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# Socioeconomic Disparities in Pediatric Scoliosis Surgery

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## INTRODUCTION

Multiple studies have been published which investigate the effects of patient demographics on elective orthopedic operations. While this research demonstrates disparities in health care delivery in other states and in single center practices, there are large administrative databases that can be used to examine patient demographics and their influence on health care delivery. We queried the State of California Office of Statewide Health Planning and Development (OSHPD) database to compare the proportions of patients undergoing surgery for scoliosis by gender, race, and ethnicity and to determine if there were underlying differences in social determinants of health as measured by the child opportunity index (COI), social deprivation index (SDI), and insurance type among these patients in order to create a foundation of knowledge for future research on health disparities in the realm of orthopaedic surgery.



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## METHODS AND MATERIALS

California residents  $\leq 20$  years old undergoing surgery for idiopathic scoliosis between 2015 to 2019 in California were included. Patients who were not from California were excluded. Basic demographics including age, gender, ethnicity, race, and payer category were obtained. Primary outcomes were COI and SDI using aggregated Zip Code Tabulation Area (ZCTA). Secondary outcomes were length of stay (LOS) and total charge.

Figure 1. State-normed COI and SDI

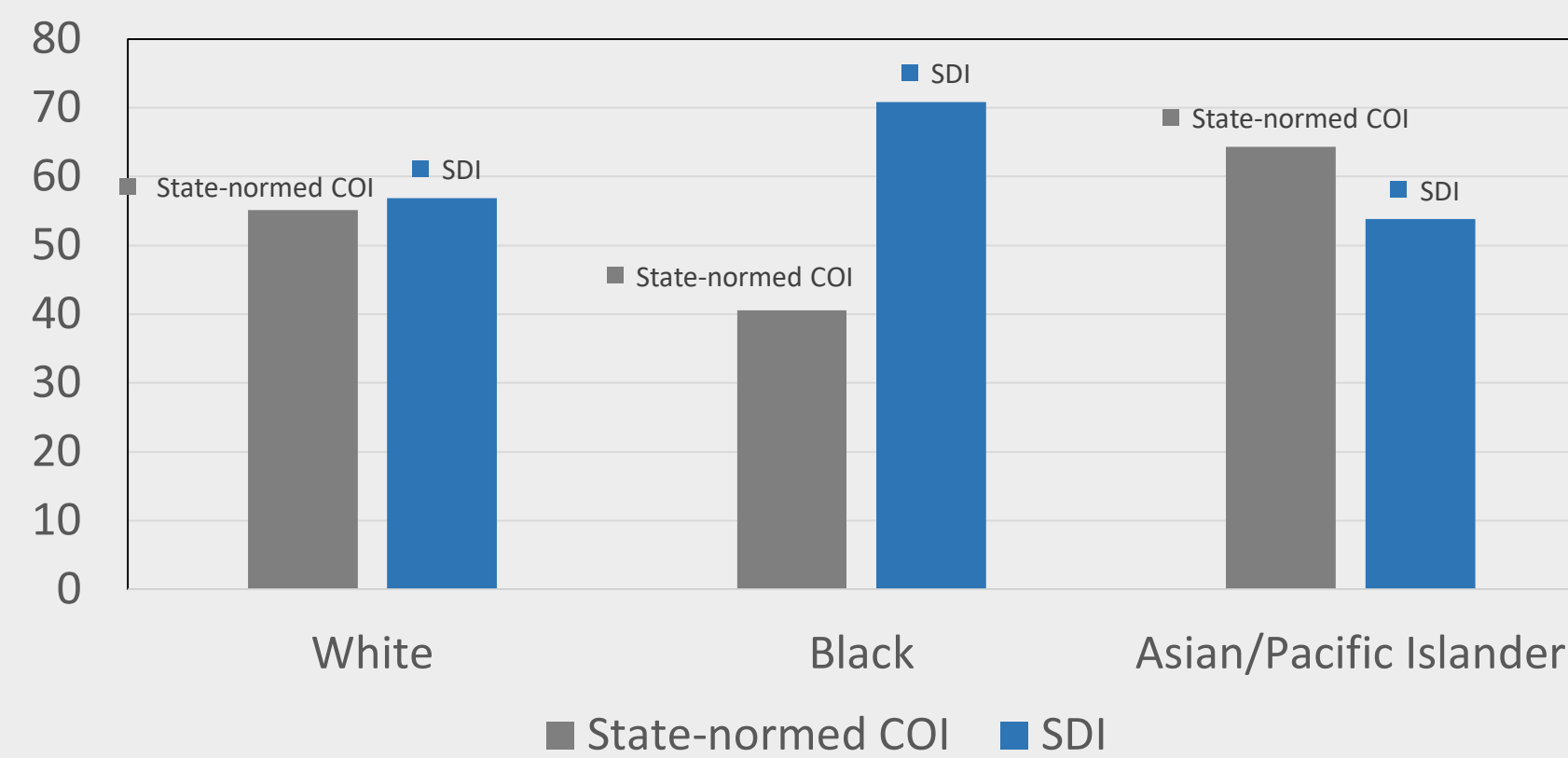


Table 1. Basic Demographics

Total sample size	4542
Age (years, SD)	13.5±3.7
Gender	
· Female	3064 (67.5%)
· Male	1478 (32.5%)
