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An Examination of Pain, Disability, and the Psychological Correlates of Chiari Malformation Pre- and Post- Surgical Correction

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Chiari Malformation Type 1 (CM1)

- Prevalence = 5 in 1000
- Anatomical malformation can be corrected with decompression surgery
- Even when surgical outcome is a success, there is a range of symptom reporting post-surgery

Psychological Symptoms in CM1

- CM1 patients present with high rates of psychological symptoms
- ~47% report a history of depression (Mueller & Oro, 2004; 2013)
- Rates of other psychiatric symptomatology are unknown

Decompression Surgery Outcomes

- **Most studies find that patients' quality of life (QOL) improves following surgery** (Meeker et al., 2015; Mueller & Oro, 2005; Pant et al., 2010)

- **Post-surgical QOL is lower in patients with comorbid psychiatric disorders; psychiatric symptoms positively correlated with CM symptom severity** (Bakim et al., 2013)

Psychiatric Outcomes Post-Surgery

- **Altered cerebellar anatomy may have a lasting effect on cognitive and affective functions (Bakim et al., 2013; Mueller & Oro, 2005) and damage to the cerebellum has been associated with increased rates of major depressive disorder (Schmahmann & Sherman, 1997)**

Present Study

- Examine rates of psychological symptoms in a large, national sample (n=1190) of CM1 patients and compare rates between patients who have and have not undergone corrective surgery.

Methods

- Participants recruited to participate in the Chiari 1000 registry between 2015-2018
- If interested, participants completed a series of questionnaires and submitted their MRI scans

Sample

- **1190 participants (1111 females, 79 males)**
- **286 provided presurgical MRI scans**
  - Scans demonstrated that all contributors had CM1 and those who received surgery had greater distention than those that did not
- **53.7% had undergone decompression surgery**
- **Age = 37.6 years (SD=10.6)**
- **93% Caucasian, 4.1% African-American**
- **80% completed at least some college**
- **48% were employed**
- **Surgery recipients received the surgery 5.3 years prior**

Measures

- Short Form-McGill Pain Questionnaire-2 – self-reported pain
- Neck Disability Scale – Activities of Daily Living
- Center for Epidemiologic Studies-Depression (CES-D)
- Depression, Anxiety and Stress Scale-21
- Illness Attitude Scale – Health anxiety

- Both clinical cutoffs and continuous scoring

Analyses

- **Examine rates of psychological symptoms in the sample as a whole**
- **Examine differences between participants who did and did not have corrective surgery**
  - Entire sample
  - Sample providing MRI scans
  - Controlled for years since diagnosis

Full sample descriptives

Conquer Chiari 1000 sample

- Moderate-Severe Depression rates = 40-70%
- Moderate-Severe Anxiety rates= 40%
- 80% reported moderate to severe disability
- 48% reported health anxiety at clinical levels

US 12-month prevalence rates

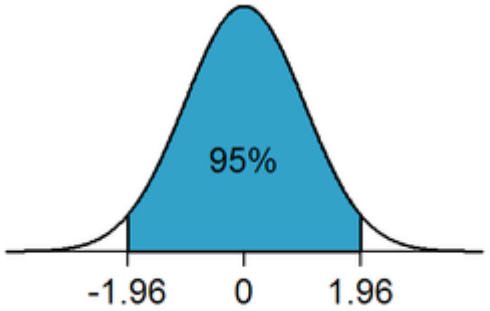
- 10.4%
- 19%

Between Group Hypotheses

- Patients who had undergone decompression surgery would report lower levels of disability than patients who had not undergone surgery.

- Patients who had undergone decompression surgery would report lower levels of psychological symptoms than patients who had not undergone surgery

