

The PROMIS Global Health Questionnaire Correlates With the QuickDASH in Patients With Upper Extremity Illness

HAND
2018, Vol. 13(1) 118–121
© The Author(s) 2017
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/1558944717691127
hand.sagepub.com

Nicky Stoop¹, Mariano E. Menendez¹, Jos J. Mellema¹, and David Ring^{1,2}

Abstract

Background: The objective of this study is to evaluate the construct validity of the Patient-Reported Outcomes Measurement Information System (PROMIS) Global Health instrument by establishing its correlation to the Quick-Disabilities of the Arm, Shoulder and Hand (QuickDASH) questionnaire in patients with upper extremity illness. **Methods:** A cohort of 112 patients completed a sociodemographic survey and the PROMIS Global Health and QuickDASH questionnaires. Pearson correlation coefficients were used to evaluate the association of the QuickDASH with the PROMIS Global Health items and subscales. **Results:** Six of the 10 PROMIS Global Health items were associated with the QuickDASH. The PROMIS Global Physical Health subscale showed moderate correlation with QuickDASH and the Mental Health subscale. There was no significant relationship between the PROMIS Global Mental Health subscale and QuickDASH. **Conclusions:** The consistent finding that general patient-reported outcomes correlate moderately with regional patient-reported outcomes suggests that a small number of relatively nonspecific patient-reported outcome measures might be used to assess a variety of illnesses. In our opinion, the blending of physical and mental health questions in the PROMIS Global Health makes this instrument less useful for research or patient care.

Keywords: construct validity, global health, PROMIS, QuickDASH, upper extremity

Introduction

As health care transitions from a fee-for-service to a value-based environment, patient-reported outcome measures (PROMs) are increasingly used to measure the quality component of value.^{1,8,12,15} Some instruments such as the Short Form-36 (SF-36) and the Patient-Reported Outcomes Measurement Information System (PROMIS) Global Health quantify overall health status and quality of life—both mental and physical—while others are anatomy- or disease-specific.^{7,20} For instance, the abbreviated version of the Disabilities of the Arm, Shoulder and Hand (QuickDASH) measures upper-extremity-specific symptoms and limitations.^{3,19} The SF-36 Physical Component Summary Score correlates moderately with the QuickDASH,²⁰ but the newer and increasingly used PROMIS Global Health is less well studied, particularly in patients with upper extremity illness.

This study evaluated the construct validity of the PROMIS Global Health by measuring correlation to the QuickDASH. We tested the primary null hypothesis that there is no correlation between individual PROMIS Global Health items and the QuickDASH. In addition, we assessed the secondary null hypotheses that: (1) there is no correlation between the PROMIS Global Health physical subscale

with the QuickDASH; (2) there is no correlation between the PROMIS Global Health mental subscale with the QuickDASH; and (3) there is no correlation between the PROMIS Global Health mental and physical subscales.

Materials and Methods

After institutional review board (IRB) approval, 117 consecutive new or follow-up patients presenting to 1 of 3 orthopedic hand surgeons were invited to participate in this prospective cross-sectional study between December 2014 and February 2015. Patients were considered eligible if they were aged 18 years or greater with sufficient English proficiency and literacy and the ability to provide informed consent. We excluded pregnant patients due to requirements

¹Massachusetts General Hospital, Boston, USA

²University of Texas at Austin, USA

Corresponding Author:

David Ring, Associate Dean of Comprehensive Care, Department of Surgery and Perioperative Care, Dell Medical School, University of Texas at Austin, Suite 1.114AC, MC:R1800, 1400 Barbara Jordan Boulevard, Austin, TX 78712, USA.
Email: david.ring@austin.utexas.edu

from the IRB for the data repository protocol used in this study. Five patients (4.3%) declined participation, leaving 112 patients in the study.

Due to competition for enrollment with other studies, patients were enrolled one morning or afternoon clinic a week depending on the availability of the researcher. All consenting patients completed a sociodemographic survey and the following 2 questionnaires: the QuickDASH^{3,9,11} and the PROMIS Global Health.⁷ Both questionnaires were completed before or after the consultation with a hand surgeon, on a secure website (<http://www.assessmentcenter.net>) with use of an encrypted laptop. During data collection, the same investigator provided laptop assistance.

