



# Worse PROMIS Depression and Anxiety Predict Worse Postoperative Function in Hand Surgery Patients

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## INTRODUCTION

- In patients with operative hand conditions, the estimated prevalence of depression and anxiety is between 10 and 31%.<sup>1,2</sup>
- Preoperative depression and anxiety are risk factors of worse self-rated hand function and satisfaction in orthopaedic surgery patients and, in other surgical settings, greater impairment, lengthened rehabilitation, and increased rates of suicide.<sup>3,4,5</sup>
- The National Institutes of Health (NIH) developed Patient-Reported Outcomes Measurement Information System (PROMIS®) Computer Adaptive Tests (CATs) to reliably measure symptoms.<sup>6</sup>

## OBJECTIVES

- To identify preoperative factors associated with postoperative depression and anxiety in hand surgery patients two years later.
- To measure the association between postoperative function and postoperative depression and anxiety in hand surgery patients.

## HYPOTHESES

- Depression and anxiety symptoms will be prevalent preoperatively and will improve on average after hand surgery.
- Worse PROMIS Depression and Anxiety scores will be associated with patient characteristics and two-year functional outcomes.

## METHODS

- Retrospective study of patients enrolled in the Maryland Orthopaedic Registry (MOR) who underwent hand surgery and completed two-year follow-up.<sup>7</sup>
- 361 patients completed the baseline assessment and 253 (70.1%) completed two-year follow-up and were analyzed.
- Questionnaires were preoperatively and postoperatively for two years: Higher scores correspond to worse symptoms for the PROMIS Depression and PROMIS Anxiety CATs, while higher scores correspond to better function for PROMIS Physical Function (PF) and the Michigan Hand Questionnaire (MHQ).
- We compared categorical data with Wilcoxon rank sum and continuous data with Spearman's rank correlation coefficient. Backwards elimination stepwise multivariable analysis controlled for up to sixteen independent variables based on bivariate analysis and *a priori* literature review. Statistical significance set at  $p < 0.05$ .

## RESULTS

- 253 patients were analyzed with mean age of 50.4 years ( $\pm 16.1$ ) and consisting of 138 (55%) females and 115 (45%) males.
  - Preoperatively, 37 (14.6%) patients had a clinical history of depression or anxiety, while 216 (85.4%) did not.
  - Preoperatively, 16 (6.4%) patients reported clinically significant depression symptoms (PROMIS score  $> 60$ ). 56 (22.5%) patients had clinically significant anxiety symptoms (PROMIS score  $> 62$ ).<sup>8,9</sup>
  - On average, PROMIS Anxiety scores improved significantly postoperatively; PROMIS Depression did not change significantly.
  - Recreational drug use, smoking, history of depression or anxiety, preop opioids, and female sex were associated with worse two-year PROMIS Depression and Anxiety. Higher BMI and lower preop expectations were also associated with worse two-year PROMIS Depression ( $p < 0.05$ ).
- Multivariable analysis controlling for variables that were statistically significant in the bivariate and identified *a priori* demonstrated:
- Worse two-year PROMIS Depression and PROMIS Anxiety were both predicted by clinical history of depression or anxiety, preop opioid use, and female sex.
  - Worse two-year PROMIS Depression predicted less improvement in MHQ and worse two-year MHQ scores. Additionally, worse two-year PROMIS Anxiety predicted worse PROMIS PF scores.

