ACL Reconstruction Improves Patient Reported Outcomes Regardless of Social Deprivation and Socioeconomic Factors

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INTRODUCTION: Anterior cruciate ligament (ACL) reconstruction is a commonly performed procedure with generally excellent postoperative outcomes. The effect of social determinants of health on outcomes of common orthopedic procedures has gained recent attention. Two of the most common publicly available indices used to evaluate deprivation are Area Deprivation Index (ADI) and the Social Vulnerability Index (SVI). Currently, there are only a few studies that evaluate the impact of ADI on patient-reported outcomes after ACL reconstruction and none using the SVI. Understanding these indices and their associations with surgical outcomes is important to address health equity concerns and policy development focused on socioeconomic needs to optimize patient outcomes. Therefore, the objective of this study is to evaluate the influence of ADI and SVI on PROMIS scores and the likelihood of achieving a minimally clinically important difference (MCID) after ACL reconstruction. We hypothesize that higher levels of social deprivation, as measured by the Area Deprivation Index (ADI) and Social Vulnerability Index (SVI), will be associated with worse postoperative patient-reported outcomes and lower rates of achieving minimally clinically important difference (MCID) following ACL reconstruction.

METHODS: Patients who underwent arthroscopic ACL reconstruction at our institution between January 1, 2015, and December 31, 2023, were retrospectively reviewed. Inclusion criteria were age ≥18 years, diagnosis of partial or complete ACL tear, and completion of both preoperative and ≥6-month postoperative PROMIS questionnaires. Patients without a valid home address or complete survey data were excluded. Means and standard deviations were reported for continuous variables and compared between groups using two-tailed t-tests; categorical variables were analyzed using chi-square tests. MCID was defined as one-half the standard deviation of preoperative PROMIS scores. ADI scores were calculated by geocoding patient addresses to census block groups and matching them to reference data from the Center for Health Disparities. SVI scores were matched using the patients' zip codes to the US Census SVI Data from 2022 and split into quartiles.

RESULTS: A total of 469 patients met inclusion criteria with minimum 6-month follow-up. The mean follow-up time was 17.0 ± 16.0 months. The mean age was 30.8 ± 11.1 years. Patients in the highest deprivation quartile for both ADI and SVI (Quartile 4) had significantly higher rates of Black patients ($P < 0.001$), public insurance ($P < 0.001$, $P = 0.039$), BMI ($P = 0.0011$, $P = 0.0048$), and no-show rates ($P < 0.001$). All quartiles for both ADI and SVI showed significant improvements in PROMIS scores postoperatively. Quartile 4 in both indexes had a significantly higher postoperative PROMIS Pain Interference (PI) score ($P = 0.0042$, $P = 0.023$), but no other differences were observed in pre- or postoperative scores (Tables 1 and 2). MCID achievement rates for PROMIS Physical Function (PF), PI, and Depression (Dep) were similar across both SVI and ADI quartiles.

DISCUSSION AND CONCLUSION: Patients demonstrated significant improvement in all PROMIS domains and the ability to achieve MCID throughout all ADI and SVI quartiles, suggesting that ACL reconstruction is an extremely successful procedure, with post-operative improvement similar across patient cohorts with varying levels of resource deprivation and social vulnerability. Consistent with prior studies, the highest deprivation quartiles for ADI and SVI demonstrated the largest proportion of black patients, patients with public insurance, and the largest no show rates. While patients in the most deprived quartiles reported higher postoperative pain levels, overall functional gains and MCID achievement were consistent across ADI and SVI groups. These findings highlight the resilience of surgical outcomes in the face of social vulnerability and support equitable access to ACL reconstruction as a reliable intervention across diverse patient populations. Surgeons can use this information to counsel patients that, regardless of socioeconomic background, they can expect meaningful improvement in function and quality of life following ACL reconstruction.