OPEN

PRS GLOBAL OPEN

ORIGINAL ARTICLE
Hand/Peripheral Nerve

Evaluation of Patient Expectations before Carpal Tunnel Release

Miranda J. Rogers, MD, MS*
Dustin J. Randall, BS*†
Jayden N. Brennan, BS*
Chong Zhang, MS‡
Angela P. Presson, PhD‡
Nikolas H. Kazmers, MD, MSE*

Background: Carpal tunnel release (CTR) is common, yet patient treatment expectations remain unclear. The primary purpose was to describe patient expectations before CTR. Secondarily, we aimed to identify factors influencing expectations.
Methods: Included patients underwent unilateral or bilateral CTR between 2015 and 2017 at a single academic center. Expectations regarding the level of relief/improvement were queried. Area deprivation index (ADI) was used to measure social deprivation. Univariate and multivariable logistic regression identified factors associated with expecting great relief/improvement.
Results: Of 307 included patients, mean age was 54 ± 16 years and 63% were women. Patients most commonly expected great (58%) or some (23%) relief/improvement. Few patients expected little (3%) or no (4%) relief/improvement, and 13% had no expectations. In the multivariable analysis, male sex, lower social deprivation, and lower BMI were associated with expecting great relief/improvement. Age, surgical technique (open versus endoscopic), use of the operating room versus procedure room, and preoperative factors (constant numbness, weakness/atrophy, duration of symptoms, and QuickDASH) were not associated with expectations.
Conclusions: Most patients expect some to great improvement after CTR. This was independent of several factors with a known association with worse outcomes (advanced age, atrophy/weakness, and constant numbness). Male sex was associated with the expectation of great improvement, in which superior outcomes relative to females have not been borne out in the literature. These findings highlight patient counseling opportunities. The observed association between social deprivation and expectations warrants further investigation, as the socioeconomically disadvantaged experience worse healthcare outcomes in general. *(Plast Reconstr Surg Glob Open 2021;9:e3823; doi: 10.1097/GOX.0000000000003823; Published online 22 September 2021.)*

INTRODUCTION

There is some evidence that positive patient expectations are associated with positive surgical outcomes.[1–4] However, the literature within various surgical fields has identified that patient expectations are often inaccurate or unrealistic.[5,6] Physicians also struggle to predict outcomes for their patients after surgery,[7] and physician expectations may drastically differ from that of their patients in terms of expectations.[8,9] Numerous studies have shown that unrealistically high preoperative patient expectations are more likely to lead to unmet postoperative expectations, which is associated with dissatisfaction.[1,10–13] At present, patient expectations appear to be varied and inconsistently correlated with patient-reported outcomes (PROs), without an accepted method for capturing and utilizing expectations before surgery.[14] Although some studies in hand surgery have focused on the role of patient expectations,[15–21] there remains a dearth of research on the topic of patient expectations before carpal tunnel release (CTR).

Carpal tunnel syndrome (CTS) impacts approximately 1% of the adult population in the United States,[22] and remains the most common procedure performed by upper extremity surgeons.[22] As such, a better understanding of patient expectations before CTR may allow for patient counseling opportunities that could improve the patient

*From the *Department of Orthopaedic Surgery, University of Utah, Salt Lake City, Utah; †Oakland University William Beaumont School of Medicine, Rochester, Mich.; and ‡Division of Public Health, University of Utah, Salt Lake City, Utah.*

Received for publication July 1, 2021; accepted July 21, 2021.

Dr. Rogers and Randall contributed equally to this work.

This investigation was supported by the University of Utah Population Health Research Foundation, with funding in part from the National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health, through Grant UL1TR002538 (formerly 5UL1TR001067-05, 8UL1TR000105, and UL1RR025764).

DOI: 10.1097/GOX.0000000000003823

Disclosure: *The authors have no financial interest to declare in relation to the content of this article.*

experience and reduce postoperative dissatisfaction related to unmet expectations. Given that the relationship between preoperative patient expectations, satisfaction, and outcome score improvement is nuanced yet important,[14] our primary purpose was to describe patient preoperative expectations before CTR. Secondarily, we aimed to identify factors associated with expecting a high level of relief or improvement among patients undergoing CTR.

METHODS

With institutional review board (IRB #00071740) approval, adult patients (≥18 y) who underwent isolated unilateral or bilateral CTR surgery performed by five fellowship-trained hand surgeons at a single tertiary academic medical center were identified between April 2015 and April 2017. We included patients undergoing open (oCTR) and endoscopic (eCTR) CTR. Patient expectations were queried within 3 months before undergoing CTR. Specifically, a question designed to ascertain patient expectations regarding their surgical outcome was asked at preoperative clinic visits within three months of CTR: "how much relief and/or improvement seems realistic to you as a result of the treatment you will be receiving?." Likert scale responses included "great relief/improvement," "some relief/improvement," "little relief/improvement," "no relief/improvement," and "I do not have any expectations." All patients received the same version of this question on an iPad (Apple Inc., Cupertino, Calif.). Preoperative patient counseling before surgery was delivered by the treating surgeon in a standardized fashion. Manual chart review was performed to collect potential predictor variables, verify coded procedures and surgical setting (operating room versus procedure room, and to ensure the anchor question was answered within 3 months preoperatively at a visit pertaining to the upcoming CTR surgery. Patients with a response to the improvement question only at visits unrelated to the preoperative CTR discussion, as were those lacking a response within 3 months preoperatively, were excluded. Patients undergoing revision CTR, and those with additional simultaneous surgical procedures performed in conjunction with the index CTR, were also excluded.

