RESEARCH ARTICLE

A Two Question Screen for Mental Health Opportunities

Prakash Jayakumar, MBBS, BSc (Hons), MRCS (Eng), D.Phil[1]; Joost T.P. Kortlever, MD[2]; Laura E. Brown, PhD[3]; David Ring, MD, PhD[2]

Research performed at the Department of Surgery and Peri-operative Care, The University of Texas at Austin, Dell Medical School, Austin, TX, USA

Received: 24 July 2019 *Accepted: 07 November 2020*

Abstract

Background: Shortened versions of validated PRO measures of coping strategies e.g. PSEQ-2, may facilitate screening and monitoring of psychological conditions such as depression and anxiety. The primary research question in this study assesses the sensitivity and specificity of a PSEQ-2 score of less than 10 for important symptoms of depression (a PHQ-2 score greater than 2), anxiety (GAD-2 score greater than 2), any impactful prior episode of psychological trauma, and QuickDASH greater than 49. Secondarily we assess the associations between self-efficacy and other demographic and psychological factors on the magnitude of limitations and pain intensity.

Methods: We performed a retrospective PRO evaluation in 926 adult patients attending an upper extremity clinic between 1st January 2018 and 31st January 2019. Demographic factors were assessed using electronic medical records and PRO data using an online platform. Patients included 556 (60%) women, 370 (40%) men (mean 51 years ± 14 (range, 19-88), mostly (n=584, 63%) with safety net insurance.

Results: A PSEQ-2 scoring threshold of less than 10 was 81% sensitive for a PHQ-2 score of 3 or greater, 84% sensitive for a GAD-2 score of 3 or greater, 84% sensitive for one or more important psychological traumas, and 82% sensitive for a QuickDASH of 50 or greater. PSEQ-2 less than 10 was independently associated with greater upper extremity limitations (β=11 [6.3 to 17, 95% Confidence interval [C.I], *P<0.001*) and pain intensity (β=0.92 (0.31 to 1.5, 95% C.I) *P=0.003*) amongst other psychological and demographic factors.

Conclusion: A PSEQ-2 score of less than 10 might, along with verbal and non-verbal signs of distress, be a useful way to introduce the use of more sensitive screening questionnaires about anxiety or depression, or open up the option of speaking directly to mental or social health professionals. Future studies are required to test this hypothesis.

Level of evidence: III

Keywords: Anxiety, Depression, Patient outcomes, Psychological factors, Resiliency, Stress, Self-efficacy

Introduction

Health care systems are increasingly recognizing the benefits of patient-reported outcome (PRO) measures for actively screening and monitoring health (1). Abbreviated versions of validated PRO measures such as the 2 question version of the Pain Self-Efficacy Questionnaire (PSEQ-2) are less burdensome (2–4). The PSEQ-2 measures confidence in one's ability to perform activities and achieve goals in life in spite of pain (5). In other words, assessing an individual's resiliency and adaptive coping strategies during a painful illness

Corresponding Author: David Ring, Department of Surgery and Peri-operative Care, The University of Texas at Austin, Dell Medical School, Austin, TX, USA
Email: David.Ring@austin.utexas.edu

THE ONLINE VERSION OF THIS ARTICLE ABJS.MUMS.AC.IR

(5). Pain is the most common musculoskeletal symptom for which people seek care. There is a strong correlation between PSEQ-2 and magnitude of musculoskeletal limitations (6–10).

Short forms of validated measures of physical limitations (e.g. Quick Disabilities of the Arm, Shoulder and Hand; QuickDASH), symptoms of depression (e.g. Patient Health Questionnaire, PHQ-2), and anxiety (e.g. Generalized Anxiety Disorder Questionnaire, GAD-2) were developed to minimize responder burden (by reducing the number of test items) and improve efficiency (by reducing test times) without losing much in the way of validity, reliability, and responsiveness (11-14). People often avoid honest answers to the sensitive questions composing self-reported psychology measures as an instinctive and protective response (15). In contrast, the 2 questions on the PSEQ-2 ("I can accomplish most of my goals… despite the pain", and "I can live a normal lifestyle… despite the pain") are positively framed and thus may be perceived to be more user-friendly and comfortable to answer compared to measures of psychological distress. The PSEQ-2 questionnaire, combined with patient verbal and non-verbal expressions of stress, distress, and less effective coping strategies, may be sufficient screens for opportunities to improve mental and social health.