Our study sample consisted of 54 men and 58 women with an average age of 50 ± 16 years (range, 20-90 years). Most patients were white (80%) and either single (43%) or married (44%). Prior to enrollment, 23% of patients had undergone surgery for their condition, 62% had sought general care, and 15% of the patients did not receive any treatment before clinic visit. Prior general care consisted of prescribed pain medication, physical therapy, brace, splint, cast, sling, antibiotics, and steroid injections. Forty-six percent had comorbid pain conditions (eg, neck pain, back pain) (Table 1).

The QuickDASH questionnaire consists of 11 items that assess upper-extremity-related symptoms and limitations.⁹ The scaled score ranges from 0 (no symptoms or limitations) to 100 (the most severe symptoms and limitations). Items are answered on 5-point Likert scales.

The PROMIS Global Health is a 10-item questionnaire that evaluates the patient's physical, mental, and social aspects of health.^{7,16} Items are scored on 5-point Likert scales. There is no overall PROMIS Global Health score, but the questionnaire can be scored into Physical Health and Mental Health subscales. The subscale scores range from 0 to 100, with a mean score of 50 points indicating the norm for the United States general population and each 10 points away from 50 representing a standard deviation difference from the mean.

Statistical Analysis

An a priori power analysis indicated that a sample size of 112 patients would provide 90% statistical power ($\alpha = 0.05$) to detect a medium effect size (0.30) between the QuickDASH and the PROMIS Global Health. Categorical variables were presented with frequencies and percentages, and continuous variables were reported using the mean and standard deviation.

Using Pearson correlation coefficients (r), we evaluated the association of the QuickDASH with the PROMIS Global Health items and subscales. We considered a P value below .05 to be statistically significant.

Table 1. Demographics From Patients With Upper Extremity Illness (n = 112).

Age, mean (SD), y	50 (16)
Education, mean (SD), y	16 (2.7)
Sex, No. (%)	
Men	54 (48)
Women	58 (52)
Race, No. (%)	
White	90 (80)
Nonwhite	22 (20)
Work status, No. (%)	
Full-time	71 (63)
Part-time	4 (3.6)
Homemaker	4 (3.6)
Retired	22 (20)
Other	11 (9.8)
Marital status, No. (%)	
Single	48 (43)
Married or living with partner	49 (44)
Separated, divorced, or widowed	15 (13)
Diagnosis, No. (%)	
Carpal tunnel syndrome	9 (8.1)
De Quervain tenosynovitis	4 (3.5)
Hand fracture	13 (12)
Wrist fracture	10 (9.0)
Elbow fracture	8 (7.2)
Osteoarthritis	9 (8.1)
Sprain, rupture, or dislocation	15 (13)
Tumor, lump, cyst, or nodule	8 (7.2)
Trigger finger	5 (4.5)
Nonspecific arm pain	6 (5.4)
Other	25 (22)
Prior general care, No. (%)	70 (62)
Prior surgery, No. (%)	26 (23)
Other pain conditions, No. (%)	51 (46)
First visit, No. (%)	54 (48)
Health-related outcomes	
QuickDASH, mean (SD) [range]	30 (22) [0-91]
PROMIS Global Health mental, mean (SD) [range]	49 (4.9) [31-59]
PROMIS Global Health physical, mean (SD) [range]	44 (4.8) [30-58]

Note. QuickDASH = Quick Disability of Arm, Shoulder and Hand; PROMIS = Patient-Reported Outcomes Measurement Information System.

Results

Six of the 10 PROMIS Global Health items were associated with QuickDASH; correlations ranged from 0.20 for Global03 Physical health ($P = .04$) and Global10 Emotional problems ($P < .04$) to 0.62 for Global06 Physical function ($P < .001$) (Table 2).

Table 2. Bivariate Analysis: Individual PROMIS Global Health Items and Global Health Subscales Associated With QuickDASH (Disability) in Patients With Upper Extremity Illness (n = 112).

