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CLINICAL RESEARCH

Is Social Support Associated With Upper Extremity Disability?

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Abstract

Background Pain intensity and disability correlate with psychosocial factors such as depression and pain interference (the degree to which pain interferes with activities of daily living) as much or more than pathophysiology in upper extremity illness. However, other factors like emotional support (perception of being cared for and valued as a person), instrumental support (perception of availability of tangible assistance when needed), positive psychosocial impact (perception and focus on the positive side of a difficult situation, sometimes characterized as posttraumatic growth, benefit-finding, or meaning making), also might be associated with disability in patients with upper extremity orthopaedic illness. This is the first published study, to our knowledge, addressing the potential association of emotional support, instrumental support, and positive psychosocial illness impact with disability in patients with upper extremity illness.

Questions/Purposes We asked: (1) Is there a correlation between the QuickDASH and the Patient-reported Outcomes Measurement Information System (PROMIS®) emotional support Computer Adaptive Testing (CAT)? (2) Is there a correlation between the QuickDASH and PROMIS® instrumental support CAT? (3) Is there a correlation between the QuickDASH and PROMIS® positive psychosocial illness impact CAT? (4) Among the PROMIS® measures of depression, emotional support, instrumental support, positive illness impact, and pain interference, which accounts for the most variance in QuickDASH scores?

Methods One hundred ninety-three patients with upper extremity illness (55% women; average age, 51 ± 18 years) of 213 approached (91% recruitment rate) completed the QuickDASH, and five different PROMIS® CATs: pain interference (the degree to which pain interferes with accomplishing one's goals), depression, emotional support, psychosocial illness impact, and instrumental support. We recruited patients from the practice of three surgeons in hand service of the department of orthopaedic surgery at a major urban university hospital.

Results Pearson Product Moment Correlations showed that emotional support ($r = -0.18$; $p = 0.014$) and instrumental support ($r = -0.19$; $p = 0.008$) were weakly and inversely associated with the QuickDASH), while positive psychosocial illness impact was moderately and inversely associated with the QuickDASH ($r = -0.36$; $p < 0.001$). In

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Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

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multivariable analyses, pain interference, but not the social support measures, was the only psychosocial factor associated with the QuickDASH and alone explained 66% of variance.

Conclusions Emotional support, instrumental support and positive psychosocial illness impact are all individually associated with disability to a small degree, but pain interference (the degree to which pain interferes with accomplishing one's goals) has the strongest influence on magnitude of disability.

Level of Evidence Level 1, prognostic study.

Introduction

Psychosocial factors, in addition to pathophysiology, can predict disability in hand and upper extremity illness [6, 16, 24, 25, 28, 29]. Among the Patient-Reported Outcomes Measurement Information System (PROMIS®) Computer Adaptive Testing (CAT) measures, PROMIS® depression and PROMIS® pain interference (the degree to which pain interferes with activities of daily living) have been shown to be associated with disability as measured by the QuickDASH [11, 21]. Social support has been found to be an independent predictor of pain outcomes among patients with chronic pain [17], and a target for psychosocial treatments in this population [13]. PROMIS® offers measures of several aspects of social support, including emotional support (perception of being cared for and valued as a person), instrumental support (perception of availability of tangible assistance when needed), and positive psychosocial illness impact (perception and focus on the positive side of a difficult situation, sometimes characterized as posttraumatic growth, benefit-finding, or meaning making)—factors that also might affect disability in patients presenting with pain in orthopaedic surgical practices.

Emotional support, instrumental support, and ability to find meaning from difficult situations (eg, positive psychosocial illness impact) are all modifiable resilience factors, shown to buffer the negative effect of stressors including injuries, illness, or trauma. These factors are associated with decreased disability in patients with chronic pain, but, to our knowledge, have not yet been studied in patients with upper extremity illness. This is an important opportunity to better the biopsychosocial care of patients with musculoskeletal pain, by assessing and addressing social support, as a means of improving outcomes such as disability and pain. Therefore, the purpose of this study is to assess the relationship of emotional support, social support, and positive psychosocial illness impact with disability in patients presenting to a hand surgery practice.

We therefore asked: (1) Is there a correlation between the QuickDASH and PROMIS® emotional support CAT? (2) Is there a correlation between the QuickDASH and PROMIS® instrumental support CAT? (3) Is there a correlation between the QuickDASH and PROMIS® positive psychosocial illness impact CAT? (4) Among the PROMIS® measures of depression, emotional support, instrumental support, positive illness impact, and pain interference, which accounts for the most variance in QuickDASH scores?

Methods

Study Design and Setting

This was a cross-sectional study conducted at a major medical institution between December 2012 and July 2013, and included patients who were newly recruited or those seen for followup.