Ethnicity	
· Hispanic	1652 (36.4%)
· Non-Hispanic	2831 (62.3%)
· Unknown	59 (1.3%)
Race	
· White	2379 (52.4%)
· Black	351 (7.7%)
· Native American / Eskimo / Aleut	11 (0.2%)
· Asian / Pacific Islander	467 (10.3%)
· Other	947 (20.8%)
· Unknown	387 (8.5%)
Payer category	
· Invalid / Blank	2 (<0.1%)
· Medicare	5 (0.1%)
· Medi-Cal	1533 (33.8%)
· Private Coverage	2214 (48.7%)
· County Indigent Programs	3 (<0.1%)
· Other Government	723 (15.9%)
· Self-Pay	54 (1.2%)
· Other Pay	8 (0.2%)
Length of stay (days, SD)	5.4±7.3
Total charge (\$, SD)	276603±221766

Table 5. Comparison by Race

Variable	White	Black	Asian / Pacific Islander	p-Value
Sample size	2379	351	467	
Age (years, SD)	13.6±3.7	13.6±3.7	13.7±3.5	0.78
Female (n, %)	1622 (68.2%)	210 (59.8%)	327 (70.0%)	0.004
Length of stay (days, SD)	5.1±6.9	5.4±5.6	5.8±8.0	0.18
Payer category				
· Medi-Cal	736 (30.9%)	144 (41.0%)	110 (23.6%)	<0.001
· Private coverage	1300 (54.6%)	136 (38.7%)	277 (59.3%)	<0.001
Total charge (\$, SD)	272524±210658	243807±167608	318948±239956	<0.001
Overall COI, nationally-normed	51.3±30.2	36.4±26.4	61.0±29.3	<0.001
Overall COI, state-normed	55.1±29.0	40.6±26.7	64.3±27.1	<0.001
SDI	56.9±29.3	70.8±25.3	53.8±29.1	<0.001

## RESULTS

- 4542 patients
- Mean age: 13.5 years
- % female: 67.5 percent
- Ethnicities: 62.3% Non-Hispanic, 36.4% Hispanic
- Race (% difference from census): White 52.4% (-19.5%), Black 7.7% (+1.2%), and Asian/Pacific Islander 10.3% (-5.7%)
- Mean LOS: 5.4 days

The female cohort had significantly higher COI compared to males. SDI was significantly lower among females. Hispanics had lower COI compared to non-Hispanics. SDI were higher among Hispanics. Black patients had significantly lower COI and higher SDI compared to Asian and White patients. Medi-Cal patients had longer LOS, lower COI, and higher SDI

