

Beyond clinical factors: the role of social determinants of health in recovery from Lisfranc injuries

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Disclosures: The authors have no conflict of interest to declare.

INTRODUCTION: While social determinants of health (SDoH) have been shown to impact post-surgical outcomes for some orthopedic injuries, few studies have examined their influence on outcomes specifically for patients with Lisfranc injuries. Understanding the role of SDoH in this patient population can help identify disparities and target interventions to optimize recovery. This study aimed to evaluate the association between SDoH and patient-reported outcome measures (PROMs) in patients who have undergone surgery for Lisfranc injuries.

METHODS: We retrospectively analyzed data from 242 Lisfranc injury patients aged ≥ 18 years receiving care at Mass General Brigham hospitals/clinics (2017-2022). Social vulnerability index (SVI) and area deprivation index (ADI) were gathered using zip codes. Patient Reported Outcomes Measurement Information System (PROMIS) surveys for physical function, depression, physical health, mental health, pain interference, and pain intensity were used.

RESULTS SECTION: Significant differences were found in physical function across age groups ($p=0.01$). White patients showed better physical health ($p=0.01$) and function ($p=0.02$) and lower scores of depression ($p<0.01$) and pain interference ($p=0.02$) versus non-whites. Private insurance was associated with better physical ($p=0.02$) and mental health ($p=0.01$). SVI correlated with depression ($p<0.01$). Lower socioeconomic status (SES) correlated with worse physical health ($p=0.02$). Household characteristics correlated with pain interference ($p<0.01$). Minority status correlated with depression ($p=0.01$). Housing/transportation correlated with mental health ($p=0.01$), pain intensity ($p=0.04$), and depression ($p=0.01$). ADI correlated with pain interference ($p=0.02$) and depression ($p=0.01$).

DISCUSSION: This study found SDoH, including race, neighborhood factors, and SES associated with patient-reported outcomes in Lisfranc injury patients, highlighting the need for stakeholders to prioritize addressing social factors when managing these orthopedic patients.

SIGNIFICANCE/CLINICAL RELEVANCE: This study contributes to the evidence on the impact of SDoH on recovery outcomes in orthopedic trauma patients. The findings highlight the need for further research and education to equip clinicians to address social factors alongside clinical care.

IMAGES AND TABLES:

Table. PROMs of patients receiving Lisfranc fixation according to individuals' characteristics		PROMs Physical Function (Mean±SD)		P-value		PROMs Pain Intensity (Mean±SD)		P-value		PROMs Depression (Mean±SD)		P-value		PROMs Physical Health (Mean±SD)		P-value	
Variable		PROMs Physical Function (Mean±SD)	P-value	PROMs Pain Intensity (Mean±SD)	P-value	PROMs Depression (Mean±SD)	P-value	PROMs Physical Health (Mean±SD)	P-value	PROMs Physical Function (Mean±SD)	P-value	PROMs Pain Intensity (Mean±SD)	P-value	PROMs Depression (Mean±SD)	P-value	PROMs Physical Health (Mean±SD)	P-value
Gender	Male	46.12 ± 8.52	0.4722	51.16 ± 9.60	0.1160	44.40 ± 8.52	0.8073	54.31 ± 9.42	0.3794	42.46 ± 9.39	0.9032	47.57 ± 8.54	0.4346	46.12 ± 8.52	0.4722	51.16 ± 9.60	0.1160
	Female	45.67 ± 9.03		46.99 ± 10.32		44.40 ± 8.52		54.31 ± 9.42		42.40 ± 9.39		46.64 ± 9.23		45.67 ± 9.03		46.99 ± 10.32	
Age	<18	53.03 ± 9.95	0.0824	50.86 ± 11.86	0.9603	38.81 ± 8.11	0.2346	49.48 ± 7.15	0.2128	50.40 ± 8.37	0.0113*	45.45 ± 6.42	0.6997	53.03 ± 9.95	0.0824	50.86 ± 11.86	0.9603
	18-65	45.62 ± 9.70		49.98 ± 9.95		44.17 ± 8.02		53.72 ± 9.23		43.02 ± 9.69		46.17 ± 9.05		45.62 ± 9.70		49.98 ± 9.95	
	≥ 65	44.74 ± 8.45		50.89 ± 9.11		44.11 ± 7.12		53.63 ± 7.68		38.94 ± 8.68		49.02 ± 8.34		44.74 ± 8.45		50.89 ± 9.11	
Race	White	46.58 ± 8.40	0.0151**	50.65 ± 9.50	0.1210	43.59 ± 7.95	0.3092	53.05 ± 8.74	0.0395*	43.64 ± 9.40	0.0274*	47.18 ± 8.18	0.0089*	46.58 ± 8.40	0.0151**	50.65 ± 9.50	0.1210
	Non-White	45.11 ± 9.43		48.27 ± 11.01		45.27 ± 8.04		54.24 ± 9.40		40.29 ± 10.34		51.79 ± 10.38		45.11 ± 9.43		48.27 ± 11.01	
	Unknown	45.11 ± 9.43		48.27 ± 11.01		45.27 ± 8.04		54.24 ± 9.40		40.29 ± 10.34		51.79 ± 10.38		45.11 ± 9.43		48.27 ± 11.01	
Ethnicity	Non-Hispanic	45.61 ± 8.53	0.6376	50.37 ± 10.05	0.8182	44.09 ± 8.02	0.8248	53.86 ± 9.12	0.3924	42.68 ± 9.40	0.3426	48.02 ± 8.95	0.9459	45.61 ± 8.53	0.6376	50.37 ± 10.05	0.8182
	Hispanic	45.48 ± 10.32		51.60 ± 6.96		43.92 ± 14.34		56.00 ± 10.92		38.31 ± 13.79		48.32 ± 10.70		45.48 ± 10.32		51.60 ± 6.96	
	Unknown	47.58 ± 7.74		47.84 ± 9.64		42.94 ± 6.20		52.35 ± 8.33		43.52 ± 10.81		46.79 ± 8.34		47.58 ± 7.74		47.84 ± 9.64	
Marital Status	Married/Partner	46.11 ± 7.95	0.8567	51.42 ± 8.47	0.1084	44.83 ± 7.98	0.0740	54.64 ± 8.84	0.1977	43.73 ± 8.96	0.8387	47.65 ± 7.95	0.8978	46.11 ± 7.95	0.8567	51.42 ± 8.47	0.1084
	Single/Divorced/Widowed	45.23 ± 9.47		49.49 ± 10.74		43.27 ± 8.01		53.09 ± 9.28		42.89 ± 10.24		46.25 ± 9.43		45.23 ± 9.47		49.49 ± 10.74	
	Unknown	44.24 ± 4.68		43.16 ± 6.62		44.35 ± 7.44		54.85 ± 7.33		42.89 ± 9.40		52.43 ± 10.34		44.24 ± 4.68		43.16 ± 6.62	