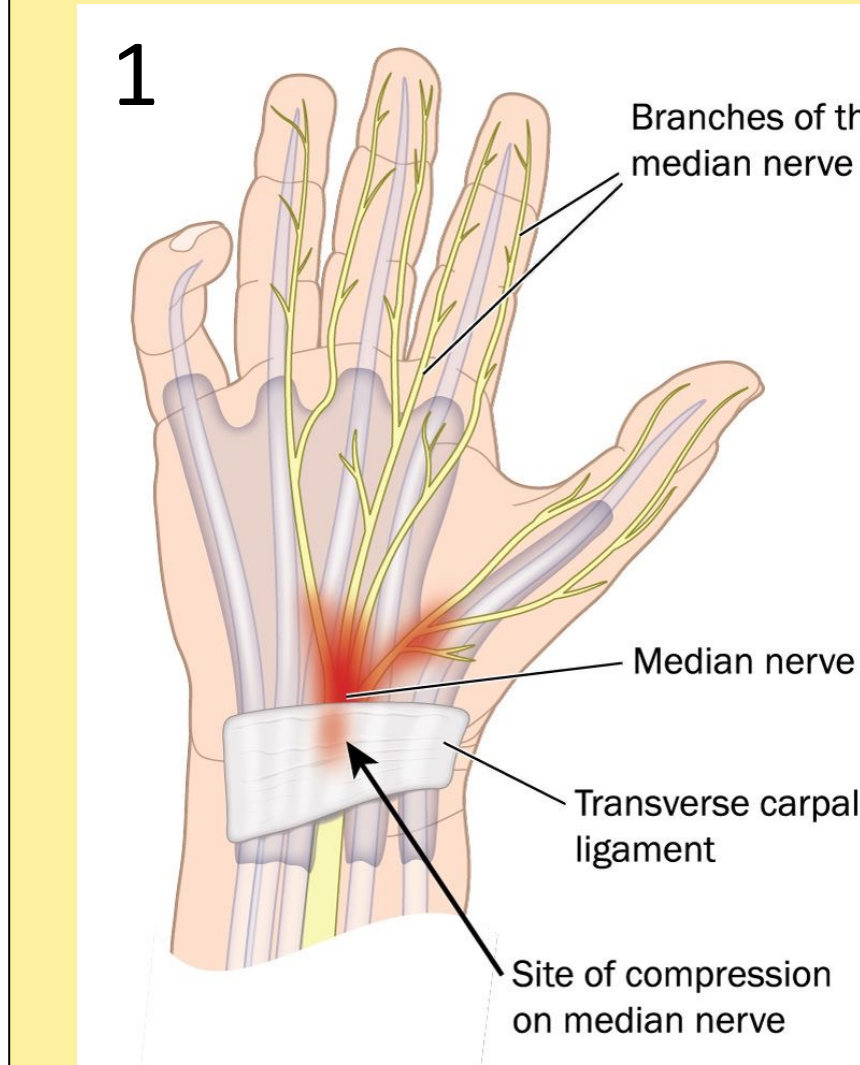
**Table 1: Multivariable Models for Depression & Anxiety**

Model	Predictor & Correlation Estimate (P value)		
	History D/A	Preop Opioids	Female Sex
2y PROMIS Depression	<b>3.2 (0.001)</b>	<b>1.9 (0.008)</b>	<b>1.7 (0.011)</b>
2y PROMIS Anxiety	<b>2.7 (0.011)</b>	<b>2.3 (0.003)</b>	<b>2.0 (0.007)</b>

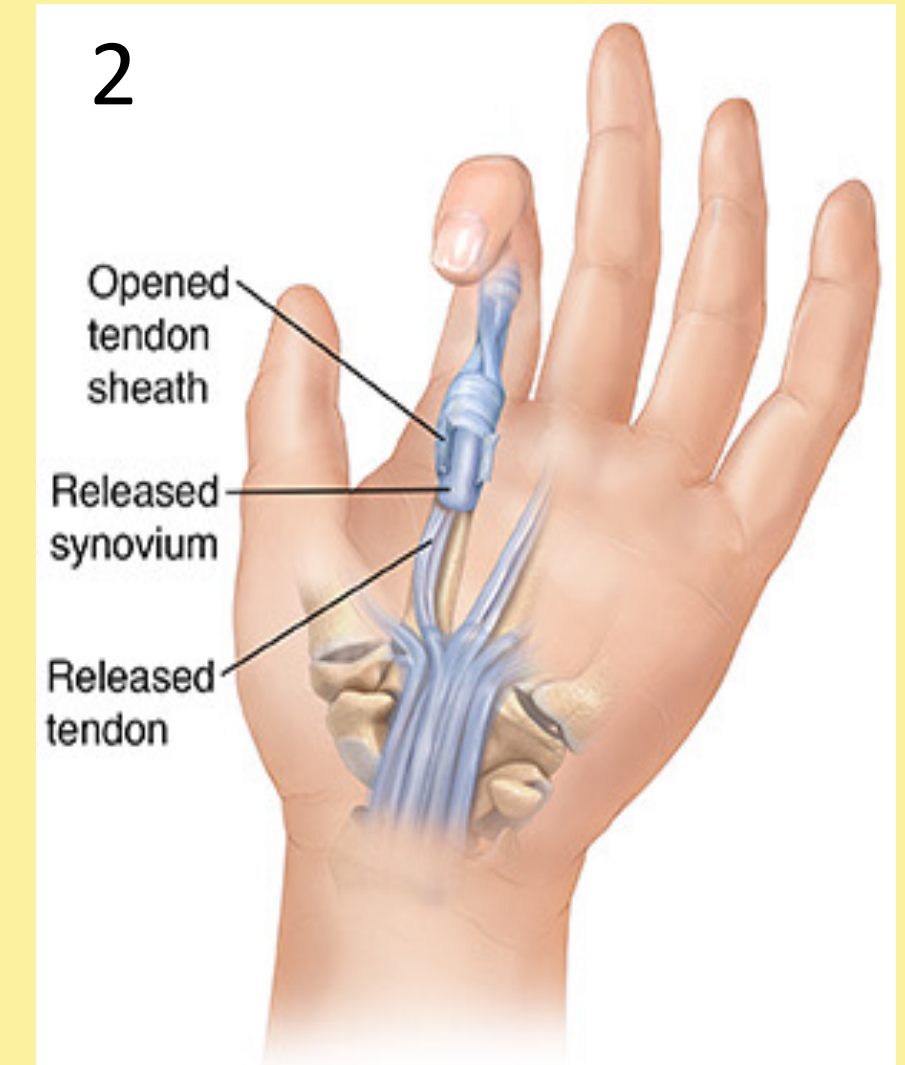
**Table 2: Multivariable Models for Functional Outcomes**

