

The Relationship Between Catastrophic Thinking and Hand Diagram Areas

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Purpose To evaluate the relationship between the total area marked on pain and numbness diagrams and psychosocial factors (depression, pain catastrophic thinking, and health anxiety).

Methods A total of 155 patients marked painful and numb areas on separate hand diagrams. Patients also completed demographic, condition-related, and psychosocial (Pain Catastrophizing Scale, Patient-Reported Outcomes Measurement Information System Depression Computer Adaptive Test, and Short Health Anxiety Inventory) questionnaires. Bivariate and multivariable analyses were used to determine factors associated with total area marked on the pain and numbness diagrams.

Results The total area marked on the pain diagram correlated with catastrophic thinking, symptoms of depression, and health anxiety. In multivariable analysis, catastrophic thinking was the sole predictor of marked pain area, accounting for 10% of variance in the hand pain diagram. The total area marked on the numbness diagram correlated with the interval between onset and visit, diagnosis, catastrophic thinking, and symptoms of depression. In multivariable analysis, the interval between onset and visit, a diagnosis of carpal tunnel syndrome, and catastrophic thinking were independently associated with total area marked on the hand numbness diagram.

Conclusions Catastrophic thinking was independently associated with larger pain and numbness areas on a hand diagram. This suggests that larger symptom markings on hand diagrams may indicate less effective coping strategies. Hand diagrams might be used as a basis for discussion of coping strategies and illness behavior in patients with upper extremity conditions. (*J Hand Surg Am.* 2015;40(12):2440–2446. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Diagnostic III.

Key words Hand diagram, psychosocial, catastrophic thinking, symptoms, pain and numbness.



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DIAGRAMS IN WHICH PATIENTS MARK the areas where they experience pain are used in the diagnoses and treatment of musculoskeletal conditions.^{1–5} Hand diagrams in which patients mark the areas where they experience numbness, tingling, and pain are used to screen for carpal tunnel syndrome.⁵ The reported diagnostic performance of the hand diagrams for diagnosis of carpal tunnel syndrome is inconsistent because sensitivity ranges between 19% and 90%, and specificity between 39% and 95%.^{5–9} Interobserver reliability of scoring

ranges from slight agreement ($\kappa = 0.24$) to nearly perfect agreement ($\kappa = 0.97$).^{7,10,11} A simplified scoring system was proposed to improve its ease of use while maintaining similar reliability and diagnostic performance.¹²

The relationship between the hand diagram and clinical and neurophysiological parameters is variable, with some studies showing an association^{5–9,12,13} and others not.¹⁴ Because the hand diagram rating system is subjective, it may be associated with psychosocial factors. Bessette et al¹⁵ found that on a hand diagram test, larger or more extensive drawings were associated with a lower score on the mental health subscales of the Short Form–36 questionnaire. Because of the substantial evidence that coping strategies and symptoms of depression explain a large part of the variation in pain intensity and disability in patients with hand and upper extremity illness,^{16–27} it is possible that a higher hand diagram score is more a function of a patient's ability to cope and psychosocial distress than of anatomic pathology. If true, this can have important clinical implications. If pain and numbness diagrams correlate with psychological distress and ineffective coping strategies, unusual diagrams could help identify patients who might benefit from screening for stress, distress, and ineffective coping strategies and consideration of psychosocial interventions. This is particularly important because psychosocial factors affect hand specific disability after surgery.²⁶

The purpose of this study was to evaluate the relationship between ratings of pain and numbness on the hand diagram and depression, catastrophic thinking, and health anxiety. We tested the null hypotheses that, first, there was no correlation between the total area marked on a hand pain diagram (in square centimeters) and catastrophic thinking, depression, health anxiety, condition-related variables, and demographics, and second, that there was no correlation between the total area marked on a numbness diagram and catastrophic thinking, depression, health anxiety, condition-related variables, and demographics. This study addressed the size, not the pattern, of the marked areas on the diagram.

MATERIALS AND METHODS

Study design

In an observational cross-sectional study approved by our institutional review board, new and follow-up patients presenting to a hand surgeon were invited to participate between April 2014 and September 2014 and again during March 2015.

TABLE 1. Patient Characteristics (n = 155)

Sex, n (%)	
Men	78 (50)
Women	77 (50)
Age, y (mean [SD])	53 (18)
Education, y (mean [SD])	15 (3)
Marital status, n (%)	
Married or with partner	92 (59)
Single	41 (26)
Separated or widowed	22 (14)
Race, n (%)	
White	136 (88)
Black	4 (3)
Asian	9 (6)
Other	6 (4)
Dominant side, n (%)	
Affected	106 (68)
Not affected	49 (32)
Postoperative, n (%)	
Yes	17 (11)
No	138 (89)
Diagnosis, n (%)	
Trigger finger	22 (14)
Carpal tunnel syndrome	22 (14)
Hand fracture	16 (10)
Distal radius fracture	11 (7)
Sprain, rupture, or dislocation	10 (14)
Elbow fracture	7 (4)
Osteoarthritis	7 (4)
Tumor, lump, cyst, or nodule	7 (4)
Amputation, crush, or laceration	5 (3)
Other	48 (31)
Interval between onset and visit, mo (mean [SD])	18 (40)
Type of visit, n (%)	
New patient	94 (61)
Follow-up patient	61 (39)
PROMIS Depression CAT score, mean (SD)	48 (10)
PCS-4 score, mean (SD)	4.8 (4)
SHAI-5 score, mean (SD)	6.3 (3)

Subjects

We obtained a sample of average hand surgery patients. Inclusion criteria were patients with English fluency and literacy, age greater than 18 years, and the ability to provide informed consent. Pregnant women were excluded consistent with requirements from the institutional review board. All patients provided informed consent before any study procedures. A total of 166 patients who met the inclusion criteria

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