Individual items	Mean ± SD	Correlation with QuickDASH	P value
Global01 General health	3.8 ± 0.90	-0.12	.21
Global02 Quality of life ^a	4.1 ± 0.86	-0.15	.12
Global03 Physical health ^b	3.6 ± 0.89	-0.2	.04
Global04 Mental health ^a	4.0 ± 0.84	-0.14	.15
Global05 Social discretionary ^a	3.9 ± 0.87	-0.12	.2
Global06 Physical function ^b	4.1 ± 1.0	-0.62	<.0001
Global07 Pain ^b	3.6 ± 0.80	-0.48	<.0001
Global08 Fatigue ^b	2.2 ± 0.86	0.4	<.0001
Global09 Social roles	3.8 ± 1.0	-0.43	<.0001
Global10 Emotional problems ^a	2.2 ± 0.86	0.2	.04

Global health subscales	Mean ± SD	Correlation with QuickDASH	P value
PROMIS Global Mental Health scale	49 ± 4.9	-0.09	.34
PROMIS Global Physical Health scale	44 ± 4.8	-0.47	<.0001

Note. PROMIS = Patient-Reported Outcomes Measurement Information System; QuickDASH = Quick Disability of Arm, Shoulder and Hand.

^aItems scored under Mental Health scale.

^bItems scored under Physical Health scale.

Bold indicates significant difference (*P* value below .05).

The PROMIS Global Physical Health subscale had moderate correlation ($r = -0.47$, $P < .001$) with QuickDASH. There was no significant relationship between the PROMIS Global Mental Health subscale and QuickDASH (Table 2). A moderate correlation ($r = 0.47$, $P < .0001$) was established between the mental and physical PROMIS Global Health subscales.

Discussion

PROMs are central in the shift toward value-based care.^{1,18,19} Multiple generic patient-reported health measures are currently used in the orthopedic setting, but the newer and increasingly used PROMIS Global Health is less tested in patients with upper extremity illness. In our study, we compared the measurement properties of the PROMIS Global Health with the QuickDASH in patients with upper extremity illness. Our aim was to examine the construct validity of the PROMIS Global Health items and subscales in patients with upper extremity illness.

This study should be considered in light of its shortcomings. First, our patients were visiting a specialized hand and upper extremity office in a tertiary hospital and consisted of 80% white, well-educated, and largely employed patients. This may reduce generalizability compared with other settings. A second limitation is that we included patients with

a full and representative spectrum of upper extremity disorders. The findings may vary for specific upper extremity conditions. Finally, the lack of a total PROMIS Global Health score makes it more difficult to use and interpret the scale. For instance, the combination of a strong correlation between the physical and mental subscales ($r = 0.63$ was seen in a previous study; 0.47 in our study).⁷ The lack of correlation with the mental subscale suggests there may be unmeasured sources of variance, making it more difficult to accurately interpret the scores.⁷

The findings that the QuickDASH had a small to large correlation with 6 of 10 PROMIS Global Health questions and a moderate correlation with the physical summary score in this study population are consistent with prior work that shows substantial correlation between general and anatomy- or disease-specific PROMs. For instance, both DASH and QuickDASH correlate moderately with the SF-12 and SF-36 physical health subscale.^{2,6,10}

We found no correlation between the PROMIS Global mental health subscale and the QuickDASH. That is consistent with the observation that only one mental health scale item (emotional problems (global10)) had a small correlation with the QuickDASH. This is inconsistent with the consistent moderate correlation of specific psychological measures (eg, symptoms of depression, catastrophic thinking) with symptoms and limitations.^{4,13,17} This could be due to the fact that the mental health questions in PROMIS Global Health questionnaire are much less specific than those in the PROMIS depression and pain interference questionnaires or the Pain Catastrophizing Scale.⁷ It is possible that the mental health questions in PROMIS Global Health are too nonspecific or that they have strong ceiling effects. In our opinion, the PROMIS Global Health questionnaire measures may be inadequate measures of stress, distress, and less effective coping strategies. On the other hand, 1 study found a moderate correlation between 3 of the 4 PROMIS individual mental health items and the PROMIS depression domain.⁷

The construct validity of the PROMIS Global Health questionnaire in patients with upper limb illness is supported by the moderate correlation of the physical health subscale and the 5 physical health questions with the QuickDASH. While general health measures might be somewhat less responsive to specific conditions (eg, upper extremity illness), more prone to floor and ceiling effects, and perhaps somewhat more susceptible to measure domains that are not relevant to the condition being studied,^{5,14} it is notable how much general and region-specific measures do correlate. So much that these disadvantages might be balanced by the advantages of using fewer PROMs in clinical practice and facilitating comparisons for quality improvement and research. In our opinion, general and upper-extremity-specific PROMs seem to be measuring similar things, and it may not be helpful to use both at the same time. Nevertheless, we feel that the PROMIS