Model	Predictor & Correlation Estimate (P value)	
	2y PROMIS Depression	2y PROMIS Anxiety
2y MHQ	<b>-0.8 (&lt;0.001)</b>	-
PROMIS PF	-	<b>-0.3 (&lt;0.001)</b>

## COMMON PROCEDURES



**FIGURE 1: 22.1% Median Nerve Transposition at Carpal Tunnel**<sup>10a</sup>



**FIGURE 2: 12.3% Tendon Sheath Incision (for Trigger Finger)**<sup>10b</sup>

## CONCLUSIONS

- Depression and Anxiety are prevalent and potentially modifiable risk factors for functional outcomes following hand surgery.
- Clinically significant anxiety symptoms are more prevalent than depression symptoms.
- Female sex, preop opioid use, and clinical history of depression and anxiety independently predicted worse two-year PROMIS Depression and Anxiety.
- Worse two-year PROMIS Depression and Anxiety independently predict lower postoperative MHQ and PROMIS PF, respectively.
- Randomized studies of perioperative intervention for depression and anxiety symptoms are warranted.

## REFERENCES

1. Beleckas, C. M., Wright, M., Prather, H., Chamberlain, A., Guattery, J., & Calfee, R. P. (2018). Relative Prevalence of Anxiety and Depression in Patients with Upper-Extremity Conditions. *The Journal of Hand Surgery*, 43(6), 571.e1-571.e8.
2. Ahmadi, M. M., Bidaki, R., Shahriari Sarhadi, T., Vakilian, A., & Sharifi Razavi, A. (2017). Prevalence of Depression and Anxiety in Patients with Carpal Tunnel Syndrome. *Rafsanjan, Iran 2014.*, 27(153), 64-73.
3. Britton, P., Cullum, N., & Sutton, M. (2017). Association between psychological health and wound complications after surgery. *BJS (British Journal of Surgery)*, 104(6), 769-776.
4. Lee, J., Kim, H.-S., Shim, K.-D., & Park, Y.-S. (2017). The Effect of Anxiety, Depression, and Optimism on Postoperative Satisfaction and Clinical Outcomes in Lumbar Spinal Stenosis and Degenerative Spondylolisthesis Patients: Cohort Study. *Clinics in Orthopedic Surgery*, 9(2), 177-183.
5. London, D. A., Stepan, J. G., Boyer, M. I., & Calfee, R. P. (2014). The Impact of Depression and Pain Catastrophization on Initial Presentation and Treatment Outcomes for Atraumatic Hand Conditions. *The Journal of Bone and Joint Surgery. American Volume*, 96(10), 806-814.
6. Driban, J. B., Morgan, N., Price, L. L., Cook, K. F., & Wang, C. (2015). Patient-Reported Outcomes Measurement Information System (PROMIS) instruments among individuals with symptomatic knee osteoarthritis: A cross-sectional study of floor/ceiling effects and construct validity. *BMC Musculoskeletal Disorders*, 16, 253.
7. Henn, R. F., 3<sup>rd</sup>, Dubina, A. G., Jauregui, J. J., Smuda, M. P., & Tracy, J. K. (2017). The Maryland Orthopaedic Registry (MOR): Design and baseline characteristics of a prospective registry. *Journal of Clinical Orthopaedics and Trauma*, 8(4), 301-307.
8. Pilkonis PA, Yu L, Dodds NE, Johnston KL, Maihoefer CC, Lawrence SM. Validation of the depression item bank from the Patient-Reported Outcomes Measurement Information System (PROMIS®) in a three-month observational study. *J Psychiatr Res*. 2014;56:112-119.
9. Schalet, B. D., Cook, K. F., Choi, S. W., & Cella, D. (2014). Establishing a common metric for self-reported anxiety: Linking the MASQ, PANAS, and GAD-7 to PROMIS Anxiety. *Journal of Anxiety Disorders*, 28(1), 88-96.
10. A) <https://www.handtoshooldertexas.com/carpal-tunnel-syndrome>; b) [https://www.fairview.org/patient-education/83703\(7.22.21\)](https://www.fairview.org/patient-education/83703(7.22.21))

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