Participants/Study Subjects

Patients presenting to the office of three orthopaedic hand surgeons (DCR, CSM, JBJ) were asked to participate in this study, which was approved by our institutional review board. Inclusion criteria were: (1) 18 years or older, (2) English speaking, and (3) ability to provide informed consent. This practice is in a tertiary care urban hospital in the northeastern United States, but most patients are referred from a large primary care network associated with the hospital. Pregnant women (mandated by our institutional review board) and patients unable or unwilling to complete the enrollment form owing to any mental status or language problems (such as dementia, head injury, overall illness) were excluded. Ten patients declined participation and eight declined to finish the study owing to time constraints, leaving 193 patients for analysis. There were 107 (55%) women and 86 (45%) men, with a mean age of 51 ± 18 years (range, 19–86 years). More than 60% of the patients had a full-time or part-time job and ½ of the patients were married. Approximately ⅓ of the patients were new and the remaining were patients seen for followup (Table 1).

Description of Experiment, Treatment, or Surgery

Patients completed the Quick DASH and five different PROMIS® instruments (pain interference, emotional support, depression, psychosocial illness impact, and instrumental support) on an encrypted computer via https://

Table 1. Demographics for the 193 patients

	Mean	SD	Range
Age, years	51	18	19–86
Education, years	16	3.0	7–22
Sex	Number	%	
Women	107	55	
Men	86	45	
Work status			
Working full time	94	49	
Working part time	29	15	
Homemaker	7	3.6	
Retired	37	19	
Unemployed, able to work	8	4.1	
Unemployed, unable to work	13	6.7	
Workers compensation	2	1.0	
Currently on sick leave	2	1.0	
Missing variable	1	0.52	
Marital status			
Single	65	34	
Living with partner	7	3.6	
Married	97	50	
Separated/divorced	19	10	
Widowed	4	2.1	
Missing variable	1	0.5	
Visit type			
Initial	74	38	
Followup	88	46	
Postoperative	31	16	
Prior surgery			
Yes	26	13	
No	167	87	
Other pain conditions			
Yes	73	38	
No	116	60	
Missing variable	4	2.1	
Physician			
Surgeon 1	8	4.1	
Surgeon 2	115	60	
Surgeon 3	70	36	
Diagnosis			
Acute/trauma	77	40	
Nonspecific arm pain	13	6.7	
Trigger finger	15	8	
Carpal/cubital tunnel syndrome	21	11	
Ganglion/cyst	23	12	
Arthritis	13	6.7	
De Quervain	6	3.1	
Dupuytren	8	4.1	
Other	17	8.8	

Table 2. Questionnaires

Questionnaire	Number	Mean	SD
PROMIS®			
Pain interference	192	55	8.8
Emotional support	192	55	8.5
Depression	193	50	8.8
Instrumental support	193	55	8.8
Psychosocial illness impact positive	191	51	9.9
QuickDASH	192	32	25

www.assessmentcenter.net (Table 2). CAT optimizes the item bank administration by choosing relevant questions selected by recruiting a dynamic item selection algorithm to target the next items based on already given responses to previous questions [4, 5]. This prevents unnecessary and redundant items from being administered, resulting in decreased burden on the respondent and increased level of efficiency and precision [7].

The PROMIS® instrument scores range from a minimum of 0 points and maximum of 100 points. The mean score is defined by PROMIS® at 50 points. For negatively worded instruments like depression, a higher score reflects more depression. For positively worded instruments (emotional support, for instance), a higher score reflects more emotional support [3].

Variables, Outcome Measures, Data Sources, and Bias

The PROMIS® bank pain interference (v1.0) CAT was used to assess the degree to which pain interferes with social, cognitive, physical, and recreational activities during the past week [1]. The PROMIS® bank v1.0 depression CAT was used to assess subjects' depressive symptoms during the past week [8, 22]. All PROMIS® items assess symptoms on a five-point Likert scale (eg, 1 = not at all, 2 = a little bit, 3 = somewhat, 4 = quite a bit, 5 = very much). Then, the social support PROMIS® items are asked without a specific time. The PROMIS® bank emotional support v1.0 CAT was used to assess patients' perceived feelings of being cared for and valued as a person [23]. The PROMIS® bank instrumental support v1.0 CAT was used to assess perceived availability of functional support that serves a specific function, such as emotional, instrumental, or informational support (eg, do they have somebody to help them with their chores if they are sick and do they have somebody who could bring them to an appointment) [23]. The PROMIS® bank psychosocial illness impact positive scale v1.0 CAT was used to measure emotional and social outcomes of illness. Items assess potential

