

Profile of Overweight and Obesity in Adolescents with Down Syndrome at Children's Wisconsin

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INTRODUCTION

- In the US, over 25% of adolescents aged 12-19 years are classified as obese, causing significant morbidity in adolescence and into early adulthood.^{1,2}
- One in 700 neonates in the US are diagnosed with Down syndrome (DS), making it the leading genetic cause of intellectual disability.³
- Adolescents with DS are 1.5-3X more likely than their peers to develop overweight or obesity.⁴⁻⁶

HISTORICAL FACT

In 1959, French geneticist Dr. Jerome Lejeune proposed an altered metabolic profile in DS.

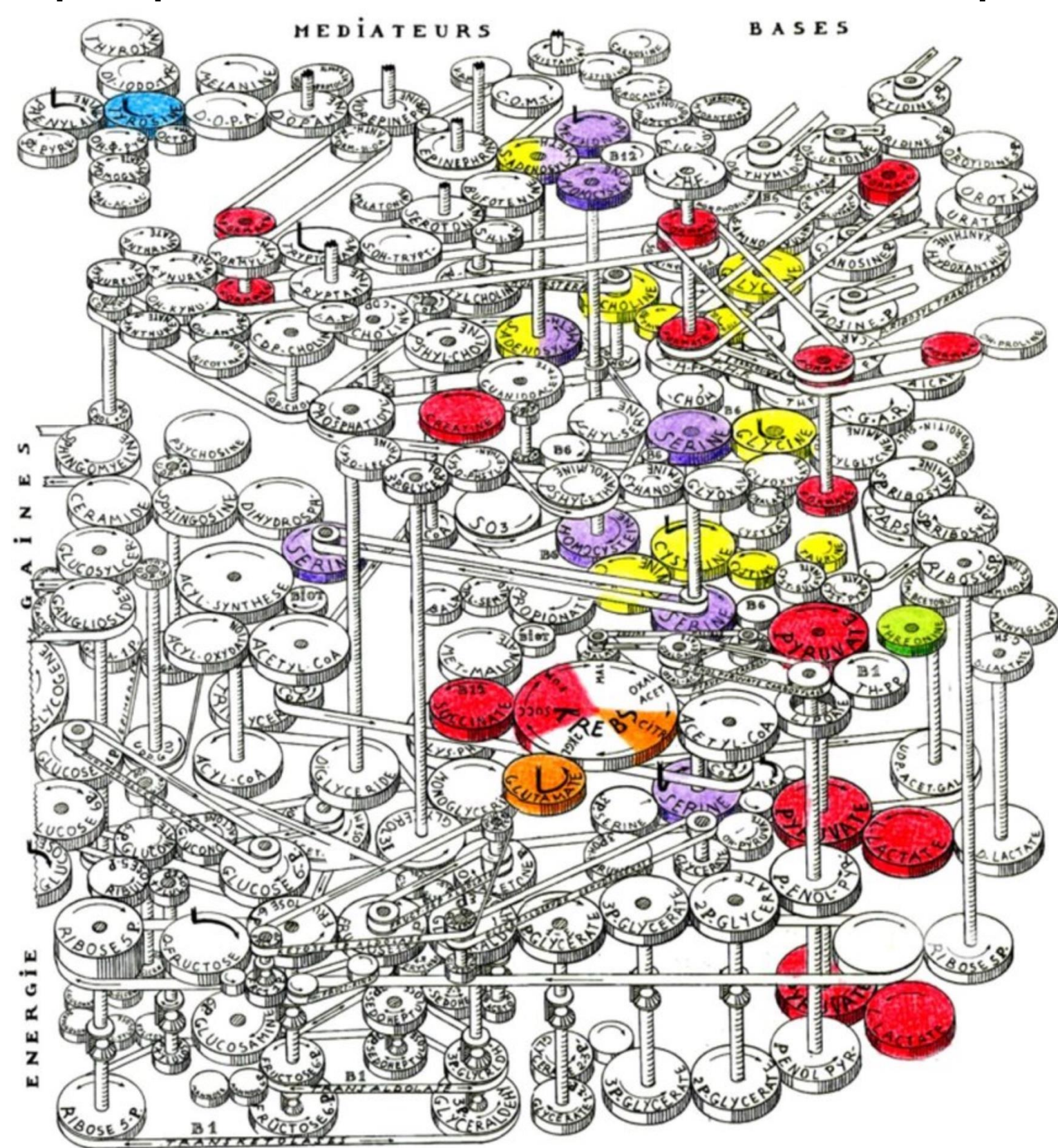
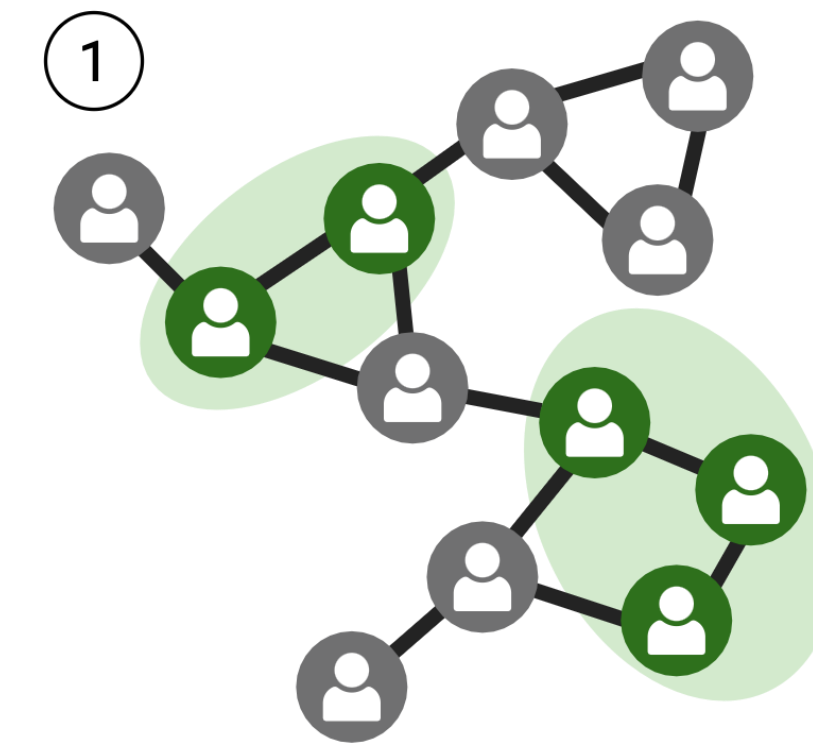


