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Factors Associated with Adherence to Medical Appointments Among Patients Undergoing Bariatric Surgery

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Agenda

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- Bariatric Surgery
 - Background
 - Pre- & post-surgical appointment adherence
 - Health literacy, health numeracy, and cognitive functioning
- Study
 - Study design and methodology
 - Results
 - Conclusions and future directions

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Bariatric Surgery: By the Numbers

Estimate of Bariatric Surgery Numbers, 2011-2019

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	2011	2012	2013	2014	2015	2016	2017	2018	2019*
Total	158,000	173,000	179,000	193,000	196,000	216,000	228,000	252,000	256,000
Sleeve	17.8%	33.0%	42.1%	51.7%	53.6%	58.1%	59.4%	61.4%	59.4%
RYGB	36.7%	37.5%	34.2%	26.8%	23.0%	18.7%	17.8%	17.0%	17.8%
Band	35.4%	20.2%	14.0%	9.5%	5.7%	3.4%	2.7%	1.1%	0.9%
BPD-DS	0.9%	1.0%	1.0%	0.4%	0.6%	0.6%	0.7%	0.8%	0.9%
Revision	6.0%	6.0%	6.0%	11.5%	13.6%	14.0%	14.1%	15.4%	16.7%
Other	3.2%	2.3%	2.7%	0.1%	3.2%	2.6%	2.5%	2.3%	2.4%
Balloons	–	–	–	–	0.3%	2.6%	2.8%	2.0%	1.8%

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Bariatric Surgery: Benefits

- Safe and most effective procedure for the treatment of severe obesity
- Average percent of excess weight loss: 61%
- High rates of remission for obesity-related medical comorbidities
 - Diabetes resolution: 77%
 - Hyperlipidemia improvement: >70%
 - Hypertension resolution: 62%
 - OSA resolution: 86%
- Associated with significant improvements in quality of life

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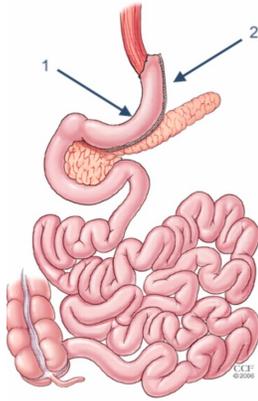
Buchwald et al., 2004; Hachem et al., 2016

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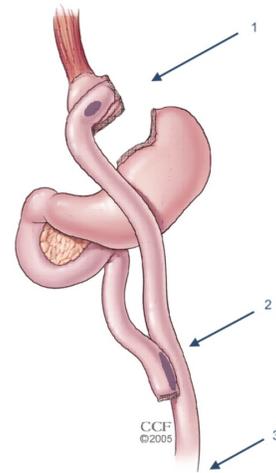
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Bariatric Surgery: Current Common Procedures

- Sleeve gastrectomy (SG)
 - Stomach is reduced to roughly the size of a banana (80% of the stomach removed)
 - Most common procedure performed in the United States



- Roux-en-Y gastric bypass (RYGB)
 - Stomach is divided to create a small pouch and part of the small intestine is re-routed to this pouch
 - Prior to the SG, was the most commonly performed bariatric procedure



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Bariatric Surgery: Lifestyle Changes

- Weight regain is common after bariatric surgery, with ~18% of individuals regaining at least 10%.
- Many of the factors which predict weight regain are behavioral
- Adherence to a healthy lifestyle after bariatric surgery can facilitate optimal weight loss outcomes: nutrition, exercise program

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Athanasiadis et al., 2021

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Bariatric Surgery: Factors Influencing Weight Outcomes

- The ability to understand and apply health-related information is associated with weight loss outcomes.
- 9.6%, 24.2%, and 29.5% of individuals undergoing bariatric surgery have lower health literacy, lower health numeracy, and probable cognitive impairment, respectively.

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BRIEF COMMUNICATION



Health Literacy, Health Numeracy, and Cognitive Functioning Among Bariatric Surgery Candidates

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Bariatric Surgery: Factors Influencing Weight Outcomes

- Previous work by our team found health literacy and health numeracy were associated with better weight outcomes 2-4 years post-surgery.



SURGERY FOR OBESITY AND RELATED DISEASES

Surgery for Obesity and Related Diseases 17 (2021) 384–389

Original article

The Influence of Health Literacy and Health Numeracy on Weight Loss Outcomes Following Bariatric Surgery

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Bariatric Surgery: Current Study

- Previous work by our team showed post-surgery weight loss outcomes are associated with attending routine post-surgical bariatric follow-up appointments.
- Study question: If health literacy, health numeracy, and cognitive functioning can impact weight loss outcomes, and those who attend their post-surgical appointments have better weight outcomes, are these variables associated with attending medical appointments?

Current Study: Methodology

- N=210 who completed a pre-surgical psychosocial evaluation in preparation for bariatric surgery
- Patients completed measures of health literacy (Rapid Estimate of Adult Literacy in Medicine), health numeracy (Brief Medical Numbers Test), and cognitive functioning (Montreal Cognitive Assessment)
- Completed and missed (cancelled or “no-showed”) healthcare appointments within 2 years of patients’ surgery dates were tallied, as well as bariatric-only post-surgical appointments within 1 year of patients’ surgery date

Current Study: Results

Table 1 Patient demographics and characteristics

	<i>M</i>	<i>SD</i>
Age in years	46.02	10.15
Years of education	14.34	2.14
Weight measures		
Pre-surgical BMI	45.96	6.83
ΔBMI 1 year post-surgery	12.89	4.15
%TWL 1 year post-surgery	28.21%	7.63
%EWL 1 year post-surgery	65.18%	21.16
	<i>n</i>	%
Gender		
Female	178	84.8
Male	32	15.2
Race/ethnicity		
White	103	49.0
Black	89	42.4
Other	9	4.3
Missing	9	4.3
Surgery type		
Sleeve gastrectomy	157	74.7
Roux-en-Y gastric bypass	53	25.3

- Majority of the sample identified as female and White.
- Nearly 75% of the sample underwent sleeve gastrectomy.
- Percentage of excess weight loss at 1-year post-surgery was ~65%.