Demographic data were obtained through a combination of electronic data acquisition and manual chart review. Other preoperative factors known to limit postoperative improvement following CTR were collected via manual chart review, including age,[23,24] presence of constant numbness or weakness/atrophy,[25] and duration of symptoms.[23,26] Preoperative composite upper extremity disability, as measured by the QuickDASH, was extracted electronically at our institution; this outcome score is queried at each clinic visit as part of routine clinical care via a tablet computer. Social deprivation was also included as a potential predictor variable given its impact on healthcare access and outcomes in general.[27] To do so, we utilized the 2015 area deprivation index (ADI) to determine the level of social deprivation on a national percentile basis for each patient (lower ADI indicates lower levels of social deprivation).[28] Recently, ADI has been studied in several upper extremity and general orthopedic studies that have demonstrated that higher levels of social deprivation are associated with worse PROs[27,29–31] and decreased satisfaction with care.[27] The ADI evaluates 17 factors that influence socioeconomic status. These factors include education level, income, and housing type for a given 9-digit zip code,[32] which is granular to the level of 10 to 20 homes on average.[33] These data, originally collected from census records based on the Health Resources and Services Administration, are updated regularly to include the most recent American Community Survey data.[33]

Continuous variables were summarized as mean (SD), median (interquartile range [IQR]) and range. Categorical variables were summarized as counts (percentages). Univariable and multivariable logistic regressions were used to identify factors associated with expectations. Specifically, we investigated which preoperative factors were associated with patients expecting great relief/improvement, versus lower levels of expectations (binning of patients with no expectations and those expecting some, little, and no relief/improvement). The multivariable model included all variables with a P value less than 0.1 in the univariaable analysis. Variance inflation factors were calculated to examine potential multicollinearity of the multivariable model. Variance inflation factors of less than 5 were deemed acceptable.[34–36] Odds ratios, 95% confidence intervals (CIs) and P values were reported from the models. Statistical significance was assessed at the 0.05 level and all tests were two-tailed.

RESULTS

Demographics and Surgical Details

The recruitment process and reasons for exclusion are illustrated in Figure 1. A total of 307 patients were included. Of those included, mean age was 54 ± 16 years and 63% were female. The mean preoperative QuickDASH was 46.0 ± 18.8 and the majority of patients fell within the lowest two quartiles of ADI. A notable proportion of patients were experiencing constant numbness (32%) or weakness/atrophy (17%) within 3 months preoperatively. A summary of the demographic factors and baseline patient characteristics is provided in Table 1. Patients underwent both eCTR (41%) and oCTR (59%), and most underwent unilateral CTR (62%). Additional surgical factors are described in Table 2.

Expectations

Regarding the primary outcome of the study, the vast majority of patients expected great (58%) or some (23%) improvement/relief of their CTS symptoms, whereas 13% did not have any expectations before surgery (Table 3). It was uncommon for patients to expect little to no relief (7%) after CTR.

Univariable and Multivariable Analyses

In the univariate analysis, older patients, White race, lower BMI, lower levels of social deprivation (lower ADI), commercial insurance or Medicare were associated with