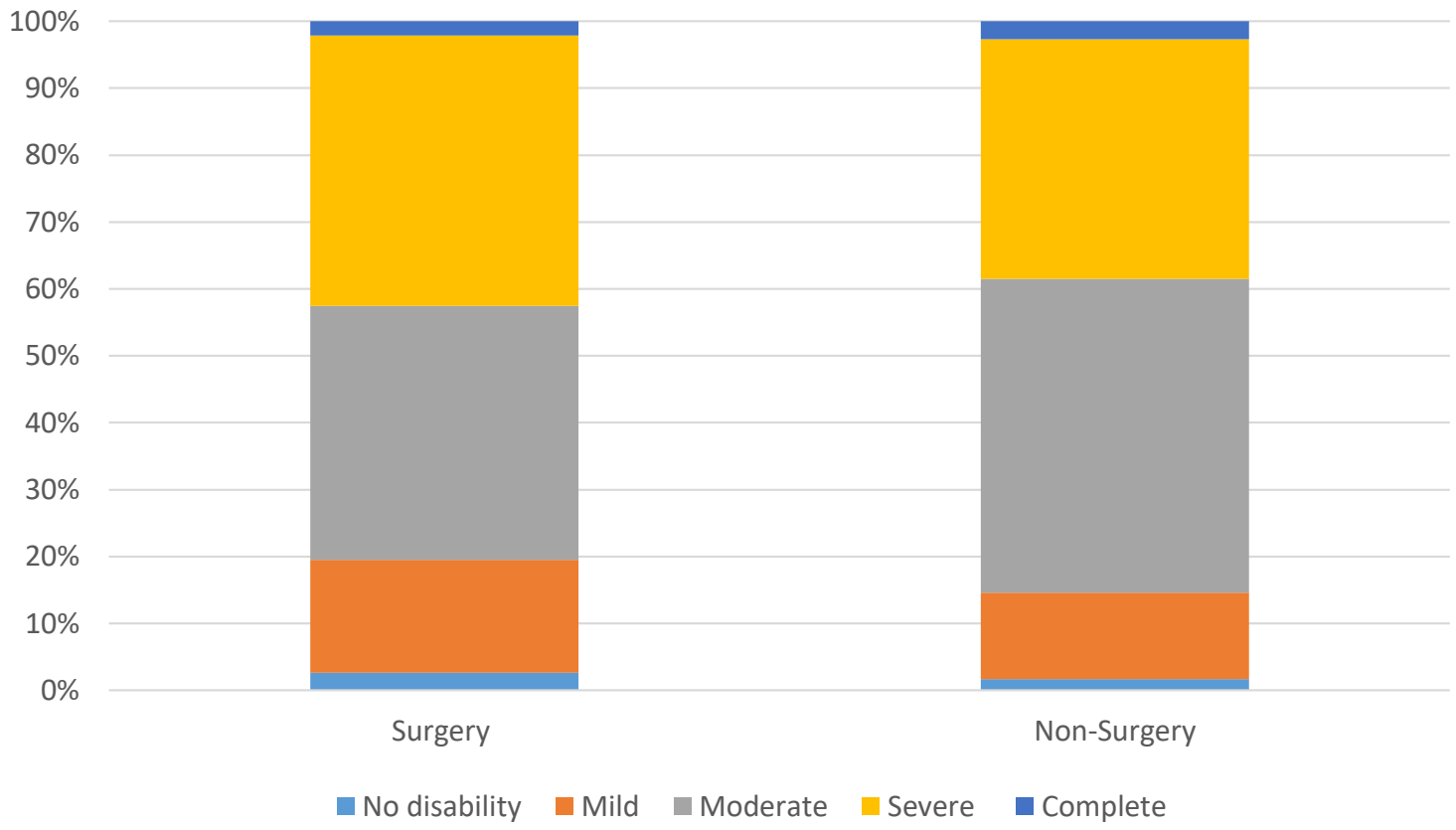
Statistical versus clinical significance