Table 3. Bivariate analysis

Variable	Quick DASH n = 192	
	r	p value
PROMIS®		
Emotional support	−0.18	0.014
Pain interference	0.83	< 0.001
Depression	0.48	< 0.001
Instrumental support	−0.19	0.008
Psychosocial illness impact positive	−0.36	< 0.001
Sex	Mean (SD)	
Men	30 (2.3)	
Women	34 (2.6)	0.200
Marital status		
Single	34 (25)	
Living with partner	30 (27)	
Married	27 (22)	0.001
Separated/divorced	51 (26)	
Widowed	45 (8.1)	
Work status		
Working full time	30 (23)	
Working part time	28 (20)	
Homemaker	24 (28)	
Retired	32 (24)	
Unemployed, able to work	29 (25)	< 0.001
Unemployed, unable to work	63 (25)	
Workers compensation	72 (27)	
Currently on sick leave	34 (19)	
Diagnosis		
Acute/trauma	39 (25)	
Nonspecific arm pain	27 (15)	
Trigger finger	22 (18)	
Carpal/cubital tunnel syndrome	37 (27)	
Ganglion/cyst	21 (25)	0.005
Arthritis	41 (30)	
De Quervain	39 (27)	
Dupuytren	14 (12)	
Other	27 (18)	
Physician		
Surgeon 1	32 (20)	
Surgeon 2	31 (24)	0.820
Surgeon 3	34 (26)	
Type of patient		
New	31 (25)	
Followup	30 (23)	0.039
Postoperative	42 (25)	
Other pain condition		
Yes	38 (27)	
No	28 (23)	0.011
Prior surgery		
Yes	38 (30)	
No	31 (24)	0.180

positive outcomes that can occur when one is confronted with illness on a psychosocial domain (eg, improved relationships, greater life appreciation) but not on functional or physical domains. It asks patients questions regarding how their illness has affected them and how they view their life before and after their illness [15].

The QuickDASH is the abbreviated version of the DASH questionnaire. It consists of 11 items that assess disability in the upper extremity using five-point Likert scores [2, 9, 10]. The overall test score ranges from 0 (no disability) to 100 (most severe disability). To get a valid score patients need to answer at least 10 items.

Statistical Analysis, Study Size

An a priori power analysis indicated that we needed a minimum sample size of 193 patients to provide 80% statistical power ($\alpha = 0.05$) to detect a 0.20 correlation between the QuickDASH and the PROMIS® emotional support item bank.

The bivariate association between the QuickDASH and the five individual PROMIS® instruments was analyzed using Pearson correlations. The association of the QuickDASH with dichotomous variables such as sex, other pain conditions, and prior surgery were analyzed using t-tests. The association of the QuickDASH and categorical variables such as marital status, work status, diagnosis, doctor, and type of visit (new, followup, or postoperative) were analyzed with a one-way ANOVA. All clinical and demographic variables were assessed as potential covariates for inclusion in the main analyses (Table 1).

Variables associated with the QuickDASH at a probability less than 0.10 in bivariate analysis were inserted in a backward, stepwise, multivariable linear regression analysis with the QuickDASH as a dependent variable.

Results

Emotional support ($r = -0.18$; $p = 0.014$) and instrumental support ($r = -0.19$; $p = 0.008$) were weakly and inversely associated with the QuickDASH), while positive psychosocial illness impact was moderately and inversely associated with the QuickDASH ($r = -0.36$; $p < 0.001$) (Table 3).

In multivariable analyses the following clinical, demographic and psychosocial variables explained 73% of the variation in QuickDASH scores: PROMIS® pain interference (coefficient: 2.2; partial R-squared: 0.66; $p < 0.001$), trauma (coefficient: 6.1; partial R-squared: 0.047; $p = 0.003$), followup patients (coefficient: −7.4; partial R-

Table 4. Multivariable analysis predicting QuickDASH

Variable	Coefficient	Part R-squared	Standard error	p value	Adjusted R-squared	95% CI
PROMIS® Pain Interference	2.2	0.66	0.11	< 0.001		1.9–2.4
Trauma	6.1	0.047	2.0	0.003		2–10
Followup patient	−7.4	0.038	2.7	0.007		−13 to −2.0
Unemployed, unable to work	8.8	0.025	4.0	0.029	0.73	0.90–17
Nonspecific arm pain	−7.9	0.023	3.8	0.040		−15 to −0.37
Initial visit	−5.8	0.022	2.8	0.043		−11 to 0.17
Separated/divorced	6.2	0.021	3.1	0.048		0.059–12

squared: 0.038; p = 0.007), unemployed and unable to work (coefficient: 8.8; partial R-squared: 0.025; p = 0.029), nonspecific arm pain (coefficient: −7.9; partial R-squared: 0.023; p = 0.040), initial visit (coefficient: −5.8; partial R-squared: 0.022; p = 0.043), and separated/divorced marital status (coefficient: 6.8; partial R-squared: 0.021; p = 0.048) (Table 4). Pain interference alone explained 66% variance in the QuickDASH.