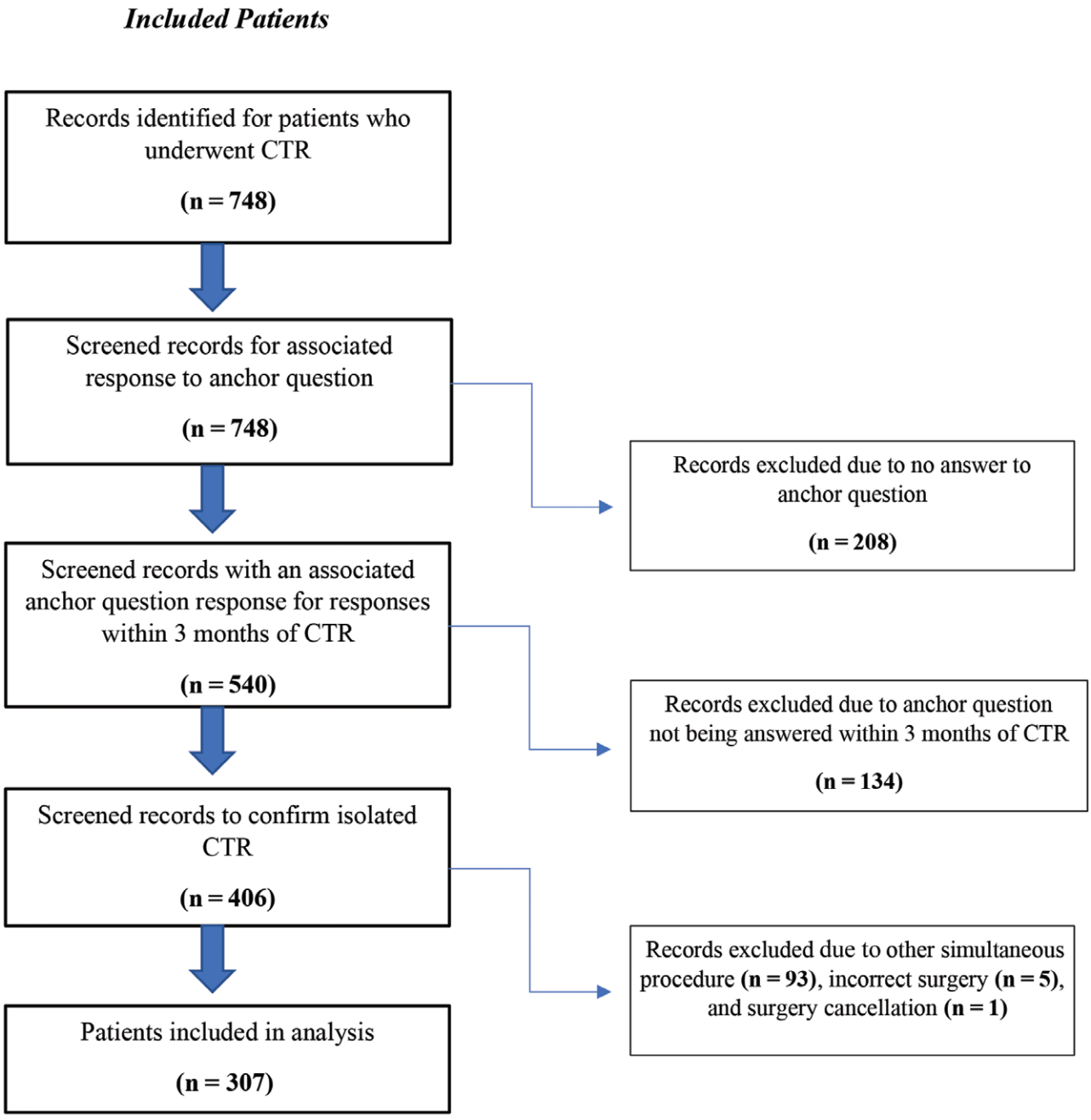

Fig. 1. Attrition of patients included in analysis based on study selection criteria.

expecting great relief/improvement ($P < 0.05$ for each; Table 4). Surgical technique (oCTR versus eCTR), surgical setting (operating room versus procedure room), surgeon, preoperative presence of constant numbness, preoperative presence of atrophy/weakness, duration of symptoms, and QuickDASH were not associated with expectations ($P > 0.05$ for each).

In the multivariable analysis, only the following predictors were significantly associated with higher expectations: male sex, lower social deprivation, and lower BMI ($P < 0.05$ for each; Table 4). Specifically, men had 87% greater odds of expecting great improvement than women (odds ratio: 1.87, 95% CI: 1.10, 3.21; $P = 0.022$). Each one point increase in BMI and one percentile increase in ADI/social deprivation were associated with a 3% and 2% decreased odds in expecting great improvement, respectively.

DISCUSSION

The relationship between preoperative patient expectations, satisfaction, and outcome score improvement is nuanced.[5,14] Our primary purpose focused on describing patient preoperative expectations before CTR, revealing that the vast majority of patients anticipated some to

Table 1. Baseline Patient Characteristics and Demographics

Descriptive Summary		
Variable		**N***
Age at time of surgery	Mean (SD)	53.8 (±15.6)
	Median (IQR)	53.1 (41.0, 65.8)
	Range	(21.8, 92.0)
BMI	Mean (SD)	31.5 (±8.6)
	Median (IQR)	30.0 (25.1, 36.0)
	Range	(17.8, 70.9)
Sex	Male	113 (36.8%)
	Female	194 (63.2%)
Race	White	258 (85.1)
	Other	45 (14.9%)
Employment	Working	157 (51.6%)
	Unemployed	47 (15.5%)
	Retired	83 (27.3%)
	Disabled	17 (5.6%)
ADI (national percentile)	Mean (SD)	35.9 (17.8)
	Median (IQR)	36.0 (23.0, 46.0)
	Range	(2.0, 100.0)
Tobacco use	Current smoker	35 (14.3%)
	Former smoker	57 (23.3%)
	Never smoker	153 (62.4%)
Insurance type	Commercial	169 (55%)
	Medicare	85 (27.7%)
	Medicaid	47 (15.3%)
	Other	6 (2%)
Clinical features of severity	Constant numbness	72 (32%)
	Preop weakness/ atrophy	46 (17.4%)
Preoperative testing and interventions	EMG	111 (36.3%)
	Injection	22 (7.2%)
Duration of symptoms (mo)	Mean (SD)	33.5 (46.3)
	Median (IQR)	24.0 (7.0, 37.0)
	Range	(1.0, 361.0)
Preoperative QuickDASH	Mean (SD)	46.0 (18.8)
	Median (IQR)	45.0 (32.0, 59.0)
	Range	(2.0, 91.0)