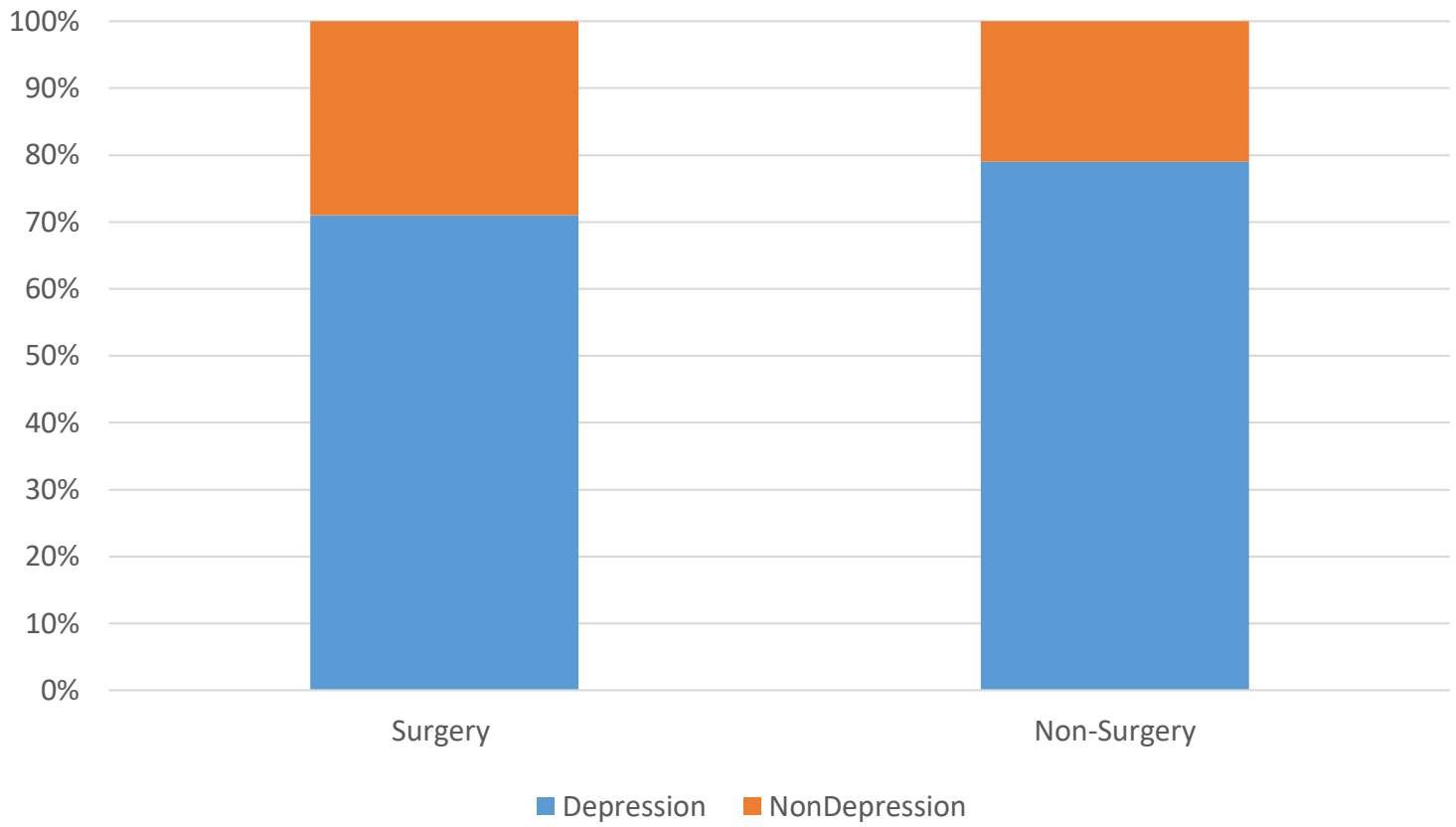
- **We use statistical significance testing to determine whether the surgery and non-surgery groups differ**
  - If results are significant ($p<.05$), we conclude that the groups differ and that there is a less than 5% chance that we are wrong
  - Very large sample sizes can detect miniscule differences between groups that are not likely relevant for clinical decision-making
- **Effect size – quantifies strength of an effect independent of sample size**