Figure 1. 'Lejeune Machine' with altered metabolic profile in individuals DS, most prominent in oxidative phosphorylation (Caracausi, 2018).

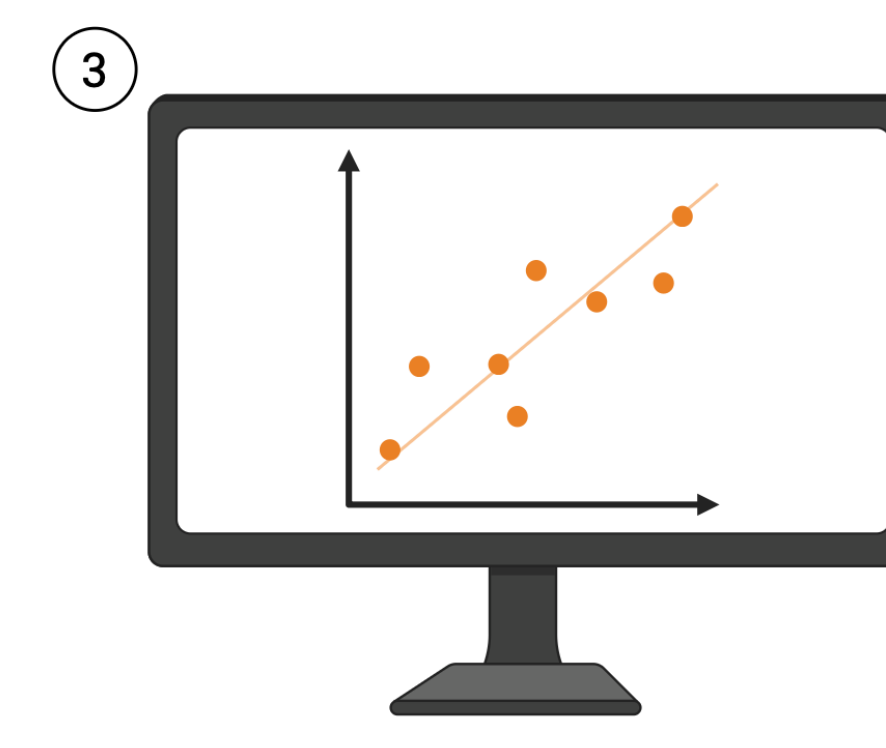
METHODS



- Diagnoses of DS
- Ages 13 to 20
- Children's Wisconsin
- Outpatient Clinic (2013-2025)



- Height, Weight, BMI(%)
- Sex, Race, Ethnicity
- Zip Code
- Comorbid Conditions



- Descriptive Statistics
- Inferential Statistics
- P-values <0.05 considered significant.