*N total of 370, with data missing for some specific demographic queries.

Table 2. Summary of Surgical Factors

Descriptive Summary		
Variable		**N***
	Endoscopic	125 (40.7%)
Surgical technique	Open	182 (59.3%)
Laterality	Unilateral	190 (61.9%)
	Bilateral	117 (38.1%)
Surgical setting	PR	196 (63.8%)
	OR	111 (36.2%)
Anesthesia type	General	29 (9.4%)
	Local	112 (36.5%)
	MAC	133 (43.3%)
	Regional	33 (10.7%)
Surgeon	Provider A	74 (24.1%)
	Provider B	31 (10.1%)
	Provider C	7 (2.3%)
	Provider D	122 (39.7%)
	Provider E	73 (23.8%)

*N total of 370, with data missing for some specific demographic queries.
OR, operating room; PR, procedure room.

great improvement after surgical management of CTS. Additionally, we observed that the expectation of great improvement was associated with male sex, lower BMI, and lower levels of social deprivation. Of equal importance, we observed that factors leading to worse outcomes did not affect expectations, including the presence of preoperative constant numbness,[26] presence of preoperative weakness/atrophy,[25] age,[23,24] and duration of symptoms.[23,26]

Table 3. Summary of Patient Expectations

Descriptive Summary	
Preoperative Expectations	**N* (%)**
Level of relief/improvement	
Great	177 (57.7%)
Some	69 (22.5%)
Little	8 (2.6%)
None	12 (3.9%)
No expectations	41 (15.6%)

*N total of 370, with data missing for some specific demographic queries.

Although we are unaware of other literature for comparison specific to CTR, patient expectations have been studied in a variety of surgical fields and are important not only because of their impact on outcomes[37–40] but because patients and their surgeons often have strikingly different expectations.[8,9,41] In the setting of breast reconstruction after mastectomy, Tedesco and Loerzel[42] demonstrated that women held unique expectations of surgical outcomes and that both these expectations and the information made available to them preoperatively influenced the overall satisfaction with breast reconstruction. Mancuso et al[9] revealed that patients undergoing total knee arthroplasty had higher mean expectations of their joint replacement than the surgeons performing their operation. In a 2019 study,[9] only 58% of surgeons performing periacetabular osteotomies for hip dysplasia felt that their expectations aligned with those of their patients.[41] Patient expectations have been studied in the setting of orthopedic joint replacement surgeries, identifying younger age, male sex, and white race to result in higher patient expectations before total knee arthroplasty.[43] In terms of other upper extremity surgeries, total shoulder replacement patients with higher preoperative function and no history of prior joint replacements had greater expectations of their surgical outcomes.[44] This latter point is important, as the lack of knowledge of what it was like to undergo shoulder replacement correlated to higher patient expectations, which speaks to the role of the surgeon in helping the patient understand what their operation, outcome, and recovery may be like if they have never experienced it. Managing and fostering appropriate perioperative patient expectations has been found to influence successful and timely discharge after total hip replacement.[45] Perhaps most importantly, small discrepancies between expectations and fulfillment of these expectations are intimately and significantly related to patient satisfaction, which was demonstrated by Kim et al[46] in the setting of medial opening wedge high tibial osteotomies.

We also found that male patients undergoing CTR had significantly higher expectations than their female counterparts. Female patients undergoing aesthetic rhinoplasty were found to have higher levels of preoperative anxiety, depression, obsessive-compulsive symptoms, and general psychopathologic symptoms,[47] as well as higher visual analog scale (VAS) pain scores before the procedure,[48] which may influence patient expectations. Sex is known to influence preoperative expectations before total joint replacement.[43] Perez et al[49] demonstrated that female patients had worse preoperative outcomes scores than male patients

Table 4. Association between Expectations and Patient Factors: Univariate and Multivariable Binary Logistic Regressions