Between-group results: Clinical cutoff scores

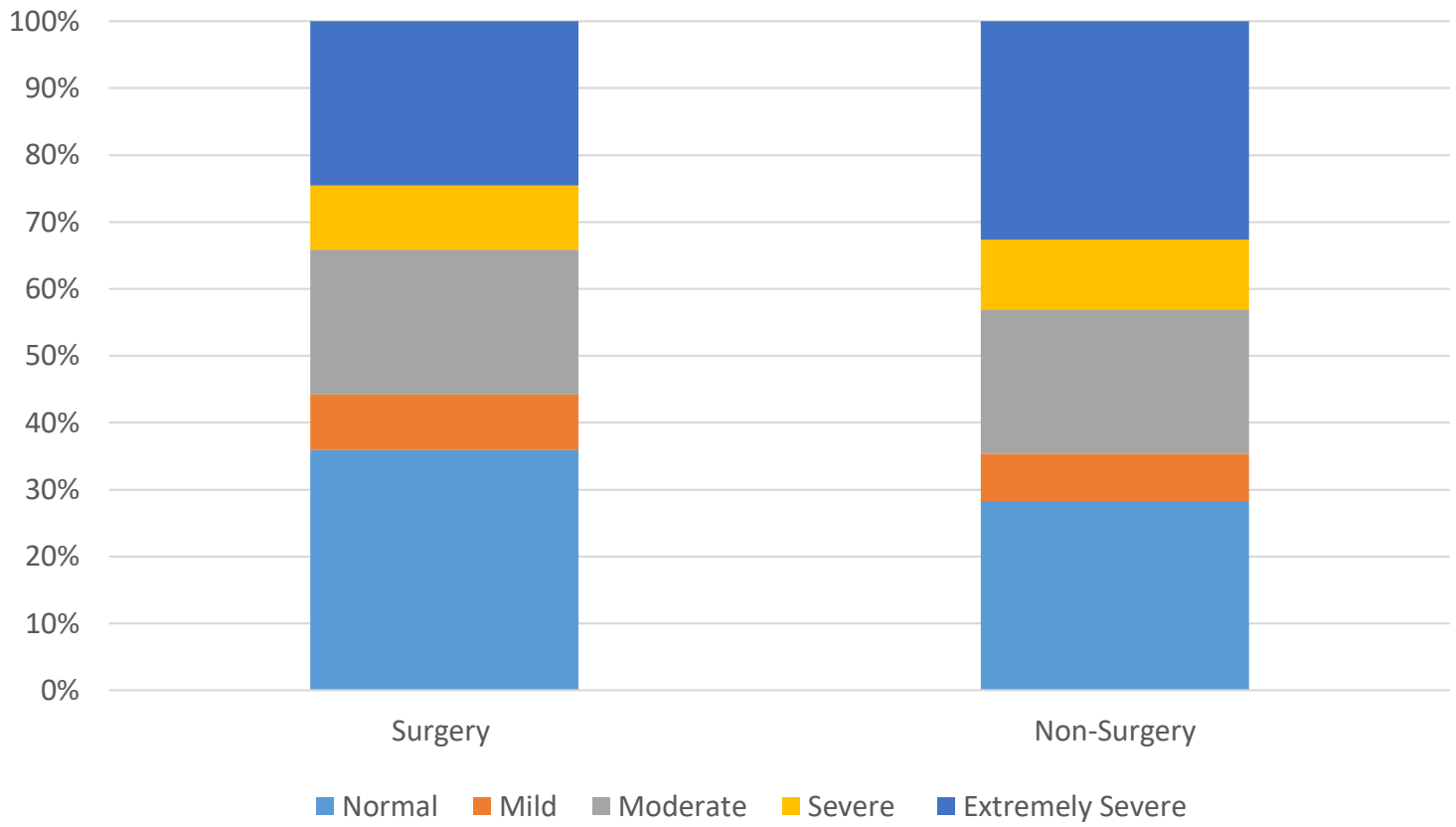
Neck disability cutoff scores: NS



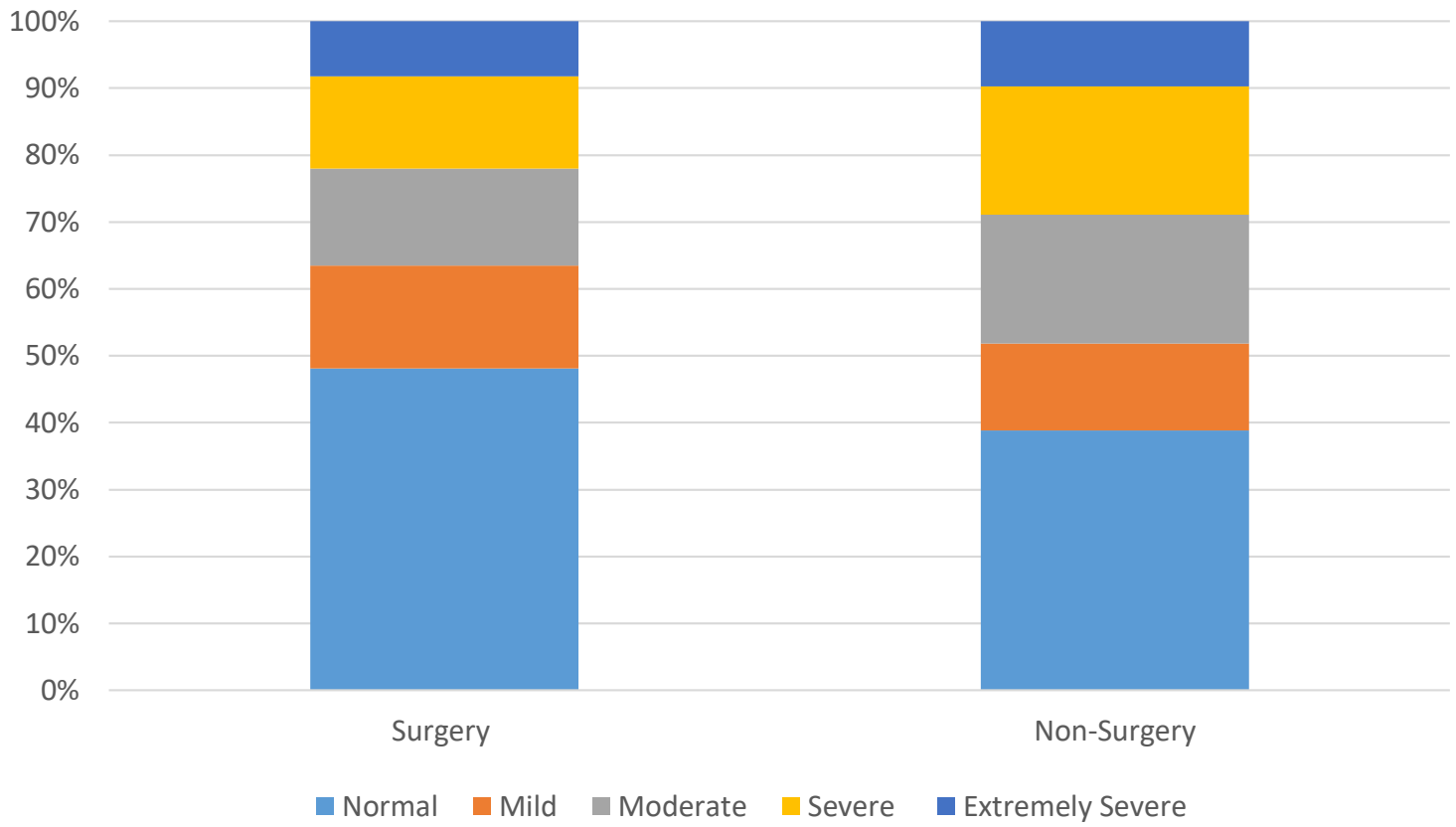
CES-D Depression cutoff scores: p<.01



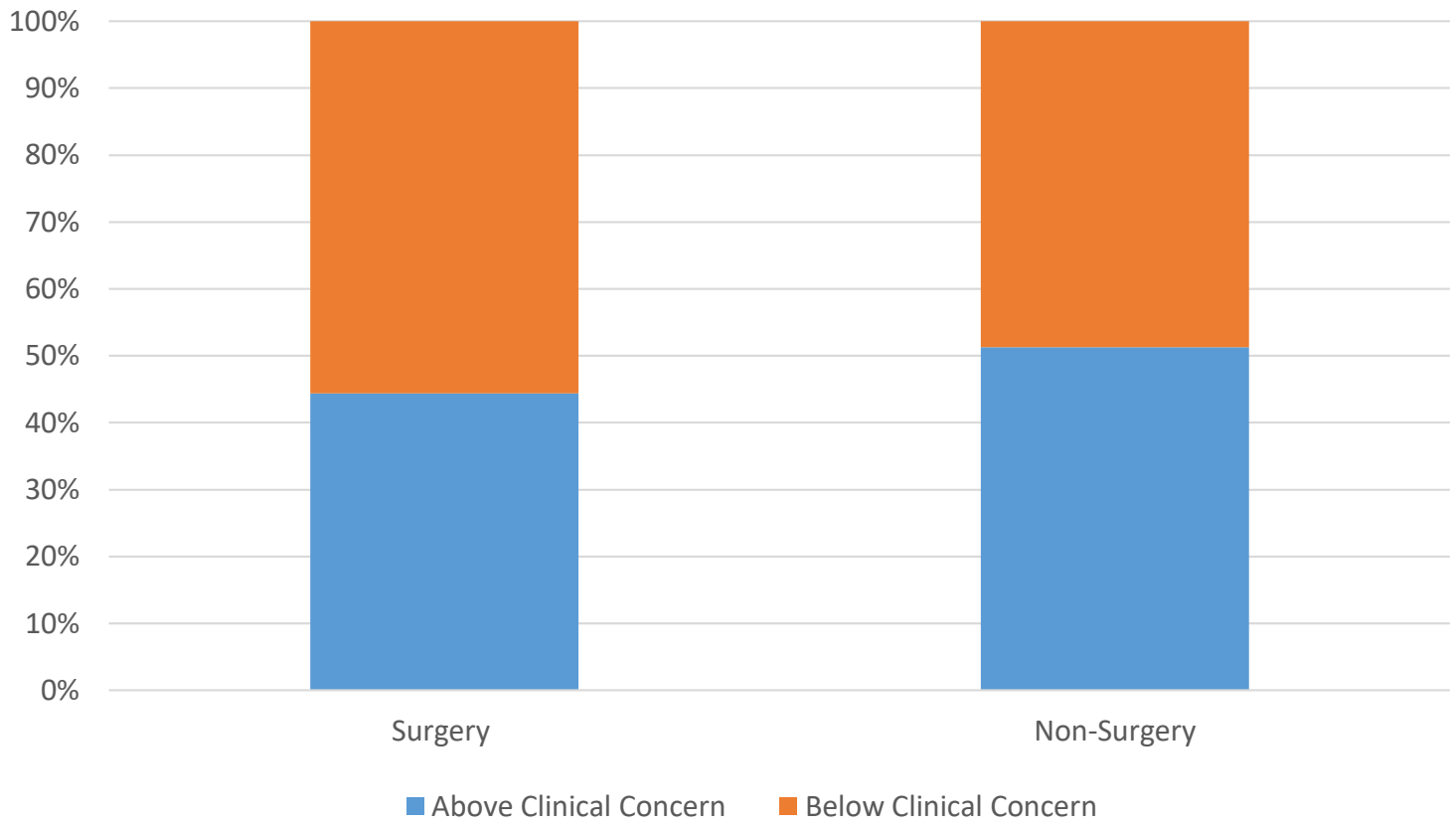
DASS-Anxiety: p<.05



DASS-Stress: p<.001

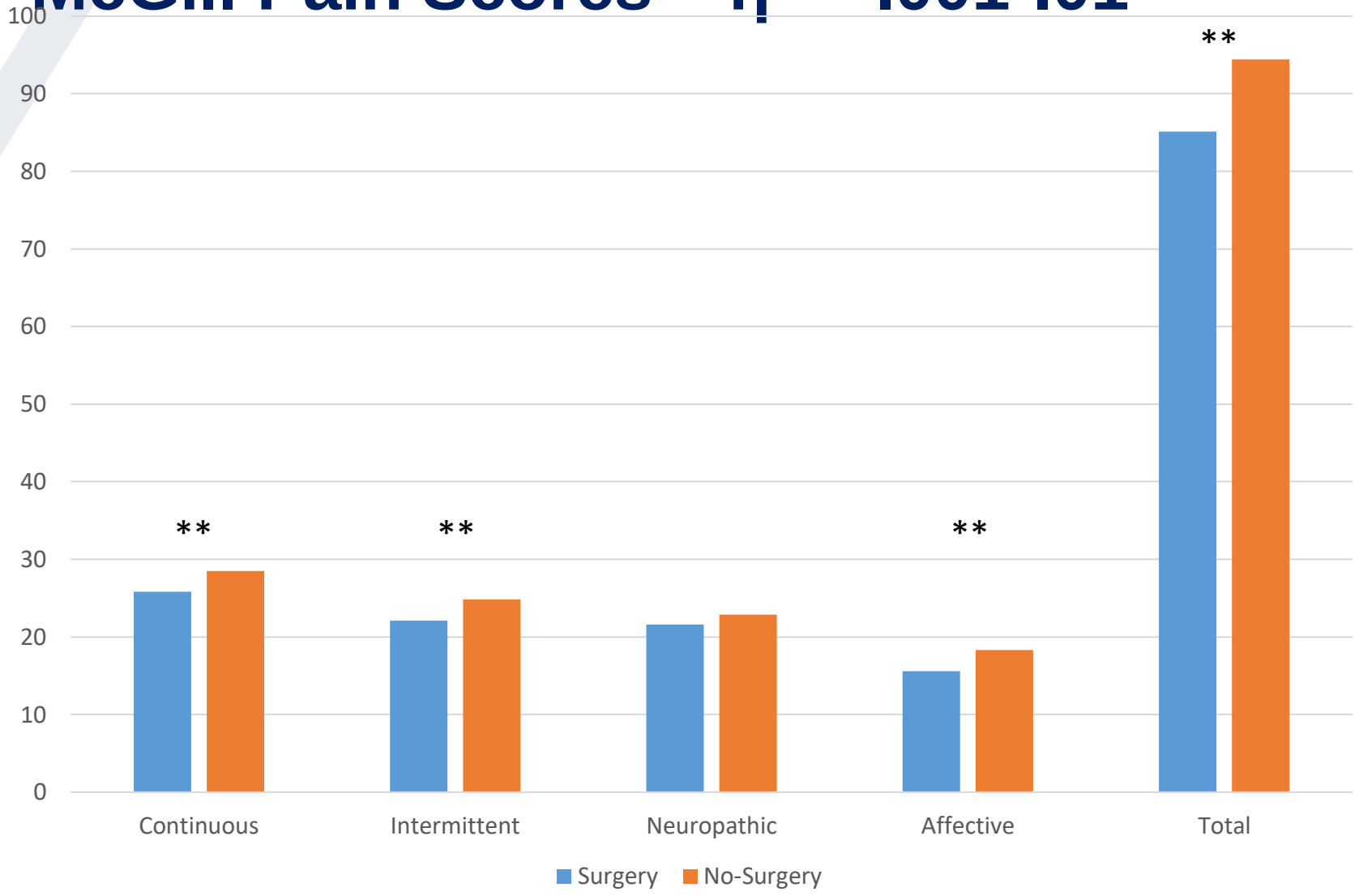


Health Anxiety: p<.05

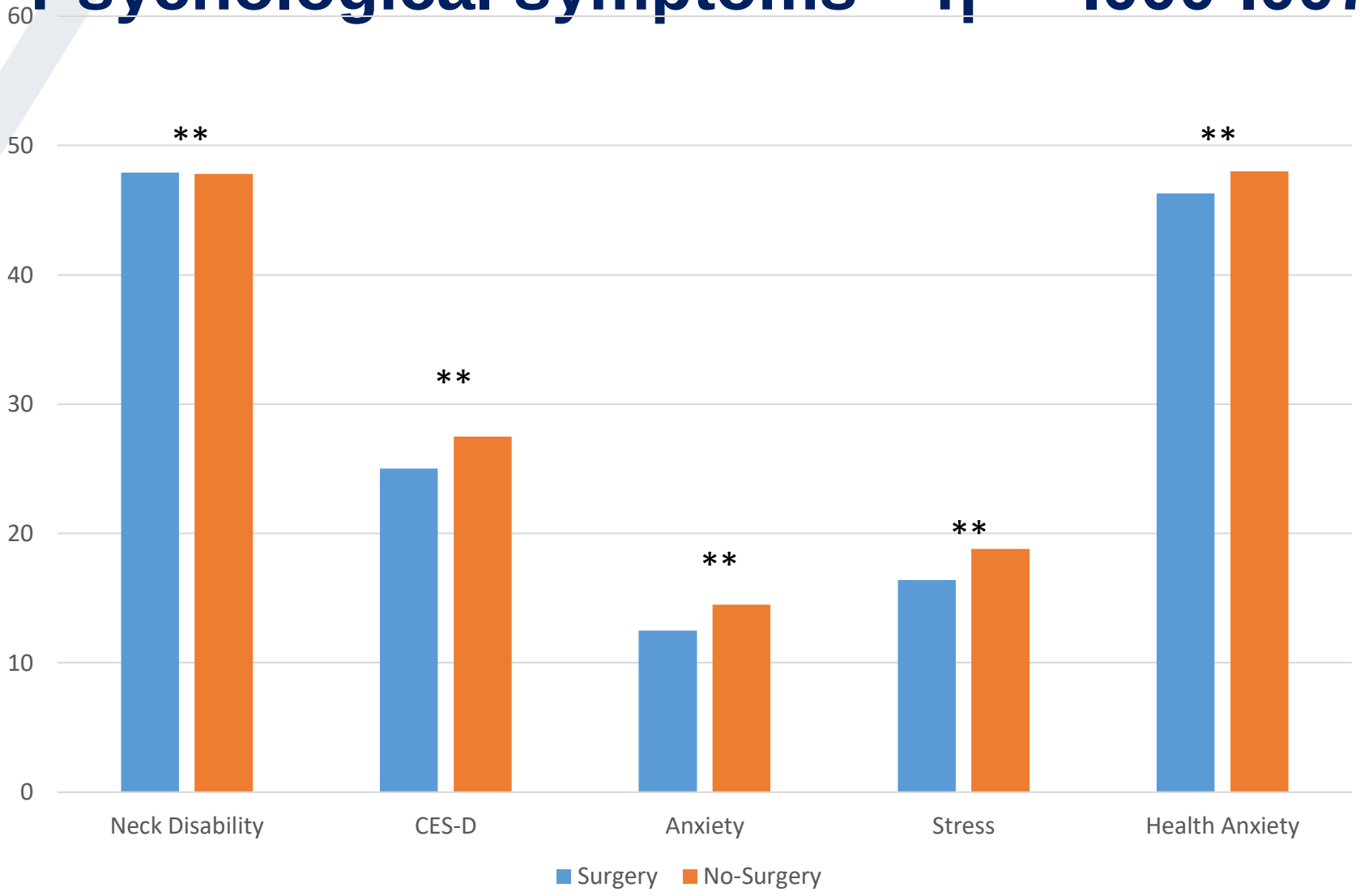


Between group results: continuous scores

McGill Pain Scores – η^2 = .001-.01



Psychological symptoms – η^2 = .000-.007



Summary of Effect sizes

- An effect size of 0 basically means that there is no effect; knowing what group the participant was in makes no difference in predicting outcome. In other words your probability of guessing would be .50 (a coin flip)
