 48)

Conclusions

- These studies provide support for the reliability and validity of the PROMIS-29 Physical and Mental Health Summary scores.
- Further work is needed to evaluate these summary scores in other samples.
- Alternative scoring approaches such as higher-order factor models should be explored.



Funding for HealthMeasures was provided by the National Institutes of Health grant U2C CA186878.



PROMIS-29 Profile v2.0

Please respond to each question or statement by marking one box per row.

Physical Function		Without any difficulty	With a little difficulty	With some difficulty	With much difficulty	Unable to do
1	Are you able to do chores such as vacuuming or yard work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Are you able to go up and down stairs at a normal pace?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Are you able to go for a walk of at least 15 minutes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Are you able to run errands and shop?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anxiety		Never	Rarely	Sometimes	Often	Always
In the past 7 days...						
5	I felt fearful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	I found it hard to focus on anything other than my anxiety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	My worries overwhelmed me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I felt uneasy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Depression		Never	Rarely	Sometimes	Often	Always
In the past 7 days...						
9	I felt worthless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	I felt helpless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	I felt depressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I felt hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fatigue		Not at all	A little bit	Somewhat	Quite a bit	Very much
During the past 7 days...						
13	I feel fatigued	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	I have trouble starting things because I am tired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PROMIS-29 Profile v2.0

Fatigue

In the past 7 days...

	Not at all	A little bit	Somewhat	Quite a bit	Very much
15 How run-down did you feel on average? ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16 How fatigued were you on average?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sleep Disturbance

In the past 7 days...

	Very poor	Poor	Fair	Good	Very good
17 My sleep quality was.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Not at all	A little bit	Somewhat	Quite a bit	Very much
18 My sleep was refreshing.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19 I had a problem with my sleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 I had difficulty falling asleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ability to Participate in Social Roles and Activities

	Never	Rarely	Sometimes	Usually	Always
21 I have trouble doing all of my regular leisure activities with others.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22 I have trouble doing all of the family activities that I want to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23 I have trouble doing all of my usual work (include work at home)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24 I have trouble doing all of the activities with friends that I want to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Pain Interference

In the past 7 days...

	Not at all	A little bit	Somewhat	Quite a bit	Very much
25 How much did pain interfere with your day to day activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26 How much did pain interfere with work around the home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27 How much did pain interfere with your ability to participate in social activities? ..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28 How much did pain interfere with your household chores?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PROMIS-29 Profile v2.0

Pain Intensity

In the past 7 days...

How would you rate your pain on average?.....

22

0
No
pain

1

2

3

4

5

6

7

8

9

10
Worst
imaginable
pain