	Univariable Model		Multivariable Model	
Variable	**Odds Ratio (95% CI)**	***P***	**Odds Ratio* (95% CI)**	***P****
Age at time of surgery†	1.02 (1.00, 1.03)	0.016	1.01 (0.99, 1.03)	0.47
Male sex	1.58 (0.98, 2.56)	0.06	1.87 (1.10, 3.21)	0.02
Non-White race	0.46 (0.24, 0.88)	0.019	0.54 (0.27, 1.06)	0.07
BMI‡	0.96 (0.93, 0.99)	0.004	0.97 (0.94, 1.00)	0.02
Employment				
Retired vs working	1.39 (0.80, 2.44)	0.25		
Unemployed vs working	0.68 (0.35, 1.30)	0.24		
Disabled vs working	0.49 (0.17, 1.35)	0.17		
Tobacco use				
Former smoker vs current	0.87 (0.37, 2.03)	0.75		
Never smoker vs current	1.38 (0.65, 2.89)	0.39		
Alcohol use (yes vs no)	0.79 (0.46, 1.34)	0.38		
ADI (national percentile)§	0.98 (0.97, 0.99)	0.004	0.98 (0.97, 1.00)	0.02
Laterality (unilateral vs bilateral CTR)	1.09 (0.68, 1.75)	0.71		
Surgical setting (PR vs OR)	1.00 (0.62, 1.61)	1.00		
qDASH‖	1.00 (0.99, 1.01)	0.65		
Clinical features				
Constant numbness present	1.40 (0.79, 2.49)	0.25		
Preoperative weakness or atrophy present	1.24 (0.65, 2.40)	0.52		
Duration of symptoms (mo)	1.00 (1.00, 1.01)	0.49		
Preoperative testing and interventions				
EMG obtained	0.85 (0.53, 1.36)	0.49		
Injection performed	0.48 (0.19, 1.15)	0.11		
Insurance				
Commercial vs Medicaid	2.08 (1.09, 4.07)	0.029	1.44 (0.70, 3.00)	0.32
Medicare vs Medicaid	2.70 (1.31, 5.70)	0.008	1.57 (0.58, 4.27)	0.37
Other vs Medicaid	2.95 (0.52, 22.82)	0.24	1.85 (0.26, 16.84)	0.55

*Multivariable model includes all variables with *P* value < 0.1 in the univariable models. Sample size for the multivariable model is N = 297.
†Refers to each additional 1 year in age.
‡Refers to each additional one point increase in BMI.
§Refers to each additional one percentile increase in ADI.
‖Refers to each additional 1 point difference in qDASH.
OR, operating room; PR, procedure room; qDASH, Quick Disabilities of Arm, Shoulder and Hand Score.

before total knee arthroplasty without notable difference postoperatively. Additionally, female patients undergoing shoulder surgery reported higher VAS pain scores as well as lower Veterans RAND mental scores preoperatively, even though there was ultimately no sex-based differences in PROs at 1-year follow-up.[50] To our knowledge, CTR outcomes do not differ by sex. Our finding that female patients have different expectations before CTR surgery than males highlights the role of the surgeon in providing preoperative counseling about surgical expectations and pertinent patient resources. This becomes particularly relevant in those patients that are male and present with constant numbness and/or weakness atrophy. These clinical findings are correlated with worse outcomes after CTR,[24] and in the context of a particular type of patient (advanced age, male, high socioeconomic status, and low BMI), represent an important opportunity for counseling on the part of the surgeon.

Additionally, our study identified that patients with greater social deprivation (higher ADI) had decreased preoperative expectations before CTR. Social deprivation describes the collective influence of a variety of external stressors—such as poverty, malnutrition, limited access to education, and violence—on an individual's physical and emotional health.[51] Furthermore, social deprivation has been shown to affect the health outcomes of patients in many contexts.[51–56] Individuals in lower socioeconomic groups have worse outcomes in the setting of colorectal cancer and after liver and renal transplantation.[54] Social deprivation in the context of upper extremity pathology has been studied to some degree, both in the adult and pediatric populations. Wall et al[51] recently assessed social deprivation in patients with congenital upper extremity abnormalities, indicating that these patients report lower psychosocial well-being and could be at risk for negative outcomes.[29] There is a documented relationship between socioeconomic deprivation and the incidence of hand injuries, with the odds of those in the most deprived category sustaining a hand injury being 1.6 times greater than those in the least deprived category.[53] Social deprivation also influences fracture care. Those in the most deprived 10% of the population have an increased incidence of experiencing fractures.[55] Davis et al[54] found that patients in lower socioeconomic groups had worse pain and functional levels before undergoing total knee arthroplasty. Given that patients from a lower socioeconomic standing are more at risk for injuries and pathology, and also have worse expectations than their higher socioeconomic counterparts, it becomes important to recognize this as a potential barrier to optimal recovery before indicating an individual for surgery. In the context of CTR however, it remains unclear whether the socially deprived experience worse outcomes, and this may be an area warranting further investigation.