Education	Pre-High School	44.94 ± 13.33	0.4310	51.87 ± 11.62	0.2881	46.27 ± 7.66	0.5313	50.18 ± 9.38	0.5106	44.12 ± 13.24	0.7548	47.99 ± 10.62	0.3797	44.94 ± 13.33	0.4310	51.87 ± 11.62	0.2881
	High School	44.23 ± 9.30		48.58 ± 10.58		44.38 ± 9.50		53.71 ± 9.73		41.95 ± 10.26		49.92 ± 10.43		44.23 ± 9.30		48.58 ± 10.58	
	Some College	45.60 ± 8.51		49.50 ± 8.51		43.55 ± 7.63		52.16 ± 9.37		43.18 ± 8.30		47.75 ± 8.38		45.60 ± 8.51		49.50 ± 8.51	
	College Graduate	46.60 ± 8.14		51.08 ± 9.87		43.78 ± 7.83		54.23 ± 9.14		42.08 ± 9.53		46.96 ± 8.03		46.60 ± 8.14		51.08 ± 9.87	
	Unknown	45.46 ± 7.57		48.98 ± 9.77		43.61 ± 6.89		54.57 ± 7.44		43.06 ± 9.26		50.00 ± 9.05		45.46 ± 7.57		48.98 ± 9.77	
Insurance	Private	46.28 ± 8.53	0.0227*	50.26 ± 9.77	0.0106*	44.09 ± 7.92	0.2896	53.92 ± 8.91	0.2037	42.99 ± 8.47	0.4917	47.64 ± 8.31	0.1548	46.28 ± 8.53	0.0227*	50.26 ± 9.77	0.0106*
	Medicaid/Medicare/Unknown	36.79 ± 9.55		43.77 ± 9.30		36.80 ± 10.00		43.77 ± 9.30		36.80 ± 10.00		43.77 ± 9.30		36.79 ± 9.55		43.77 ± 9.30	
BMI**	18.5-25	47.99 ± 9.19	0.0101**	50.34 ± 11.62	0.8340	43.41 ± 7.63	0.0048	51.82 ± 9.10	0.3740	45.68 ± 9.90	0.0037**	47.68 ± 9.78	0.3161	47.99 ± 9.19	0.0101**	50.34 ± 11.62	0.8340
	25-30	45.77 ± 8.31		50.11 ± 9.30		43.77 ± 7.36		54.49 ± 8.41		43.77 ± 8.31		49.60 ± 9.23		45.77 ± 8.31		50.11 ± 9.30	
	30-35	44.93 ± 8.60		49.93 ± 9.84		43.82 ± 8.33		54.93 ± 9.35		42.92 ± 10.98		47.09 ± 9.68		44.93 ± 8.60		49.93 ± 9.84	
	35-40	37.63 ± 8.64		38.80 ± 14.64		44.06 ± 14.03		54.06 ± 13.53		34.08 ± 5.40		53.37 ± 14.30		37.63 ± 8.64		38.80 ± 14.64	
	Unknown	42.48 ± 9.99		47.46 ± 10.81		43.84 ± 9.81		53.19 ± 9.12		39.63 ± 8.98		50.74 ± 8.28		42.48 ± 9.99		47.46 ± 10.81	
Smoking Status	Current	46.04 ± 8.90	0.0349*	49.82 ± 7.04	0.1453	43.94 ± 8.30	0.5058	53.19 ± 9.12	0.7861	39.63 ± 8.98	0.0772	50.74 ± 8.28	0.1843	46.04 ± 8.90	0.0349*	49.82 ± 7.04	0.1453
	Former	46.04 ± 8.90		49.82 ± 7.04		43.94 ± 8.30		53.19 ± 9.12		39.63 ± 8.98		50.74 ± 8.28		46.04 ± 8.90		49.82 ± 7.04	
	Never	46.04 ± 8.90		49.82 ± 7.04		43.94 ± 8.30		53.19 ± 9.12		39.63 ± 8.98		50.74 ± 8.28		46.04 ± 8.90		49.82 ± 7.04	
	Unknown	46.04 ± 8.90		49.82 ± 7.04		43.94 ± 8.30		53.19 ± 9.12		39.63 ± 8.98		50.74 ± 8.28		46.04 ± 8.90		49.82 ± 7.04	
	Unknown	46.04 ± 8.90		49.82 ± 7.04		43.94 ± 8.30		53.19 ± 9.12		39.63 ± 8.98		50.74 ± 8.28		46.04 ± 8.90		49.82 ± 7.04	
Alcohol Consumption (Units/Week)	0-2	46.06 ± 8.64	0.8165	53.30 ± 8.87	0.1306	44.36 ± 7.65	0.3409	53.11 ± 9.86	0.5366	43.31 ± 11.68	0.3694	46.72 ± 7.87	0.1813	46.06 ± 8.64	0.8165	53.30 ± 8.87	0.1306
