## Hip Arthroscopy Patients Experiencing Greater Neighborhood-Level Socioeconomic Disadvantage are More Likely to Achieve Minimal Clinically Important Differences in Functional Outcomes at 1-Year Follow-up

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INTRODUCTION: As medicine continues to emphasize the importance of holistic, patient-centered care, it is imperative that orthopaedic surgeons understand the influence of social determinants of health (SDOH) on patient outcomes. SDOH is an umbrella term that encompass a patient's economic stability, access to quality education, healthcare accessibility, neighborhood and built environment, and sense of community. The direct relationship between SDOH and physical health has led to the development of the Area Deprivation Index (ADI), a validated score funded by the National Institutes of Health that calculates neighborhood-level socioeconomic disadvantage according to a composite measure of 17 census variables across the following domains: income, education, employment, and housing quality. Despite the growing volume of neighborhood-level health disparity research, there remains a paucity of high-quality, prospective studies investigating the relationship between ADI and functional outcomes for patients undergoing hip arthroscopy. The primary purpose of the present study was to examine whether patients from neighborhoods with greater socioeconomic disadvantage experienced inferior patient-reported outcome measures (PROMs). Secondary outcomes consisted of rates of achieving the minimum clinically important difference (MCID) or patient acceptable symptom state (PASS), patient satisfaction, likelihood of choosing the same treatment again, and rates of revision hip arthroscopy or conversion to total hip arthroplasty (THA).

METHODS: This retrospective analysis of prospectively collected data queried patients aged ≥18 years with minimum 1year follow-up who underwent hip arthroscopy for the treatment of symptomatic labral tears secondary to femoroacetabular impingement (FAI). The ADI normalizes census block groups as a national percentile ranking from 1 to 100 with an ADI of 1 indicating the lowest level of "disadvantage" and 100 indicating the highest level of "disadvantage." Utilizing the addresses of patients meeting inclusion/exclusion criteria, census block groups were assigned, and their respective ADI scores were collected. The ADI scores of patients meeting inclusion criteria were normalized to a relative mean percentile of 50%, and the top and bottom half of patients were stratified into ADI<sub>High</sub> (most socioeconomic deprivation) and ADI<sub>Low</sub> cohorts (least socioeconomic deprivation), respectively. Collected PROMs included the modified Harris Hip Score (mHHS), Nonarthritic Hip Score (NAHS), Hip Outcome Score (HOS)–Activities of Daily Living (HOS-ADL), HOS–Sports Specific Subscale (HOS-SSS), 33-item International Hip Outcome Tool (iHOT-33), VAS pain score, and patient satisfaction. Pearson's χ2 test and Fisher's exact test were used to compare categorical variables; two-sample t-tests were used to compare continuous variables. A multivariable-adjusted logistic regression analysis, controlling for ADI score (1-100), age, sex, BMI, laterality, and Tönnis grade was performed to predict achievement of clinically meaningful thresholds.

RESULTS: 228 patients met inclusion criteria and were included in the final analysis. After stratifying patients by ADI score, the  $ADI_{Low}$  (n = 113; ADI: 5.8 ± 3.0; range: 1 to 12) and  $ADI_{High}$  (n=115; ADI: 28.0 ± 14.5; range: 13 to 97) cohorts had no differences in baseline patient demographics (Table 1).  $ADI_{High}$  patients reported significantly worse pre-operative baseline scores for all 5 PROMs; however, no differences were present by 1-year follow-up (Table 2). When controlling for patient demographics, patients with higher ADI scores had greater odds of achieving MCID for all PROMs except for iHOT-33 (Table 3).

DISCUSSION AND CONCLUSION: Although hip arthroscopy patients experiencing greater neighborhood-level socioeconomic disadvantage exhibited significantly lower pre-operative baseline scores, this disparity resolved at 1-year follow-up. In fact, when adjusting for patient characteristics including ADI score, more disadvantaged patients had greater odds of achieving MCID. The present study is merely a first step towards understanding health inequities among patients seeking orthopaedic care. Future research expanding this investigation to multiple institutions around the United States and internationally is warranted to improve the generalizability of the present study's findings. Lastly, further development of clinical guidelines and health policy research is necessary to advance care for patients from disadvantaged communities.