This study reinforced the connection between sex, increased BMI, and worse social deprivation with lower expectations before CTR. This is important not only because these factors are identifiable before surgery but given the evidence in the literature that higher preoperative expectations are associated with improved outcomes.[37–40]

Rauck et al[37] demonstrated that patients with higher expectations before reverse total shoulder arthroplasty experienced improved outcomes in terms of less nocturnal pain and return to overhead sports. Additionally, there is a documented positive correlation between patient expectations and their outcome after total joint arthroplasty.[38] Jain et al[40] demonstrated that higher preoperative expectations predicted greater PROs, satisfaction, and fulfillment of expectations. This is further convoluted by the fact that that those from higher socioeconomic status have higher expectations of arthroplasty to begin with.[11] Ultimately, the surgeon has the opportunity to identify the factors that make their patient more at risk—such as their socioeconomic background, BMI, and sex—and provide counseling or resources, intervene on unrealistic expectations, and allow that individual to reframe their expectations and support their individual postoperative recovery. Ultimately, helping patients set realistic expectations produces anticipations that are more likely to be met, which may improve overall patient satisfaction.[57] Preoperative counseling as a result of unrealistic expectations can also lead to a more informed decision-making process for patients considering surgical treatment and can assist in identifying physician–patient communication barriers. This has been borne out in the literature surrounding breast reconstruction after mastectomy, where Tedesco and Loerzel[42] demonstrated that provider counseling catered to patients based on their individual expectations before surgery—as determined by a preoperative questionnaire—resulted in patients feeling more prepared for both the surgery and what to anticipate in the postoperative recovery period.

Study limitations that warrant mention include the possibility of selection bias given that we did not have 100% enrollment. Additionally, the generalizability of our study may be limited due to the homogeneity of our study population (mostly White) with the majority falling in the lower two quartiles in terms of social deprivation. Our study may be subject to recall bias, as aspects such as symptom duration are based on patient histories. As there is no gold standard anchor question, the use of different anchor questions, or alternate wording or answer choices may affect the results. Although ADI was associated with expectations, it remains unclear if ADI affects the outcome (satisfaction or dissatisfaction) or PROs following CTR. Further research is required to evaluate this.

In summary, the majority of patients expected great improvement after CTR. Preoperative expectations regarding improvement following CTR were independent of surgical technique and setting. Older age, constant numbness, and presence of weakness and/or atrophy were not found to influence patient expectations, which highlights an opportunity for patient counseling given that these factors lead to worse outcomes and a greater level of residual symptoms after CTR.[23–26,58] Our finding that social deprivation is associated with lower expectations is consistent with a plethora of data demonstrating worse outcomes and decreased access to healthcare for the socioeconomically disadvantaged,[33] and highlights the importance of evaluating health disparities among CTR patients.

Nikolas H. Kazmers, MD, MSE
Department of Orthopaedics
University of Utah
590 Wakara Way
Salt Lake City, UT 84108
E-mail: nkazmers@gmail.com

REFERENCES

1. Iversen MD, Daltroy LH, Fossel AH, et al. The prognostic importance of patient pre-operative expectations of surgery for lumbar spinal stenosis. *Patient Educ Couns.* 1998;34:169–178.
2. Lutz GK, Butzlaff ME, Atlas SJ, et al. The relation between expectations and outcomes in surgery for sciatica. *J Gen Intern Med.* 1999;14:740–744.
3. Rönnberg K, Lind B, Zoëga B, et al. Patients' satisfaction with provided care/information and expectations on clinical outcome after lumbar disc herniation surgery. *Spine (Phila Pa 1976).* 2007;32:256–261.
4. Sun PO, Walbeehm ET, Selles RW, et al; Hand Wrist Study Group. Patient mindset and the success of carpal tunnel release. *Plast Reconstr Surg.* 2021;147:66e–75e.
5. Smith D, Loewenstein G, Jepson C, et al. Mispredicting and misremembering: patients with renal failure overestimate improvements in quality of life after a kidney transplant. *Health Psychol.* 2008;27:653–658.
6. Waljee JF, Ubel PA, Atisha DM, et al. The choice for breast cancer surgery: can women accurately predict postoperative quality of life and disease-related stigma? *Ann Surg Oncol.* 2011;18:2477–2482.
7. Wilson KA, Dowling AJ, Abdolell M, et al. Perception of quality of life by patients, partners and treating physicians. *Qual Life Res.* 2000;9:1041–1052.
8. Lattig F, Fekete TF, O'Riordan D, et al. A comparison of patient and surgeon preoperative expectations of spinal surgery. *Spine (Phila Pa 1976).* 2013;38:1040–1048.
9. Mancuso CA, Graziano S, Briskie LM, et al. Randomized trials to modify patients' preoperative expectations of hip and knee arthroplasties. *Clin Orthop Relat Res.* 2008;466:424–431.
10. Culliton SE, Bryant DM, Overend TJ, et al. The relationship between expectations and satisfaction in patients undergoing primary total knee arthroplasty. *J Arthroplasty.* 2012;27:490–492.
11. Mahomed NN, Liang MH, Cook EF, et al. The importance of patient expectations in predicting functional outcomes after total joint arthroplasty. *J Rheumatol.* 2002;29:1273–1279.
12. Noble PC, Conditt MA, Cook KF, et al. The John Insall Award: patient expectations affect satisfaction with total knee arthroplasty. *Clin Orthop Relat Res.* 2006;452:35–43.
13. Scott CE, Howie CR, MacDonald D, et al. Predicting dissatisfaction following total knee replacement: a prospective study of 1217 patients. *J Bone Joint Surg Br.* 2010;92:1253–1258.
14. Waljee J, McGlinn EP, Sears ED, et al. Patient expectations and patient-reported outcomes in surgery: a systematic review. *Surgery.* 2014;155:799–808.
15. Sears ED, Burns PB, Chung KC. Relationship between patient expectations and clinical measures in patients undergoing rheumatoid hand surgery from the Silicone Arthroplasty in Rheumatoid Arthritis (SARA) study. *Plast Reconstr Surg.* 2015;136:775e–781e.
16. Henry LE, Aneizi A, Nadarajah V, et al. Preoperative expectations and early postoperative met expectations of extremity orthopaedic surgery. *J Clin Orthop Trauma.* 2020;11(suppl 5):S829–S836.
17. Mandl LA, Burke FD, Shaw Wilgis EF, et al. Could preoperative preferences and expectations influence surgical decision making? Rheumatoid arthritis patients contemplating metacarpophalangeal joint arthroplasty. *Plast Reconstr Surg.* 2008;121:175–180.