- An effect size of .1 means that, if you were given a score on one of the measures, you would have .52 probability of correctly guessing what group that person belonged to
- All effect sizes were between 0-0.1

Discussion

- First study to examine a broad range of psychological symptoms in a nationwide sample of patients with CM1 who had and had not undergone corrective surgery

- We observed high rates of distress, anxiety, depression and pain, regardless of surgical group status

Discussion

- **Examining differences between those who did and did not have surgery**
  - Statistically, the group that did not have surgery reported more pain, anxiety and stress than the surgery group.
  - Clinically, the results appear driven by the large sample size and do not reflect meaningful differences
- **Results were similar in the subgroup who provided MRI scans**

Take Home

- There are high levels of psychological symptoms in patients with CM1, regardless of surgical status
- Psychological treatment should be incorporated into medical/surgical treatment plans regardless of whether or not patients elect to undergo decompression surgery

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Thank you to all of the participants for their time and effort.

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Results

	N	Total %	Surgery %	No Surgery %	Chi-Square
Neck Disability	823				8.00
No Disability		2.2	2.6	1.7	
Mild		14.9	16.9	12.9	
Moderate		42.3	38.0	46.9	
Severe		38.2	40.4	35.8	
Complete		2.4	2.1	2.7	
CES-D	1057				7.09**
Scores below 16		25.7	29.1	21.9	
Scores over 16		74.4	70.9	78.1	
DASS-Depression	1035				6.88
Normal		43.9	47.2	40.1	
Mild		12.7	10.9	14.7	
Moderate		17.9	17.1	18.8	
Severe		10.0	10.2	9.9	
Extremely Severe		15.6	14.7	16.5	

	N	Total %	Surgery %	No Surgery %	Chi-Square
DASS-Anxiety	1035				11.47*
Normal		32.4	35.9	28.3	
Mild		7.7	8.3	7.0	
Moderate		21.5	21.6	21.5	
Severe		10.0	9.6	10.5	
Extremely Severe		28.3	24.5	32.6	
DASS-Stress	1035				14.81**
Normal		43.8	48.1	38.8	
Mild		14.3	15.4	13.0	
Moderate		16.7	14.5	19.2	
Severe		16.3	13.8	19.2	
Extremely Severe		8.9	8.2	9.7	
Health Anxiety	1010				4.75*
Below Clinical Concern		52.4	55.6	48.7	
Clinical Health Anxiety		47.6	44.4	51.3	

* $p < .05$. ** $p < .001$.

Results – continuous variables

	N	F	P	η^2	M_{group1}	$M_{group2\ (surgery)}$
McGill Pain	1066					
Continuous		7.88	.005	.007	28.45(14.22)	25.87(15.19)
Intermittent		5.48	.019	.005	24.82(16.37)	22.08(16.54)
Neuropathic		.691	.406	.001	22.87(14.34)	21.57(14.67)
Affective		11.65	.001	.011	18.29(11.06)	15.63(10.69)
Total		6.56	.011	.006	94.44(49.32)	85.15(51.35)
Neck Disability	973					
Total		.752	.386	.001	47.78(18.38)	47.93(19.60)

CES-D	1049					
Total		2.85	.091	.003	27.51(13.56)	24.99(13.58)
DASS-21	1027					
Depression		.625	.429	.001	14.15(11.54)	13.11(11.65)
Anxiety		4.44	.035	.004	14.45(10.29)	12.51(9.96)
Stress		7.63	.006	.007	18.79(10.31)	16.35(10.65)
Health Anxiety	1004					
Total		.403	.526	.000	48.03(16.99)	46.29(15.45)

* p < .05. ** p < .001.