

# Post Pandemic Mental and Physical Well-Being Have Continued to Decline Among Patients Undergoing Orthopedic Surgery

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**Introduction:** The past five years have seen notable changes in well-being, altering the physical and mental needs of patient populations. Research about the psychosocial effects of COVID-19 has reported increases in anxiety, depression, sleep disorders, and substance abuse along with general mental health deterioration and emotional distress during periods of lockdown. While population-wide mental health has improved compared to the acute pandemic period, it has not fully returned to pre-pandemic levels. A strong association exists between outcomes of orthopedic surgery and patients' preoperative mental health. Prior studies have shown preoperative emotional distress to be predictive of worsened postoperative pain, function, and satisfaction following many common orthopedic procedures. As such, changes in well-being during and after the pandemic are of great interest to providers. We evaluated whether there were changes in well-being among patients undergoing orthopedic surgery in New York City before, during, and after the pandemic using self-reported mental and physical health as measured by the Patient-Reported Outcome Measurement Information System v1.2-Global Health (PROMIS-GH). Secondary aims included identifying demographic and clinical factors associated with "low" mental and physical health.

**Methods:** This retrospective, hospital-wide, observational study was performed at an urban, tertiary academic specialty hospital with the approval of the Institutional Review Board. The study period was January 1, 2019, to August 19, 2024. During this time, 179,493 adult patients underwent an orthopedic surgical procedure at the study site. Among these, 49,816 patients with incomplete or missing PROMIS-GH responses were excluded, leaving 129,677 patients (72%) for analysis. Included patients were stratified based on procedure date into the pre-pandemic, pandemic, or post-pandemic cohorts. Preoperative PROMIS-GH mental health (MH) and physical health (PH) scores were analyzed with low MH defined as a T-score < 40 and low PH as a T-score < 42. The meaningful change threshold for PROMIS-GH ranges from 2 – 6 T-score points, with PROMIS leadership suggesting a threshold of 3 T-score points may be reasonable for most contexts. One-way Analysis of Variance or the Kruskal Wallis test, depending on normality, was used to compare continuous variables across the pre-pandemic, pandemic, and post-pandemic groups. Chi-squared tests or Fisher's exact tests, as appropriate, were used to compare categorical variables. Unadjusted and adjusted logistic regressions were performed to assess the association between pandemic and post-pandemic time periods and low MH and PH controlling for demographic, underlying health risk, and social factors.

**Results:** Each group was composed mostly of patients that live in New York State and identify as White or Caucasian and not Hispanic or Latino. This population was relatively advantaged socioeconomically and had moderate-to-low social vulnerability according to Area Deprivation Index (ADI) and Social Vulnerability Index percentiles. Patients most commonly underwent surgery in the Adult Reconstruction & Joint Replacement Service, had commercial insurance, and had a low American Status of Anesthesiologists (ASA) status and Charlson Comorbidity Index (CCI). The change in median pandemic and post-pandemic MH scores compared to pre-pandemic were within the defined 2 – 6-point meaningful change threshold range while 25th percentile scores were > 3 points less. Compared to the pre-pandemic cohort, the proportion of patients with low MH increased in the pandemic cohort (11% vs 5%) and increased further in the post-pandemic cohort (14%). The increased likelihood of having low MH in the pandemic and post-pandemic cohorts corresponded to odds ratios (ORs) of 2.57 (95% confidence interval [CI] 2.40 – 2.75; p < .001) and 3.29 (95% CI 3.07 – 3.52; p < .001), respectively, according to unadjusted regression models. The change in median post-pandemic PH scores compared to pre-pandemic were within the defined 2 – 6-point meaningful change threshold while pandemic and post-pandemic 25th percentile scores were > 3 points less. Compared to the pre-pandemic cohort, the proportion of patients with low PH increased in the pandemic cohort (37% vs 25%) and increased further in the post-pandemic cohort (40%). The increased likelihood of having low PH in the pandemic and post-pandemic cohorts, relative to the pre-pandemic cohort, corresponded to ORs of 1.78 (95% CI 1.72 – 1.84; p < .001) and 2.03 (95% CI 1.96 – 2.11; p < .001), respectively, according to unadjusted regression models. Relative to the pre-pandemic period, the odds of low MH adjusted for demographic, clinical, and social factors were 2.70 (95% CI 2.52 – 2.89; p < .001) for the pandemic period and 3.46 (95% CI 3.22 – 3.72; p < .001) for the post-pandemic period; for low PH 1.95 (95% CI 1.88 – 2.02; p < .001) and 2.21 (95% CI 2.12 – 2.30; p < .001), respectively. Other factors associated with low MH and low PH included an increased ASA level and CCI, being middle aged (ages 40 – 49, 50 – 64) at date of surgery, abnormal body mass index, identifying as female or Hispanic or Latino, having a surgery within the Spine service, having public or employer-mandated/liability insurance, and an increased ADI.

**Discussion:** Our results suggest that mental and physical health among patients undergoing orthopedic surgery in New York City worsened during the pandemic. In the post-pandemic period, mental and physical health have continued to decline with a higher proportion of low MH and low PH compared to pre-pandemic and pandemic levels. In response to this negative trend, surgeons and institutions should consider additional preoperative supports for patients with diminished well-being. While the race and ethnicity of the study sample is not representative of the general U.S. or greater New York City population, which may limit the generalizability and associations of the covariate factors, the distribution of race and ethnicity is similar to patients hospitalized in the U.S. for orthopedic procedures (77 – 83% white, 7 – 10% Black, 1 – 2% Asian, 4 – 7% Hispanic or Latino per the National Inpatient Sample). Thus, the results are likely generalizable to the broader orthopedic population.

**Clinical Relevance:** Mental and physical health among patients undergoing orthopedic surgery has worsened since the onset of COVID-19 and continued to deteriorate following the pandemic's conclusion. Furthermore, various demographic and clinical factors remain associated with low MH and PH. These results may serve as a warning to similar institutions given the established relationship between preoperative health status and postoperative surgical outcomes. It is advised that additional, multidisciplinary preoperative measures such as mental health counseling and prehabilitation be considered to mitigate population-wide declines in well-being.

Sample Characteristics	Pre-Pandemic Cohort		Pandemic Cohort		Post-Pandemic Cohort		Significance
	Median (IQR)	Range	Median (IQR)	Range	Median (IQR)	Range	
Pre-Op PROMIS MH	53.3 (7.7)	21.2 – 67.6	50.8 (12.5)	16.0 – 67.6	50.8 (12.5)	21.2 – 67.6	<.001
25 <sup>th</sup> percentile	48.3		43.5		43.5		
75 <sup>th</sup> percentile	56.0		56.0		56.0		
Sample Characteristics	Median (IQR)	Range	Median (IQR)	Range	Median (IQR)	Range	p-value
Pre-Op PROMIS PH	44.9 (8.5)	16.2 – 67.7	44.0 (13.4)	15.0 – 67.7	42.3 (13.4)	16.2 – 67.7	<.001
25 <sup>th</sup> percentile	42.3		37.4		37.4		
75 <sup>th</sup> percentile	50.8		50.8		50.8		
Sample Characteristics	n	Proportion of Pre-Pandemic Cohort %	n	Proportion of Pandemic Cohort %	n	Proportion of Post-Pandemic Cohort %	p-value
Patients with Low Mental Health (< 40)	1,218	5%	7,407	11%	5,327	14%	<.001
Patients with Low Physical Health (< 42)	6,448	25%	24,514	37%	15,437	40%	<.001

IQR = Interquartile Range; MH = Mental Health; PH = Physical Health

**Table 1.** PROMIS-GH Scores Across Cohorts