The primary research question in this study assesses the sensitivity and specificity of a PSEQ-2 score of less than 10 for important symptoms of depression (a PHQ-2 score greater than 2), anxiety (GAD-2 score greater than 2), any impactful prior episode of psychological trauma, and QuickDASH greater than 49. Secondarily we assess the associations between self-efficacy and other demographic and psychological factors on the magnitude of limitations and pain intensity.

Materials and Methods

We retrospectively evaluated questionnaires collected routinely as part of the clinical evaluation in 926 adult patients who attended an upper extremity clinic at a teaching hospital between 1st January 2018 and 31st January 2019. We accessed demographic (age, gender, language, insurance status) and questionnaire data from our electronic medical records and outcome measurement platforms respectively. Inclusion criteria were fluency in spoken English or Spanish, being aged 18 years or older and having any upper extremity disorder. No patients were excluded from analysis. Of the 926 patients, 556 (60%) were women and 370 (40%) were men with a mean age of 51 years ± 14 (range, 19-88) [Table 1]. Demographic details also included insurance status where the majority of patients (n=584, 63%) were supported by a safety net insurance plan. PRO measures included PSEQ-2, PHQ-2, GAD-2, a check for any important psychological trauma, QuickDASH and pain intensity using a numerical rating scale. These questionnaires were administered on tablet devices using an outcome measurement platform following clinic registration by concierge staff in clinic as patients attended for their review (11, 16, 17).

Outcome measures

PSEQ-2 includes two items scored on a 7-point Likert scale which are added to form a total score ranging from 0 to 12 (3, 4). High scores indicate greater self-efficacy.

PHQ-2 consists of the first two items of the PHQ-9, depressed mood and loss of interest (anhedonia), scored on a scale from 0 to 3 and added to form a total score ranging from 0 to 6 (12, 13). A threshold greater than or equal to 3 indicates clinically significant depression, prompting completion of the full PHQ-9 and a clinical review assessing for major depressive disorder.

GAD-2 consists of the first two items of the GAD-7, which correspond to two key diagnostic criteria for generalized anxiety disorder, and scored on a scale from 0 to 3 and added to form a total score ranging from 0 to 6 (18,19). A threshold greater than or equal to 3 indicates clinically significant anxiety, prompting completion of the full GAD-7 and a clinical review to identify the type of anxiety disorder and whether treatment is necessary.

Patients were also asked about the experience of one of

Table 1. Patient and clinical characteristics

Variables	N=926[1]
Age in years	51 ± 14 (19-88)
Women	556 (60)
Language	
Spanish	289 (31)
English	629 (69)
Insurance status	
Commercial	196 (21)
Safety-net	584 (63)
Medicare	80 (8.7)
Medicaid	65 (7.0)
PHQ-2 score >2	183 (24)
GAD-2 score >2	158 (21)
Psychological traumas >0	98 (18)
PSEQ-2 score≥10	147 (29)
QuickDASH score>50	271 (53)
QuickDASH	52 ± 24 (0-100)
Pain intensity	5.9 ± 2.8 (0-10)

Continuous variables as mean ± standard deviation (range); Discrete variables as number (percentage); [1] N=918 for language, 925 for insurance, 759 for PHQ-2, 767 for GAD-2, 545 for PTSD-5, 512 for PSEQ-2, 511 for QuickDASH, and 510 for pain intensity; PHQ=Patient Health Questionnaire; GAD=Generalised Anxiety Disorder; PSEQ=Pain Self-Efficacy Questionnaire; QuickDASH=Quick Disabilities of the Arm, Shoulder and Hand.

5 major psychological traumas incorporated within the primary care post-traumatic stress disorder scale (PC-PTSD-5) (20).

QuickDASH assesses physical functioning (e.g. daily tasks) and arm symptoms (e.g. pain) using 11, 5-point Likert scales (11, 16, 17, 21). Total scores are scaled from 0 to 100 with higher scores representing greater limitations (11).

Pain intensity was assessed using an 11-point numerical scale that rated level of pain from 0, no pain, to 10, extreme pain.