Discussion

As predicated by the biopsychosocial model, psychological, social, and biological factors are interrelated in how they influence illness outcomes in patients with various medical conditions including pain. Prior research has identified that depression and pain interference are important psychological factors associated with disability in patients with upper extremity illness, opening the door to opportunities to decrease disability through teaching coping skills aimed at improving mood and pain-related mindset [14, 29]. Social factors such as feeling cared for, perceiving that others are available to help with tangible tasks, and the ability to see the positives in stressful situations like illness and pain, are important resiliency factors that buffer the effect of stress. These social factors are associated with decreased disability in patients with chronic pain but, to our knowledge, have not yet been studied in patients with upper extremity illness. This study is aimed at improving our understanding of the social correlates of disability in patients with upper extremity illness, to be able to improve patients' biopsychosocial care. Toward this end, we examined the individual association of disability to emotional support, instrumental support, and positive psychosocial illness impact; we also examined the association of these social variables, psychological variables (depression, pain interference), and clinical and demographic variables to upper extremity disability, in an effort to understand the relative importance of these modifiable social and psychological variables in relation to upper extremity disability.

Our findings should be interpreted in light of their limitations. The mean QuickDASH score was relatively low in this sample, and the mean for all PROMIS® measures was close to the mean score for the general population. We might find different results among patients with more varied and severe disabilities and impaired psychosocial profiles. In addition, the PROMIS® pain interference and the QuickDASH ask similar questions regarding the ability to engage in activities of daily living, with one focusing only on the effect of pain (eg, pain interference) and the other asking about symptoms and ability to engage in daily upper limb tasks (QuickDASH). In a prior study, Kortlever et al. [14] found that measures of catastrophic thinking, self-efficacy about pain, and pain interference were all highly correlated, and they all correlated with the QuickDASH. However it is unclear whether this indicates that limitations attributable to pain strongly reflect coping strategies or simply that most limitations are attributable to pain. In other words, is PROMIS® pain interference a measure of coping strategy or of disability, or are they all measuring the same construct. The strong correlation of the PROMIS® pain interference with PROMIS® upper extremity function might have limited the influence of the social support instruments in the multivariable regression, although the social support instruments had small correlations in the bivariate analysis. Finally, the results are limited by the cross-sectional nature of the study. It is possible that the level of support influences the degree of disability2 but studying these variables in a circumscribed time allowed us to only capture associations.

Emotional support had a small inverse correlation with upper extremity symptoms and disability in patients presenting to the hand surgeons' offices. This finding is consistent with prior research in patients with chronic back pain [26, 27]. This suggests that the perception of feeling cared for and valued may be important to nurture when treating patients with upper extremity illness.

Instrumental support also had a small inverse correlation with upper extremity symptoms and disability. This finding is consistent a prior study [20] of patients with rheumatoid arthritis, where receiving adequate instrumental support

was associated with less disability especially when looking at activities that are specifically valued by patients. This suggests that having someone available to provide help with daily life activities may be important for patients with musculoskeletal pain, particularly during the period of adjustment to the specific illness.

Positive psychosocial illness impact had a moderate association with disability. This suggests that an upper extremity illness is less limiting to the extent that one can regard it in a positive, adaptive manner. This finding is consistent with research on posttraumatic growth, benefit finding, and meaning making [12, 19], which suggests that patients who are able to look at a stressful or traumatic situation through an adaptive lens that allows for finding positives such as insight into one's own ability to cope, appreciation for support from others, sense of peace, acceptance, and trust in one's ability to adapt have better health outcomes compared with those who do not.

Among the psychosocial measures, pain interference was the sole predictor of disability. Although social support has a relationship with the DASH, this relationship appears to be weak compared with that between pain interference and disability. None of the support variables was selected as the best combination of predictors to explain variance in disability. This finding is consistent with prior research and reinforces the contention that pain interference is the strongest predictor of disability in patients with upper extremity pain [18].

Pain interference—the ability to successfully use coping mechanisms and engage in activities despite pain—was by far the dominant determinant of pain intensity and magnitude of disability in patients with upper extremity illness. Although social support influences pain intensity and magnitude of disability, the influence of coping strategies seems much stronger. This suggests that cognitive behavioral therapy interventions should target primarily coping strategies in response to pain, and secondarily, aspects of social support. Treatments that encourage and enhance strategies that help patients remain active and achieve their goals despite pain seem integral to musculoskeletal care. PROMIS® CAT measures can aid in identifying patients who might benefit. Future studies should assess the relationship of social and psychological variables to disability in patients with upper extremity illness using a prospective design. This design would allow important inferences about the role of social factors in the development or reinforcement of disability in this population. Use of modern statistical methods such a structural equation modeling would allow examinations of the interrelation of social and psychological variables, and open the door of examination of explanatory (eg, mediation, moderation) models of how disability develops through more naturalistic, comprehensive designs.

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