Table 6. Comparison by Payer Category

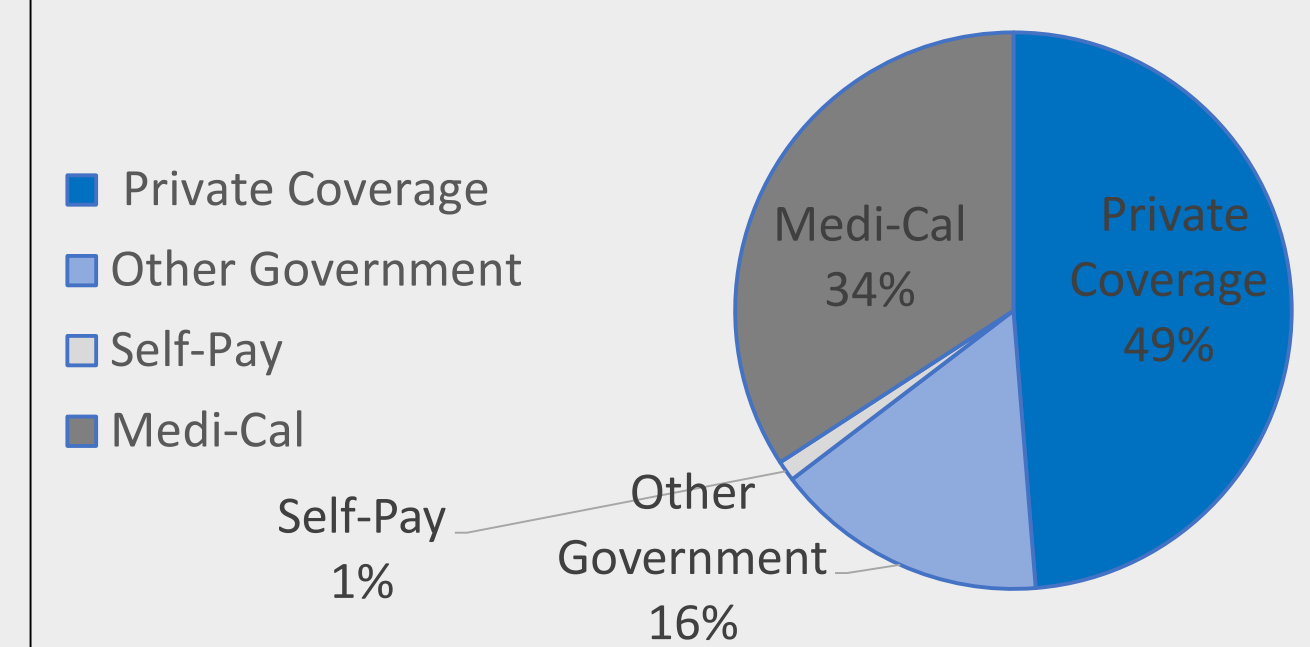
Variable	Medi-Cal	Private Coverage	p-Value
Sample size	1533	2214	
Age (years, SD)	13.1±4.4	13.9±3.2	<0.001
Female (n, %)	973 (63.5%)	1573 (71.0%)	<0.001
Ethnicity			
· Hispanic	853 (55.6%)	461 (20.8%)	<0.001
· Non-Hispanic	659 (43.0%)	1724 (77.9%)	<0.001
Race			
· White	736 (48.0%)	1300 (58.7%)	<0.001
· Black	144 (9.4%)	136 (6.1%)	<0.001
· Asian/Pacific Islander	110 (7.2%)	277 (12.5%)	<0.001
Length of stay (days, SD)	5.3±5.4	4.6±5.4	<0.001
Total charge (\$, SD)	246917±193888	273543±210781	<0.001
Overall COI, nationally-normed	33.9±24.8	60.9±28.6	<0.001
Overall COI, state-normed	38.2±25.5	64.3±26.5	<0.001
SDI	75.4±23.3	49.2±28.2	<0.001



## DISCUSSION

In our effort to examine social determinants of health in the care of children and adolescents with scoliosis we have verified that race and gender are associated with the rate of scoliosis surgery and socioeconomic status variables are associated with differing LOS outcomes. Significant underlying differences in social determinants of health among patients  $\leq 20$  years undergoing surgery for scoliosis in the state of California were demonstrated. Lower social determinants of health (lower COI, higher SDI) were observed among males, Hispanics, and Black patients, and these patients were more likely to be covered by Medi-Cal, which is associated with increased LOS. This plays a role in access to resources and raises concerns about potential effects on treatment outcomes.

Figure 2. % Patients by Payer Category



## CONCLUSIONS

Our study examined a large pediatric population focusing on the proportions of various demographics that have an intersectional role in health-related outcomes. The data demonstrated significant underlying differences in social determinants of health as measured by race, ethnicity, gender, insurance type, COI, and SDI among patients  $\leq 20$  years undergoing surgery for idiopathic scoliosis in the state of California. The noted differences in SES and insurance are known and/or expected to have an impact on access to quality health care, exposing a need for future studies to determine whether COI and SDI influence patient outcomes after scoliosis surgery.