	3-4	46.17 ± 7.56		47.76 ± 7.40		46.10 ± 6.46		54.44 ± 8.31		42.61 ± 7.32		50.84 ± 9.05		46.17 ± 7.56		47.76 ± 7.40	
	5-7	46.13 ± 8.29		46.77 ± 8.78		46.67 ± 8.78		54.45 ± 8.48		42.43 ± 7.37		50.45 ± 8.00		46.13 ± 8.29		46.77 ± 8.78	
	≥ 8	47.02 ± 8.28		50.00 ± 9.00		41.06 ± 6.44		53.21 ± 8.11		44.07 ± 8.44		50.15 ± 8.13		47.02 ± 8.28		50.00 ± 9.00	
	Unknown	45.73 ± 9.17		49.23 ± 10.33		43.97 ± 8.24		54.16 ± 9.00		42.40 ± 8.33		46.43 ± 9.24		45.73 ± 9.17		49.23 ± 10.33	
SVI (Overall)***	Low	47.48 ± 9.53	0.0027	51.67 ± 9.71	0.1040	34.94 ± 7.26	0.0044	48.83 ± 7.37	0.0873	46.01 ± 10.68	0.3401	41.30 ± 4.29	0.0066*	47.48 ± 9.53	0.0027	51.67 ± 9.71	0.1040
	Low-Medium	46.38 ± 8.78		50.76 ± 10.05		44.04 ± 7.93		53.63 ± 8.79		43.04 ± 8.79		47.48 ± 8.53		46.38 ± 8.78		50.76 ± 10.05	
	Medium-High	46.38 ± 8.78		50.76 ± 10.05		44.04 ± 7.93		53.63 ± 8.79		43.04 ± 8.79		47.48 ± 8.53		46.38 ± 8.78		50.76 ± 10.05	
	High	43.24 ± 9.31		47.53 ± 9.76		43.08 ± 8.16		53.23 ± 9.68		40.83 ± 10.63		50.36 ± 10.30		43.24 ± 9.31		47.53 ± 9.76	
	Unknown	46.03 ± 8.93		50.30 ± 9.90		43.23 ± 7.77		52.84 ± 8.77		43.36 ± 9.30		46.83 ± 8.26		46.03 ± 8.93		50.30 ± 9.90	
Sign (Vulnerability Score)	Low	47.77 ± 7.68	0.0200*	50.98 ± 9.71	0.0713	44.33 ± 8.13	0.4189	54.63 ± 9.24	0.2380	43.97 ± 9.83	0.1322	46.83 ± 8.26	0.1333	47.77 ± 7.68	0.0200*	50.98 ± 9.71	0.0713
	Low-Medium	47.77 ± 7.68		50.98 ± 9.71		44.33 ± 8.13		54.63 ± 9.24		43.97 ± 9.83		46.83 ± 8.26		47.77 ± 7.68		50.98 ± 9.71	
	Medium-High	47.77 ± 7.68		50.98 ± 9.71		44.33 ± 8.13		54.63 ± 9.24		43.97 ± 9.83		46.83 ± 8.26		47.77 ± 7.68		50.98 ± 9.71	
	High	43.23 ± 9.31		47.53 ± 9.76		43.08 ± 8.16		53.23 ± 9.68		40.83 ± 10.63		50.36 ± 10.30		43.23 ± 9.31		47.53 ± 9.76	
	Unknown	46.03 ± 8.93	50.30 ± 9.90	43.23 ± 7.77	52.84 ± 8.77	43.36 ± 9.30	46.83 ± 8.26	46.03 ± 8.93	50.30 ± 9.90								
Household Characteristics (Vulnerability Score)	Low	47.48 ± 9.53	0.0027	51.67 ± 9.71	0.1040	34.94 ± 7.26	0.0044	48.83 ± 7.37	0.0873	46.01 ± 10.68	0.3401	41.30 ± 4.29	0.0066*	47.48 ± 9.53	0.0027	51.67 ± 9.71	0.1040
	Low-Medium	46.38 ± 8.78		50.76 ± 10.05		44.04 ± 7.93		53.63 ± 8.79		43.04 ± 8.79		47.48 ± 8.53		46.38 ± 8.78		50.76 ± 10.05	
	Medium-High	46.38 ± 8.78		50.76 ± 10.05		44.04 ± 7.93		53.63 ± 8.79		43.04 ± 8.79		47.48 ± 8.53		46.38 ± 8.78		50.76 ± 10.05	
	High	43.24 ± 9.31		47.53 ± 9.76		43.08 ± 8.16		53.23 ± 9.68		40.83 ± 10.63		50.36 ± 10.30		43.24 ± 9.31		47.53 ± 9.76	
	Unknown	46.03 ± 8.93	50.30 ± 9.90	43.23 ± 7.77	52.84 ± 8.77	43.36 ± 9.30	46.83 ± 8.26	46.03 ± 8.93	50.30 ± 9.90								