Statistical analysis

We calculated the number and proportion of patients with PSEQ-2 scores of less than 10 and the sensitivity and specificity of these scores for important symptoms of depression (a PHQ-2 score greater than 2), anxiety (GAD-2 score greater than 2), any impactful prior episode of psychological trauma, and QuickDASH greater than 49. Bivariate analysis involved Pearson correlation, student's t test, and one-way analysis of variance (ANOVA; Appendix 1).

To assess the associations between self-efficacy and other demographic and psychological factors on the magnitude of limitations and pain intensity, we created two multivariable models for factors independently associated with limitations and pain intensity.

Descriptive statistics included frequencies and percentages for discrete variables, and mean, standard deviation, and range for normally distributed continuous variables. No sample size calculation was required based on the high volume of patients and relatively small number of variables assessed. Variables with *P<0.05* were considered significant.

Results

A PSEQ-2 scoring threshold of less than 10 was 81% sensitive for a PHQ-2 score of 3 or greater (specificity, 34%), 84% sensitive for a GAD-2 score of 3 or greater (specificity, 34%), 84% sensitive for one or more important psychological traumas (specificity 33%), and 82% sensitive for a QuickDASH of 50 or greater (specificity, 40%) [Table 2].

Accounting for confounding variables in multivariable analysis, greater upper extremity limitations measured using QuickDASH were independently associated with a PSEQ-2 score less than 10 (β=11 [6.3 to 17, 95% C.I], *P<0.001*), an important psychological trauma (β=6.3 [0.31 to 12, 95% C.I], P=0.039), PHQ-2 score greater than 2 (β=9.3 [2.9 to 16, 95% C.I], P=0.005), safety-net insurance (β=13 [6.7 to 19, 95% C.I], *P<0.001*) or Medicaid (β=18 [7.5 to 29, 95% C.I], P=0.001; adjusted R^2 full model = 0.23) [Table 3].

Accounting for confounding variables in multivariable analysis, pain intensity was independently associated with PSEQ-2 less than 10 (β=0.92 (0.31 to 1.5, 95% C.I) P=0.003), GAD-2 scores greater than 2 (β=0.87 (0.05 to 1.7, 95% C.I), *P=0.037*), being on safety-net insurance (β=1.6, [0.81 to 2.3, 95% C.I], *P<0.001*), older age (β=0.01, [0.01 to 0.06, 95% C.I], *P=0.001*), and female gender (β=0.83, [0.25 to 1.4, 95% C.I], P=0.005; adjusted R^2 full model = 0.18).

Table 2. Number of patients per psychological measure and QuickDASH per PSEQ-2 cut-off score [1]

Variables N=926 [2]	PSEQ-2 score ≥10 N=151	PSEQ-2 score <10 N=376	Sensitivity PSEQ-2	Specificity PSEQ-2
PHQ-2 score >2 (N=759)				
No	99 (85)	195 (73)	81%	34%
Yes	17 (15)	71 (27)		
GAD-2 score >2 (N=767)				
No	104 (90)	205 (76)	84%	34%
Yes	12 (10)	63 (24)		
Psychological traumas >0 (N=545)				
No	93 (89)	191 (76)	84%	33%
Yes	12 (11)	61 (24)		
QuickDASH score >50 (N=511)				
No	97 (66)	143 (39)	82%	40%
Yes	50 (34)	221 (61)		

Discrete variables as number (percentage); [1] A higher score on the PSEQ-2 indicates a more positive coping status, a higher score on the other psychological measures and QuickDASH indicate psychological or physical limitations; [2] Total numbers do not add up since not all patients completed all measures; PHQ=Patient Health Questionnaire; GAD=Generalised Anxiety Disorder; PSEQ=Pain Self-Efficacy Questionnaire; QuickDASH=Quick Disabilities of the Arm, Shoulder and Hand.