18. Briet JP, Hageman MG, Overbeek CL, et al. Factors associated with met expectations in patients with hand and upper extremity disorders: a pilot study. *Psychosomatics*. 2016;57:401–408.
19. Fang C, Chen YJ, Fang E, et al. Patient expectations predict outcomes following distal radius fracture: a prospective cohort study using the TEFTOM questionnaire. *Injury*. 2021;52:877–882.
20. Hageman MG, Briët JP, Bossen JK, et al. Do previsit expectations correlate with satisfaction of new patients presenting for evaluation with an orthopaedic surgical practice? *Clin Orthop Relat Res*. 2015;473:716–721.
21. Blackburn J, van der Oest MJW, Chen NC, et al; Hand-Wrist Study Group. Are patient expectations and illness perception associated with patient-reported outcomes from surgical decompression in de Quervain's tenosynovitis? *Clin Orthop Relat Res*. 2021;479:1147–1155.
22. Elfar JC, Foad MB, Foad SL, et al. A cost analysis of staged and simultaneous bilateral carpal tunnel release. *Hand (N Y)*. 2012;7:327–332.
23. Alimohammadi E, Bagheri SR, Hadidi H, et al. Carpal tunnel surgery: predictors of clinical outcomes and patients' satisfaction. *BMC Musculoskelet Disord*. 2020;21:51.
24. Leit ME, Weiser RW, Tomaino MM. Patient-reported outcome after carpal tunnel release for advanced disease: a prospective and longitudinal assessment in patients older than age 70. *J Hand Surg Am*. 2004;29:379–383.
25. Wintman BI, Winters SC, Gelberman RH, et al. Carpal tunnel release. Correlations with preoperative symptomatology. *Clin Orthop Relat Res*. 1996:135–145.
26. Masud M, Rashid M, Malik SA, et al. Does the duration and severity of symptoms have an impact on relief of symptoms after carpal tunnel release? *J Brachial Plex Peripher Nerve Inj*. 2019;14:e1–e8.
27. Stephens AR, Tyser AR, Kazmers NH. The impact of social deprivation on orthopaedic outpatient satisfaction using the press ganey outpatient medical practice survey. *J Am Acad Orthop Surg*. 2020;28:e1111–e1120.
28. Department of Medicine, University of Wisconsin School of Public Health. The Neighborhood Atlas. Available at https://www.neighborhoodatlas.medicine.wisc.edu/. Accessed March 29, 2021.
29. Wright MA, Adelani M, Dy C, et al. What is the impact of social deprivation on physical and mental health in orthopaedic patients? *Clin Orthop Relat Res*. 2019;477:1825–1835.
30. Wright MA, Beleckas CM, Calfee RP. Mental and physical health disparities in patients with carpal tunnel syndrome living with high levels of social deprivation. *J Hand Surg Am*. 2019;44:335.e1–335.e9.
31. Okoroafor UC, Gerull W, Wright M, et al. The impact of social deprivation on pediatric PROMIS health scores after upper extremity fracture. *J Hand Surg Am*. 2018;43:897–902.
32. Kind AJH, Buckingham WR. Making neighborhood-disadvantage metrics accessible - the neighborhood atlas. *N Engl J Med*. 2018;378:2456–2458.
33. Kind AJ, Jencks S, Brock J, et al. Neighborhood socioeconomic disadvantage and 30-day rehospitalization: a retrospective cohort study. *Ann Intern Med*. 2014;161:765–774.
34. Marquaridt DW. Generalized inverses, ridge regression, biased linear estimation, and nonlinear estimation. *Technometrics*. 1970;12:591–612.
35. Neter J, Wasserman W, Kutner MH. *Applied Linear Regression Models*. 2nd ed. Homewood: Richard D. Irwin Inc;1989.
36. O'brien RM. A caution regarding rules of thumb for variance inflation factors. Quality *Quantity*. 2007;41:673–690.
37. Rauck RC, Swarup I, Chang B, et al. Effect of preoperative patient expectations on outcomes after reverse total shoulder arthroplasty. *J Shoulder Elbow Surg*. 2018;27:e323–e329.