	ADI (n=113)	ADI <sub>mat</sub> (8=115)	P-value
Area Deprivation Index (ADI)	$5.8 \pm 3.0$	$28.0 \pm 14.5$	<0.001
Age, years	$34.4 \pm 11.1$	$36.7 \pm 11.3$	0.128
BMI, kg/m <sup>2</sup>	$24.7 \pm 3.3$	$25.4 \pm 3.5$	0.086
Sex, n (%)			0.289
Male	61 (53.9%)	54 (47.0%)	
Female	52 (46.1%)	61 (53.0%)	
Tônnis Grade, n (%)			0.694
0	56 (49.6%)	54 (47.0%)	
1	57 (50.4%)	61 (53.0%)	
Laterality, n (%)			0.359
Left	61 (54.0%)	69 (60.0%)	
Right	52 (46.0%)	46 (40.0%)	
Labral management, n (%)			0.325
Repair alone	11 (9.7%)	8 (7.0%)	
Reconstruction with capsular augmentation	102 (90.3%)	107 (93.0%)	
Additional chondral treatment, n (%)			0.801
None	34 (30.0%)	37 (32.2%)	
Microfracture	2 (1.8%)	1 (0.9%)	
BMAC (bone marrow aspirate concentrate)	77 (68.2%)	77 (66.9%)	

Pre-operative	ADI_100 (0*113)	ADIma (n=115)	P-value
nints	66.3±13.1	$61.8 \pm 14.9$	0.017
HOS-ADL	74.5 ± 17.7	$67.6 \pm 18.7$	0.005
H06-885	$47.8 \pm 24.1$	$41.1 \pm 23.7$	0.034
NAHS	$68.2 \pm 16.8$	$63.0 \pm 17.3$	0.023
iH0T-33	$43.8 \pm 16.9$	$38.6 \pm 17.4$	0.024
VAS Pain	49±2.6	$5.2 \pm 2.6$	0.490
12 Months	ADI_1++ (n+113)	ADI <sub>man</sub> (n=115)	
nélits	$87.0 \pm 11.8$	84.4 ± 15.5	0.424
HOS-ADL	90.0 + 11.2	87.6±14.7	0.089
HOS-885	$72.4 \pm 25.8$	$70.9 \pm 25.7$	0.159
NAIIS	$88.4 \pm 10.8$	85.3 ± 14.5	0.358
8107-33	$74.7 \pm 19.7$	$73.3 \pm 22.0$	0.223
VAS Pain	2.0 ± 2.0	$2.1 \pm 1.9$	0.517
Satisfaction with treatment, n (%)	-		0.994
Yes	101 (94.4%)	94 (94.0%)	
No	6 (5.6%)	6 (6.0%)	
Would choose the same treatment again, n (%)	-		0.951
Yes	55 (88.8%)	89 (89.0%)	
No	12 (11.250	11(11.0%)	
Revision hip anhroscopy, n (%)			>0.999
Yes	0 (0%)	0 (0%)	
No	113 (100%)	115 (100%)	
Convenion to THA, n (%)			>0.999
Yes	0.(254)	0 (0%)	
Na	113 (100%)	115 (100%)	

Table 2: PROM

12 Months					,	AC1D				
	mHHS		HOS-ADL		HOS-SSS		NAHS		i80T-33	
Variation	OR	P-value.	OR	P-value	OR	P-value	OR	P-value	OR	P-value
ADI Scere (0-1005	1.63	.847	1.83	.011	1.03	.836	1.82	.050	1.02	.113
Are	0.54	.001	0.97	.037	0.96	.004	8.55	.028	0.96	.010
Sex	3.48	.092	2.99	.004	1.59	.177	1.94	.053	2.19	.032
BMI	1.02	.316	1.12	.034	1.08	.140	1.13	.030	1.07	.253
Laterality	0.65	.243	0.97	.909	1.15	.\$70	.87	.661	1.93	.064
Tonnis Orade	0.84	.637	1.10	.765	0.53	.062	.77	.419	0.62	.168
Variables -	PASS									
	OR	P-value	OR	P-value	OR	P-value	OR	P-value	OR	P-value
ADI Scere (0-1006	1.00	.326	1.02	.126	1.01	.157	1.00	.714	1.02	.048
Ass	0.97	.842	0.97	.044	0.97	.048	0.55	.005	0.99	.590
Scs	1.18	.565	0.72	.277	1.05	.\$73	0.91	.794	1.20	.544
BMI	1.05	.265	0.97	.438	1.09	.849	1.63	.622	1.00	.985
Latentity	0.90	.692	1.04	.898	1.09	.363	1.10	.773	1.03	.919
Tônnis Orade	0.50	.432	0.78	.398	0.55	.043	0.43	.016	0.45	.011