Table 3. Multivariable linear regression analysis of factors associated with QuickDASH and pain intensity

Dependent variables	Retained variables	Regression coefficient [β] (95% CI)	Standard error	*P value*	Semipartial R^2	Adjusted R^2
QuickDASH	Age in years	0.17 (-0.01 to 0.35)	0.09	0.072		0.23
	Women	3.2 (-1.7 to 8.1)	2.5	0.198		
	Language					
	Spanish	Reference value				
	English	3.5 (-2.1 to 9.0)	2.8	0.224		
	Insurance status					
	Commercial	Reference value				
	Safety net	13 (6.7 to 19)	3.2	**<0.001**	0.04	
	Medicare	3.7 (-6.0 to 13)	4.9	0.449		
	Medicaid	18 (7.5 to 29)	5.5	**0.001**	0.002	
	PHQ-2 score >2	9.3 (2.9 to 16)	3.3	**0.005**	0.02	
	GAD-2 score >2	4.6 (-2.4 to 12)	3.5	0.196		
	Psychological traumas > 0	6.3 (0.31 to 12)	3.1	**0.039**	0.01	
	PSEQ-2 score <10	11 (6.3 to 17)	2.6	**<0.001**	0.04	
Pain intensity	Age in years	0.04 (0.01 to 0.06)	0.01	**0.001**	0.02	0.18
	Women	0.83 (0.25 to 1.4)	0.29	**0.005**	0.02	
	Language					
	Spanish	Reference value				
	English	0.65 (-0.01 to 1.3)	0.33	0.053		
	Insurance status					
	Commercial	Reference value				
	Safety net	1.6 (0.81 to 2.3)	0.38	**<0.001**	0.04	
	Medicare	-0.04 (-1.2 to 1.1)	0.58	0.939		
	Medicaid	1.1 (-0.18 to 2.3)	0.64	0.093		
	PHQ-2 score >2	0.62 (-0.14 to 1.4)	0.38	0.109		
	GAD-2 score >2	0.87 (0.05 to 1.7)	0.42	**0.037**	0.01	
	Psychological traumas >0	-0.09 (-0.81 to 0.62)	0.36	0.799		
	PSEQ-2 score <10	0.92 (0.31 to 1.5)	0.31	**0.003**	0.02	

Bold indicates statistically significant difference; Only the semipartial R^2 of significant variables is displayed; CI=Confidence interval; R^2=R-squared; PHQ=Patient Health Questionnaire; GAD=Generalised Anxiety Disorder; PSEQ=Pain Self-Efficacy Questionnaire; QuickDASH=Quick Disabilities of the Arm, Shoulder and Hand.

Discussion

Health care systems are increasingly focused on more precise, efficient, and user-friendly ways to screen and monitor health outcomes in patients. Positively framed questionnaires measuring domains such as self-efficacy, combined with observations and expressions of stress, distress, and coping strategies, may provide sufficient screening for opportunities to improve mental and social health. Such questionnaires provide useful alternatives to self-reported psychology measures containing questions that may be avoided due to patient sensitivities.

A score less than 10 on PSEQ-2 appears to have high sensitivity (greater than 80%) but low specificity (around 30%) for notable symptoms of depression or anxiety, or at least one important psychological trauma. This threshold for self-efficacy also appeared to be associated

with magnitude of limitations (along with the threshold for depression, at least one psychological trauma, and safety net or Medicaid insurance), and pain intensity (along with older age, being female, within threshold for anxiety and on safety net insurance). High sensitivity and low specificity are suitable in these circumstances as there is little downside to a conversation about mental and social health. Relatively low specificity can be appreciated considering the health concept measured by PSEQ-2 – namely one's capability, goals and daily activities. We explored the ability of these simple, relevant, and user-friendly questions to signal mental and social health opportunities to clinicians. In this context, only sensitivity is relevant i.e. providing the chance to ask non-offensive, more comfortable questions that feel relevant to identify the vast majority of such opportunities.

While low specificity may not uncover any mental and social health opportunities following the administration of the PSEQ-2, discussion and relationship building triggered by the two questions is still worthwhile.

The notable influence of psychological conditions on musculoskeletal symptoms and limitations is increasingly recognized in research circles but may be under-appreciated and under-treated in clinical settings. Current evidence suggests orthopedic clinicians should routinely assess mental health and be prepared to address a patient's emotional needs. Screening for symptoms of depression and anxiety, especially using probing questions in full length questionnaires potentially risks missing important opportunities and capturing vulnerable patients that may find questions too sensitive to answer honestly. PRO measurement of mental health and scoring thresholds are also prone to labelling individuals with diagnoses that may be counterproductive and stigmatizing. Furthermore, these negatively framed instruments often lack an assessment of effective cognitive coping strategies.