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Current Study: Results

- Lower health literacy- 13.3%
- Lower health numeracy- 21.4%
 - Those with inadequate health numeracy were older. Age was considered a control variable.
- Lower cognitive functioning- 37.6%

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Current Study: Pre-Surgery Results

Table 1 Adherence to medical appointments by cognitive functioning, health literacy, and health numeracy levels

	Adequate cognitive functioning <i>M% (SD%)</i>	Lower cognitive functioning <i>M% (SD%)</i>	<i>t</i>	<i>p</i>	Adequate health literacy <i>M% (SD%)</i>	Limited health literacy <i>M% (SD%)</i>	<i>t</i>	<i>p</i>	Adequate health numeracy <i>M% (SD%)</i>	Limited health numeracy <i>M% (SD%)</i>	<i>F^a</i>	<i>df</i>	<i>p</i>
Percentage pre-surgical no show appointments	4.5% (7.0%)	6.4% (8.3%)	1.7	.04	5.1% (7.5%)	5.4% (8.0%)	.18	.43	4.7% (7.3%)	6.9% (8.3%)	4.84	1,207	.03
Percentage pre-surgical missed appointments	20.1% (15.1%)	24.6% (15.0%)	1.8	.04	22.2% (15.0%)	22.4% (15.2%)	.05	.48	21.5% (14.9%)	25.1% (15.5%)	2.31	1,207	.13

- Individuals with lower cognitive functioning no-showed and missed more medical appointments, as did those with lower health numeracy

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Current Study: Post-Surgery Results

Table 1 Adherence to medical appointments by cognitive functioning, health literacy, and health numeracy levels

	Adequate cognitive functioning <i>M% (SD%)</i>	Lower cognitive functioning <i>M% (SD%)</i>	<i>t</i>	<i>p</i>	Adequate health literacy <i>M% (SD%)</i>	Limited health literacy <i>M% (SD%)</i>	<i>t</i>	<i>p</i>	Adequate health numeracy <i>M% (SD%)</i>	Limited health numeracy <i>M% (SD%)</i>	<i>F^a</i>	<i>df</i>	<i>p</i>
Percentage no show post-surgical appointments	5.3% (12.4%)	8.1% (17.0%)	1.2	.11	6.1% (14.1%)	7.8% (15.7%)	.56	.29	5.6% (12.7%)	9.2% (18.9%)	3.48	1,202	.06
Percentage missed post-surgical appointments	23.6% (24.0%)	24.3% (24.7%)	.18	.43	22.8% (24.1%)	31.0% (23.1%)	.75	.05	23.9% (23.9%)	23.8% (24.8%)	.15	1,202	.70

- Those with lower health numeracy missed more medical appointments

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Current Study: Pre & Post-Surgery Results

Table 1 Adherence to medical appointments by cognitive functioning, health literacy, and health numeracy levels

	Adequate cognitive functioning M% (SD%)	Lower cognitive functioning M% (SD%)	<i>t</i>	<i>p</i>	Adequate health literacy M% (SD%)	Limited health literacy M% (SD%)	<i>t</i>	<i>p</i>	Adequate health numeracy M% (SD%)	Limited health numeracy M% (SD%)	<i>F</i> ^a	<i>df</i>	<i>p</i>
Percentage total no show appointments	4.8% (6.8%)	6.8% (8.5%)	1.8	.04	5.5% (7.4%)	5.6% (8.2%)	.28	.48	5.0% (7.1%)	7.1% (8.7%)	5.83	1,206	.02
Percentage total missed appointments	22.1% (14.0%)	26.3% (13.2%)	2.1	.02	23.6% (13.8%)	24.0% (14.2%)	.93	.48	23.0% (13.6%)	26.0% (14.7%)	2.59	1,202	.11

^aANCOVA controlling for age; bolded text denotes significance at *p* < .05

- Individuals with lower cognitive functioning no-showed and missed more medical appointments, as did those with lower health numeracy

Current Study: Conclusions

- Health literacy, health numeracy, and cognitive functioning are not routinely assessed pre-surgically, but results from this study suggest these factors are linked with adherence to medical appointments.
- Assessing these factors may help to better support those with lower functioning in these areas.
- Promoting adherence at medical appointments may be a way to facilitate better short and longer term weight loss outcomes, although interventions to address health numeracy are especially needed as this factor was associated with attending bariatric-specific healthcare appointments after surgery.

Current Study: Limitations and Future Directions

- Limitations:
 - Did not assess bariatric-specific health literacy or health numeracy
 - Do not have data available outside of the electronic health record for patients who had post-surgical follow-ups at other health systems
- Future research would benefit from examining if pre or post-surgical interventions to improve health literacy, health numeracy, and/or cognitive functioning improve weight loss outcomes.

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Thank you!

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