RESULTS

PRIMARY AIM RESULTS

VISITS		918	
PATIENTS		200	
MEAN AGE [SD]		17.37 [1.81]	
BMI%ILE (MEDIAN)		92.93	
ZIP CODES		116	
COUNTIES (STATES)		30 (3)	
SEX (%)		ETHNICITY (%)	
Male	Female	Hispanic or Latino	Non-Hispanic or Latino
53	47	11	89
RACE (%)			
Asian	Black	White	Other
3.5	7.0	86.5	3.0

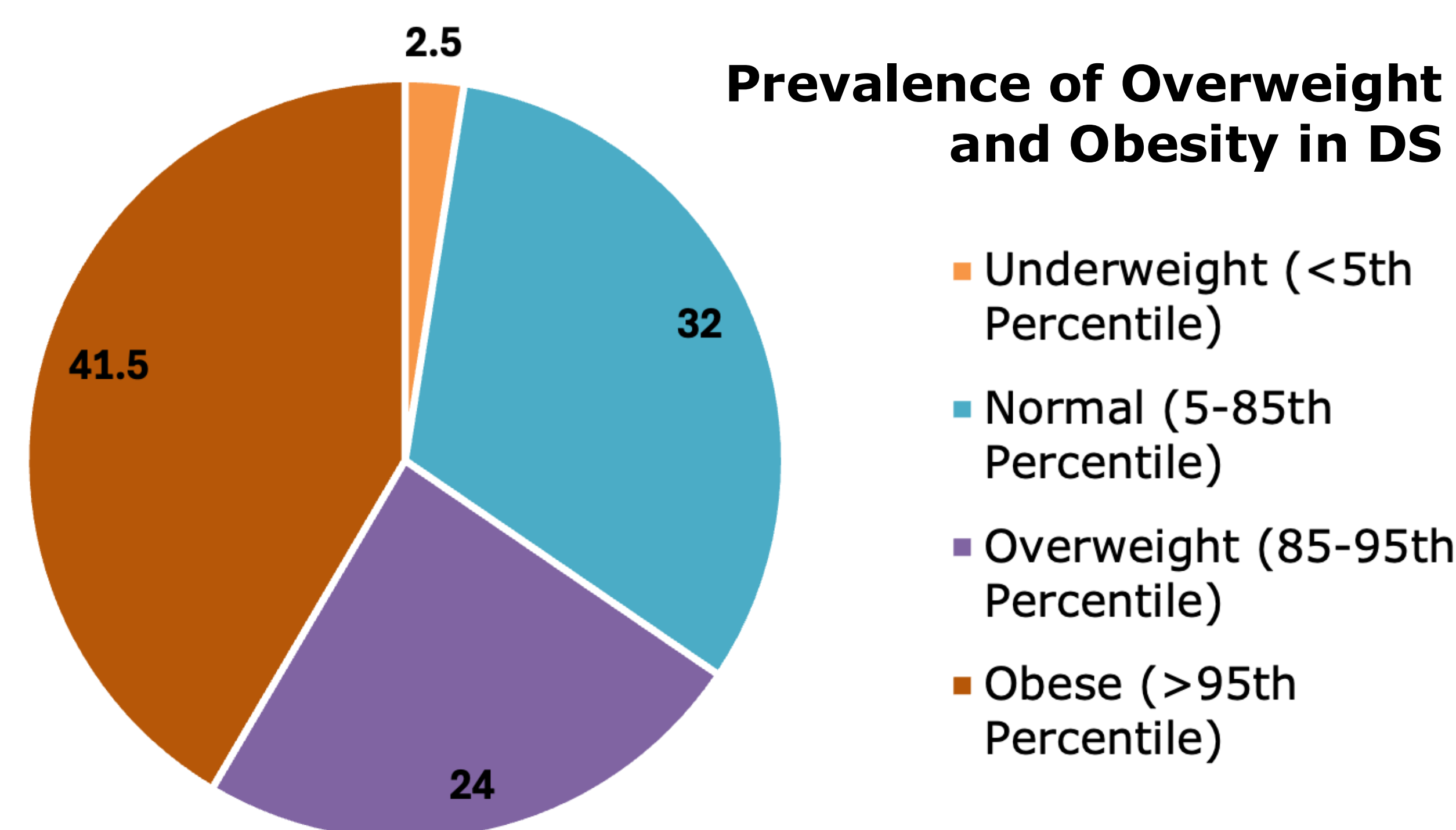


Figure 2. Pie chart showing percentage (bolded black text) of patients within adolescent CDC BMI categories (colored sectors) out of 200 unique patients with DS.