Our preliminary data support using an abbreviated, positively-framed, 2-question measure in combination with vigilance by health care professionals for verbal (e.g. "I cant…") and non-verbal cues (e.g. protection body language and posturing) provides a catalyst for further discussion and signaling those with greater emotional and social needs. This may prompt a more detailed psychological evaluation using full length questionnaires or a formal interview about mental and social determinants of health (22, 23). The approach may also prevent overburdening patients who don't exhibit features (through scores and / or verbal and non-verbal cues) of distress and instead exhibit sufficient coping ability. This may be attractive to providers challenged by the measurement of patient outcomes due to concerns around interference with clinical flow, fear of responder burden and confusion around instrument selection from an evolving myriad of options (14).

Based on our findings, a difference in framing of content also does not appear to affect the scoring interaction between these instruments since the sensitivity of PSEQ-2 for PHQ-2, GAD-2 and the experience of one of 5 major psychological traumas incorporated within the PC-PTSD-5 within tested thresholds appears relatively high. This is supported by a recent study suggesting the content of psychological questionnaires does not seem to affect patient experience, at least in terms of patient satisfaction and patient-perceived empathy related to clinical consultations (24). Further studies are required to assess the impact of more positively and negatively framed items on the relationships between PRO measures and patients with providers.

This combined, streamlined and potentially softer approach may help specialists take advantage of most mental health opportunities. Further, musculoskeletal professionals should be supported (e.g. through communication skills training, improved access to specialists in behavioral health and social care) in managing the transition toward 'complete care' i.e. a patient's physical as well as psychosocial needs, if they are not doing so already.

Psychological and demographic factors also accounted for about 20% of the variation in magnitude of limitations and pain intensity, PSEQ-2 being the psychological measure with the strongest independent influence. This might be greater in specific subpopulations with painful conditions, whereas this study included people with other symptoms such as numbness or a lump. Effective coping strategies such as self-efficacy and negative coping strategies such as catastrophic thinking tend to be the best measures of the mental health contributions to symptoms and limitations (5, 9, 10).

There are several limitations to this study. First, this work was performed at a single institution and thus our findings may not be generalizable. Given that the majority of patients were underinsured and supported by a safety net insurance program, our results may not apply as well in other settings. Further studies are warranted to assess the relationship between these screeners across different health care systems, population and clinical characteristics, including subpopulations with painful compared to asymptomatic conditions, where results may differ. However, it should be noted that the heterogenous nature of the patient population, including patients not experiencing pain or distress, may be representative of a broad range of patients that may receive a screening questionnaire in normal practice. Second, this study was retrospective and lacking some demographic data e.g. employment, education and social status, and clinical details e.g. diagnoses, acute or traumatic etiology. Further evaluation is recommended, involving a prospective patient cohort with more granular demographic and clinical parameters. Third, our analysis was limited to assessing sensitivity and specificity analysis of thresholds within PRO measures. Future studies in this area could utilize methods such as factor analysis to assess common latent constructs being measured by such instruments to better understand their measurement characteristics. This method has been used to demonstrate the assessment of common aspects of human illness behavior by four widely used measures of coping strategy in a prior study (5). Receiver operated characteristics (ROC) analysis could also be used to assess specific thresholds along the continuum

of each domain rather than dichotomizing the scoring ranges. Finally, it could be argued that PSEQ-2 should be compared with the full length scores (gold standards) for depression, anxiety and limitations rather than being assessed as a well matched screener of other screeners and abbreviated measures.

The importance of measuring psychological conditions such as depression, anxiety and stressful experiences alongside a patient's physical limitations is increasingly recognized. However, many professionals are still challenged by applying PRO measures of psychological conditions in clinical settings. PSEQ-2 may provide an efficient, multi-purpose screener and more positively-framed approach for orthopaedic surgeons and allied professionals to explore mental health opportunities and discuss emotional issues. A PSEQ-2 score less than 10 might be—along with certain verbal and nonverbal signs of distress or less effective coping strategies—a more useful way to introduce questionnaires about anxiety or depression. Or perhaps it is sufficient to introduce the option of speaking with a mental or social health professional member of the team directly. We plan to test these hypothesis in future studies.