38. Sharma L, Sinacore J, Daugherty C, et al. Prognostic factors for functional outcome of total knee replacement: a prospective study. *J Gerontol A Biol Sci Med Sci*. 1996;51:M152–M157.
39. Bishop MD, Mintken PE, Bialosky JE, et al. Patient expectations of benefit from interventions for neck pain and resulting influence on outcomes. *J Orthop Sports Phys Ther*. 2013;43:457–465.
40. Jain D, Bendich I, Nguyen LL, et al. do patient expectations influence patient-reported outcomes and satisfaction in total hip arthroplasty? A prospective, multicenter study. *J Arthroplasty*. 2017;32:3322–3327.
41. Edelstein AI, Kaiser Tegel K, Shaunfield S, et al; ANCHOR Group. ANCHOR surgeon views of patient selection and expectations for periacetabular osteotomy. *J Hip Preserv Surg*. 2019;6:109–116.
42. Tedesco D, Loerzel V. Breast reconstruction: impact of patient-centered, expectations-based education on women undergoing reconstructive surgery after mastectomy. *Clin J Oncol Nurs*. 2020;24:186–194.
43. Hepinstall MS, Rutledge JR, Bornstein LJ, et al. Factors that impact expectations before total knee arthroplasty. *J Arthroplasty*. 2011;26:870–876.
44. Rauck RC, Swarup I, Chang B, et al. Preoperative patient expectations of elective reverse shoulder arthroplasty. *J Shoulder Elbow Surg*. 2019;28:1217–1222.
45. Padilla JA, Feng JE, Anoushiravani AA, et al. Modifying patient expectations can enhance total hip arthroplasty postoperative satisfaction. *J Arthroplasty*. 2019;34(7S):S209–S214.
46. Kim MS, Koh IJ, Kim CK, et al. Patient expectations and satisfaction after medial opening wedge high tibial osteotomy. *J Arthroplasty*. 2020;35:3467–3473.
47. Naraghi M, Atari M. Gender differences in aesthetic rhinoplasty patients: a study on psychopathological symptoms. *Open J Med* Psychol 2016;5:1.
48. Spiekermann C, Beule AG, Rudack C, et al. Influence of the subjective body image on the outcome of functional rhinoplasty. *Aesthetic Plast Surg*. 2019;43:196–201.
49. Perez BA, Slover J, Edusei E, et al. Impact of gender and race on expectations and outcomes in total knee arthroplasty. *World J Orthop*. 2020;11:265–277.
50. Daniels SD, Stewart CM, Garvey KD, et al. Sex-based differences in patient-reported outcomes after arthroscopic rotator cuff Repair. *Orthop J Sports Med*. 2019;7:2325967119881959.
51. Wall LB, Wright M, Samora J, et al; CoULD Study Group. Social deprivation and congenital upper extremity differences-an assessment using PROMIS. *J Hand Surg Am*. 2021;46:114–118.
52. Urwin M, Symmons D, Allison T, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Ann Rheum Dis*. 1998;57:649–655.
53. Horton TC, Dias JJ, Burke FD. Social deprivation and hand injury. *J Hand Surg Eur Vol*. 2007;32:256–261.
54. Davis ET, Lingard EA, Schemitsch EH, et al. Effects of socioeconomic status on patients' outcome after total knee arthroplasty. *Int J Qual Health Care*. 2008;20:40–46.
55. Court-Brown CM, Aitken SA, Duckworth AD, et al. The relationship between social deprivation and the incidence of adult fractures. *J Bone Joint Surg Am*. 2013;95:e321–e327.
56. Dy CJ, Lane JM, Pan TJ, et al. Racial and socioeconomic disparities in hip fracture care. *J Bone Joint Surg Am*. 2016;98:858–865.
57. Deakin AH, Smith MA, Wallace DT, et al. Fulfilment of preoperative expectations and postoperative patient satisfaction after total knee replacement. A prospective analysis of 200 patients. *Knee*. 2019;26:1403–1412.
58. Mondelli M, Padua L, Reale F. Carpal tunnel syndrome in elderly patients: results of surgical decompression. *J Peripher Nerv Syst*. 2004;9:168–176.