Global Health questionnaire has important disadvantages compared with other general health measures. Most important, we find it better to separate mental and physical measures and to use mental health measures that address specific factors with corresponding evidence-based treatments such as symptoms of depression and less effective coping strategies like catastrophic thinking.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent

Informed consent was obtained from all patients included in the study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Andrawis JP, Chenok KE, Bozic KJ. Health policy implications of outcomes measurement in orthopaedics. *Clin Orthop Relat Res.* 2013;471(11):3475-3481.
2. Atroshi I, Gummesson C, Andersson B, et al. The disabilities of the arm, shoulder and hand (DASH) outcome questionnaire: reliability and validity of the Swedish version evaluated in 176 patients. *Acta Orthop Scand.* 2000;71(6):613-618.
3. Beaton DE, Wright JG, Katz JN. Development of the QuickDASH: comparison of three item-reduction approaches. *J Bone Joint Surg Am.* 2005;87(5):1038-1046.
4. Bot AG, Becker SJ, van Dijk CN, et al. Psychologic questionnaires are valid in patients with hand conditions. *Clin Orthop Relat Res.* 2013;471(12):4037-4044.
5. Brazier JE, Harper R, Munro J, et al. Generic and condition-specific outcome measures for people with osteoarthritis of the knee. *Rheumatology (Oxford).* 1999;38(9):870-877.
6. Fan ZJ, Smith CK, Silverstein BA. Assessing validity of the QuickDASH and SF-12 as surveillance tools among workers with neck or upper extremity musculoskeletal disorders. *J Hand Ther.* 2008;21(4):354-365.
7. Hays RD, Bjorner JB, Revicki DA, et al. Development of physical and mental health summary scores from the patient-reported outcomes measurement information system (PROMIS) global items. *Qual Life Res.* 2009;18(7):873-880.
8. Herberts P, Malchau H. Long-term registration has improved the quality of hip replacement: a review of the Swedish THR Register comparing 160,000 cases. *Acta Orthop Scand.* 2000;71(2):111-121.
9. Institute for Work and Health. The QuickDASH outcome measure, information for users; 2013. <http://www.dash.iwh.on.ca/dash-manual>
10. Jain R, Hudak PL, Bowen CV. Validity of health status measures in patients with ulnar wrist disorders. *J Hand Ther.* 2001;14(2):147-153.
11. Kennedy CA, Beaton DE, Smith P, et al. Measurement properties of the QuickDASH (disabilities of the arm, shoulder and hand) outcome measure and cross-cultural adaptations of the QuickDASH: a systematic review. *Qual Life Res.* 2013;22(9):2509-2547.
12. Labek G, Janda W, Agreiter M, et al. Organisation, data evaluation, interpretation and effect of arthroplasty register data on the outcome in terms of revision rate in total hip arthroplasty. *Int Orthop.* 2011;35(2):157-163.
13. Nickel MC, Lindenhovius AL, Watson JB, et al. Correlation of DASH and QuickDASH with measures of psychological distress. *J Hand Surg Am.* 2009;34(8):1499-1505.
14. Overbeek CL, Nota SPFT, Jayakumar P, et al. The PROMIS physical function correlates with the QuickDASH in patients with upper extremity illness. *Clin Orthop Relat Res.* 2015;473(1):311-317.
15. Porter ME. What is value in health care? *N Engl J Med.* 2010;363(26):2477-2481.
16. PROMIS Health Organization PCG. *PROMIS Instrument Development and Validation Scientific Standards Version 2.0*; 2015. <http://www.healthmeasures.net/explore-measurement-systems/promis/measure-development-research>
17. Ring D, Kadzielski J, Fabian L, et al. Self-reported upper extremity health status correlates with depression. *J Bone Joint Surg Am.* 2006;88(9):1983-1988.
18. Rolfson O, Rothwell A, Sedrakyan A, et al. Use of patient-reported outcomes in the context of different levels of data. *J Bone Joint Surg Am.* 2011;93 (suppl 3):66-71.
19. Smith MV, Calfee RP, Baumgarten KM, et al. Upper extremity-specific measures of disability and outcomes in orthopaedic surgery. *J Bone Joint Surg Am.* 2012;94(3):277-285.
20. SooHoo NF, McDonald AP, Seiler JG, et al. Evaluation of the construct validity of the DASH questionnaire by correlation to the SF-36. *J Hand Surg Am.* 2002;27(3):537-541.