Prakash Jayakumar MBBS BSc (Hons) MRCS(Eng) D.Phil[1]
Joost T.P. Kortlever MD[2]
Laura E. Brown PhD[3]
David Ring MD PhD[2]
1 UK Harkness Fellowship in Health Care Policy and Practice Innovations, The Value Institute / Department of Surgery and Peri-operative Care, The University of Texas at Austin, Dell Medical School, Austin, TX, USA
2 Department of Surgery and Peri-operative Care, The University of Texas at Austin, Dell Medical School, Austin, TX, USA
3 Center for Health Communication, The University of Texas at Austin, Dell Medical School, Austin, TX, USA

References

1. Porter ME, Larsson S, Lee TH. Standardizing Patient Outcomes Measurement. N Engl J Med. 2016; 374(6):504–6.
2. Bot AGJ, Nota SPFT, Ring D. The Creation of an Abbreviated Version of the PSEQ: The PSEQ-2. Psychosomatics. 2014;55(4):381–5.
3. Briet JP, Bot AGJ, Hageman MGJS, Menendez ME, Mudgal CS, Ring DC. The pain self-efficacy questionnaire: validation of an abbreviated two-item questionnaire. Psychosomatics. 2014;55(6):578–85.
4. Nicholas MK, McGuire BE, Asghari A. A 2-Item Short Form of the Pain Self-Efficacy Questionnaire: Development and Psychometric Evaluation of PSEQ-2. J Pain. 2015;16(2):153–63.
5. Kortlever JTP, Janssen SJ, van Berckel MMG, Ring D, Vranceanu AM. What Is the Most Useful Questionnaire for Measurement of Coping Strategies in Response to Nociception? Clin Orthop Relat Res. 2015;473(11):3511–8.
6. Ahmed SA, Shantharam G, Eltorai AEM, Hartnett DA, Goodman A, Daniels AH. The effect of psychosocial measures of resilience and self-efficacy in patients with neck and lower back pain. Spine J Off J North Am Spine Soc. 2019;19(2):232–7.
7. Chiarotto A, Vanti C, Cedraschi C, Ferrari S, de Lima E Sà Resende F, Ostelo RW, et al. Responsiveness and Minimal Important Change of the Pain Self-Efficacy Questionnaire and Short Forms in Patients With Chronic Low Back Pain. J Pain Off J Am Pain Soc. 2016;17(6):707–18.
8. Hageman M, Briet J, Oosterhoff T, Bot A, Ring D, Vranceanu A-M. The Correlation of Cognitive Flexibility with Pain Intensity and Magnitude of Disability in Upper Extremity Illness. J Hand Microsurg. 2016;06(02):59–64.
9. Jayakumar P, Overbeek CL, Lamb S, Williams M, Funes C, Gwilym S, et al. What Factors Are Associated With Disability After Upper Extremity Injuries? A Systematic Review. Clin Orthop. 2018;476(11):2190–215.
10. Menendez ME, Baker DK, Oladeji LO, Fryberger CT, McGwin G, Ponce BA. Psychological Distress Is Associated with Greater Perceived Disability and Pain in Patients Presenting to a Shoulder Clinic. J Bone Joint Surg Am. 2015;97(24):1999–2003.
11. Beaton DE, Wright JG, Katz JN. Development of the QuickDASH: Comparison of Three Item-Reduction Approaches. VO LU M E. 2005;9.
12. Kroenke K, Spitzer RL, Williams JBW. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003;41(11):1284–92.
13. Löwe B, Kroenke K, Gräfe K. Detecting and monitoring depression with a two-item questionnaire (PHQ-2). J Psychosom Res. 2005;58(2):163–71.
14. Bingham CO, Noonan VK, Auger C, Feldman DE, Ahmed S, Bartlett SJ. Montreal Accord on Patient-Reported Outcomes (PROs) use series – Paper 4: patient-reported outcomes can inform clinical decision making in chronic care. J Clin Epidemiol. 2017;89:136–41.
15. Guattery JM, Dardas AZ, Kelly M, Chamberlain A, McAndrew C, Calfee RP. Floor Effect of PROMIS Depression CAT Associated With Hasty Completion in Orthopaedic Surgery Patients. Clin Orthop. 2018;476(4):696–703.
16. Mintken PE, Glynn P, Cleland JA. Psychometric properties of the shortened disabilities of the Arm, Shoulder, and Hand Questionnaire (QuickDASH) and