Missing Status (Vulnerability Score)	Low	47.77 ± 7.68	0.0445*	50.98 ± 9.71	0.1083	44.33 ± 8.13	0.3379	54.63 ± 9.24	0.2743	43.97 ± 9.83	0.1387	46.83 ± 8.26	0.1268	47.77 ± 7.68	0.0445*	50.98 ± 9.71	0.1083
	Low-Medium	47.77 ± 7.68		50.98 ± 9.71		44.33 ± 8.13		54.63 ± 9.24		43.97 ± 9.83		46.83 ± 8.26		47.77 ± 7.68		50.98 ± 9.71	
	Medium-High	47.77 ± 7.68		50.98 ± 9.71		44.33 ± 8.13		54.63 ± 9.24		43.97 ± 9.83		46.83 ± 8.26		47.77 ± 7.68		50.98 ± 9.71	
	High	43.23 ± 9.31		47.53 ± 9.76		43.08 ± 8.16		53.23 ± 9.68		40.83 ± 10.63		50.36 ± 10.30		43.23 ± 9.31		47.53 ± 9.76	
	Unknown	46.03 ± 8.93	50.30 ± 9.90	43.23 ± 7.77	52.84 ± 8.77	43.36 ± 9.30	46.83 ± 8.26	46.03 ± 8.93	50.30 ± 9.90								
Housing type and transportation (Vulnerability Score)	Low	47.68 ± 10.33	0.0865	53.31 ± 9.66	0.0142*	36.71 ± 7.93	0.0499*	49.36 ± 7.29	0.0862	45.83 ± 11.15	0.8280	41.77 ± 2.89	0.0147*	47.68 ± 10.33	0.0865	53.31 ± 9.66	0.0142*
	Low-Medium	44.25 ± 8.81		48.56 ± 8.38		46.81 ± 4.69		57.34 ± 9.84		42.05 ± 8.14		46.06 ± 8.75		44.25 ± 8.81		48.56 ± 8.38	
	Medium-High	49.76 ± 4.76		56.66 ± 7.77		42.97 ± 7.12		53.15 ± 8.91		41.45 ± 8.64		47.79 ± 8.16		49.76 ± 4.76		56.66 ± 7.77	
	High	47.47 ± 8.82		49.45 ± 10.09		44.13 ± 8.08		53.68 ± 8.90		42.64 ± 10.02		49.08 ± 9.15		47.47 ± 8.82		49.45 ± 10.09	
	ADI (State Decile)****	Low	46.98 ± 8.56	0.0815	50.46 ± 10.33	0.6169	42.83 ± 8.31	0.0976	52.48 ± 9.38	0.0261*	44.62 ± 9.70	0.0239*	47.55 ± 8.55	0.6116	46.98 ± 8.56	0.0815	50.46 ± 10.33
Medium		44.34 ± 8.85	49.82 ± 9.61		44.98 ± 7.46		54.84 ± 8.30		41.49 ± 9.53		46.86 ± 8.99		44.34 ± 8.85		49.82 ± 9.61		
High		45.20 ± 8.30	49.14 ± 4.86		46.61 ± 7.70		57.89 ± 8.82		39.71 ± 9.10		47.17 ± 11.20		45.20 ± 8.30		49.14 ± 4.86		
Unknown		56.35 ± 7.85	53.65 ± 7.57		40.20 ± 6.00		52.00 ± 8.70		40.80 ± 9.90		51.00 ± 0.00		56.35 ± 7.85		53.65 ± 7.57		
ADI (National Percentile)	Low	45.71 ± 8.71	0.9749	50.41 ± 9.80	0.5327	43.91 ± 9.97	0.2370	53.50 ± 9.23	0.3487	43.27 ± 8.68	0.6325	47.70 ± 8.47	0.2512	45.71 ± 8.71	0.9749	50.41 ± 9.80	0.5327
	Low-Medium	45.36 ± 8.80		49.33 ± 10.14		43.46 ± 7.95		54.24 ± 8.38		41.66 ± 8.45		49.11 ± 9.72		45.36 ± 8.80		49.33 ± 10.14	
	Medium-High	46.30 ± 16.12		47.20 ± 8.63		60.50 ± 0.00		66.00 ± 0.00		43.35 ± 10.25		69.40 ± 0.00		46.30 ± 16.12		47.20 ± 8.63	
	High	47.70 ± 0.00		41.10 ± 0.00		49.40 ± 0.00		58.40 ± 3.96		39.40 ± 9.90		53.10 ± 14.99		47.70 ± 0.00		41.10 ± 0.00	
	Unknown	56.35 ± 7.85		53.65 ± 7.57		40.20 ± 6.00		52.00 ± 8.70		40.80 ± 9.90		51.00 ± 0.00		56.35 ± 7.85		53.65 ± 7.57	