Numeric Pain Rating Scale in patients with shoulder pain. J Shoulder Elbow Surg. 2009;18(6):920–6.
17. Tsang P, Walton D, Grewal R, MacDermid J. Validation of the QuickDASH and DASH in Patients With Distal Radius Fractures Through Agreement Analysis. Arch Phys Med Rehabil. 2017;98(6):1217-1222.e1.
18. Kroenke K, Spitzer RL, Williams JBW, Monahan PO, Löwe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. Ann Intern Med. 2007;146(5):317–25.
19. Skapinakis P. The 2-item Generalized Anxiety Disorder scale had high sensitivity and specificity for detecting GAD in primary care. Evid Based Med. 2007;12(5):149.
20. Prins A, Bovin MJ, Smolenski DJ, Marx BP, Kimerling R, Jenkins-Guarnieri MA, et al. The Primary Care PTSD Screen for DSM-5 (PC-PTSD-5): Development and Evaluation Within a Veteran Primary Care Sample. J Gen Intern Med. 2016;31(10):1206–11.
21. Hudak PL, Amadio PC, Bombardier C, Beaton D, Cole D, Davis A, et al. Development of an upper extremity outcome measure: The DASH (disabilities of the arm, shoulder, and head). Am J Ind Med. 1996;29(6):602–8.
22. Bot AGJ, Vranceanu A-M, Herndon JH, Ring DC. Correspondence of patient word choice with psychologic factors in patients with upper extremity illness. Clin Orthop. 2012;470(11):3180–6.
23. Wilkens SC, Lans J, Bargon CA, Ring D, Chen NC. Hand Posturing Is a Nonverbal Indicator of Catastrophic Thinking for Finger, Hand, or Wrist Injury. Clin Orthop. 2018;476(4):706–13.
24. Vranceanu A-M, Safren S, Zhao M, Cowan J, Ring D. Disability and Psychologic Distress in Patients with Nonspecific and Specific Arm Pain. Clin Orthop. 2008;466(11):2820–6.

Appendix 1. Bivariate analyses of factors associated with QuickDASH and pain intensity

Variables	QuickDASH	*P value*	Pain intensity	*P value*
Age in years (*r*)	0.09	**0.034**	0.12	**0.008**
Gender				
Men	49 ± 25	**0.030**	5.3 ± 2.9	**0.001**
Women	54 ± 24		6.2 ± 2.7	
Language				
Spanish	53 ± 24	0.641	6.0 ± 2.8	0.473
English	52 ± 25		5.8 ± 2.8	
Insurance status				
Commercial	38 ± 21	**<0.001**	4.5 ± 2.6	**<0.001**
Safety net	55 ± 24		6.3 ± 2.7	
Medicare	47 ± 23		5.1 ± 2.9	
Medicaid	65 ± 21		7.0 ± 2.2	
PHQ-2 score >2				
No	47 ± 24	**<0.001**	5.5 ± 2.8	**<0.001**
Yes	65 ± 22		7.0 ± 2.5	
GAD-2 score >2				
No	49 ± 24	**<0.001**	5.6 ± 2.7	**0.001**
Yes	63 ± 25		6.8 ± 2.7	
Psychological traumas >0				
No	49 ± 24	**<0.001**	5.7 ± 2.8	**0.041**
Yes	63 ± 21		6.5 ± 2.6	
PSEQ-2 score ≥10				
No	56 ± 22	**<0.001**	6.3 ± 2.6	**<0.001**
Yes	41 ± 26		4.8 ± 3.1	
Pain intensity (*r*)	0.67	**<0.001**	-	-

Bold indicates statistically significant difference; Continuous variables as mean ± standard deviation (range); Discrete variables as number (percentage); PHQ=Patient Health Questionnaire; GAD=Generalised Anxiety Disorder; PSEQ=Pain Self-Efficacy Questionnaire; QuickDASH=Quick Disabilities of the Arm, Shoulder and Hand.