SECONDARY AIM RESULTS

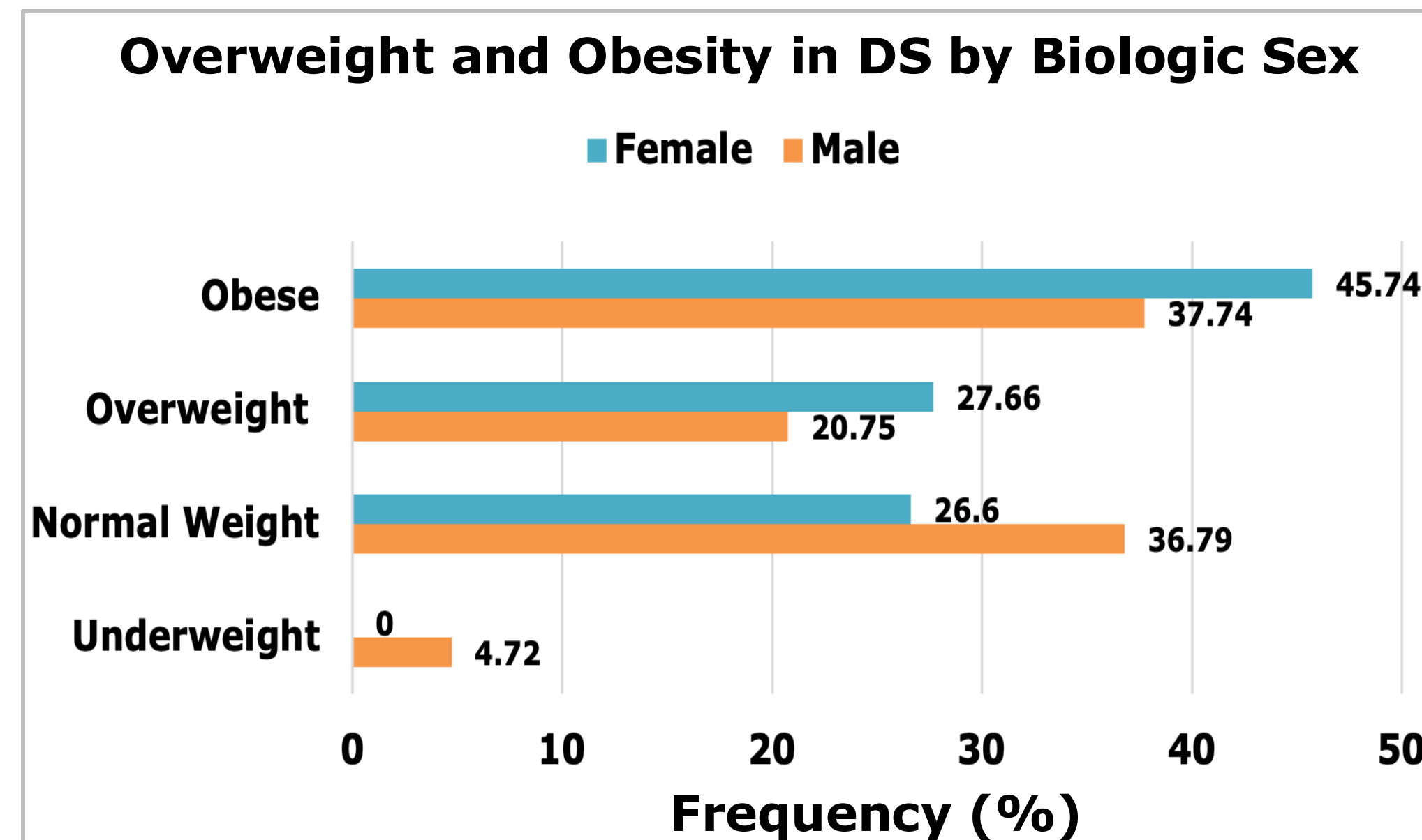


Figure 3. Clustered bar plot of frequency of CDC BMI category in females (orange) and males (blue). As BMI%ile increased, the proportion of females compared to males increased (P = 0.03; Cochran-Armitage).

GROUP	Obstructive Sleep Apnea		Antibody + Hypothyroidism		Type 1 Diabetes	
	YES	NO	YES	NO	YES	NO
BMI < 85%	28 (40.6)	41 (59.4)	36 (52.2)	33 (47.8)	4 (5.8)	65 (94.2)
BMI ≥ 85%	71 (54.2)	60 (45.8)	53 (40.5)	78 (59.5)	5 (3.8)	126 (96.2)
	P = 0.07		P = 0.11		P = 0.50	

Table 1. No significant relationship was found between overweight and obesity with any selected comorbidities. Values represent the number of patients within each bucket (with or without comorbidity and with or without overweight/obesity) followed by row percentage. P-values obtained using Chi-Square statistic.

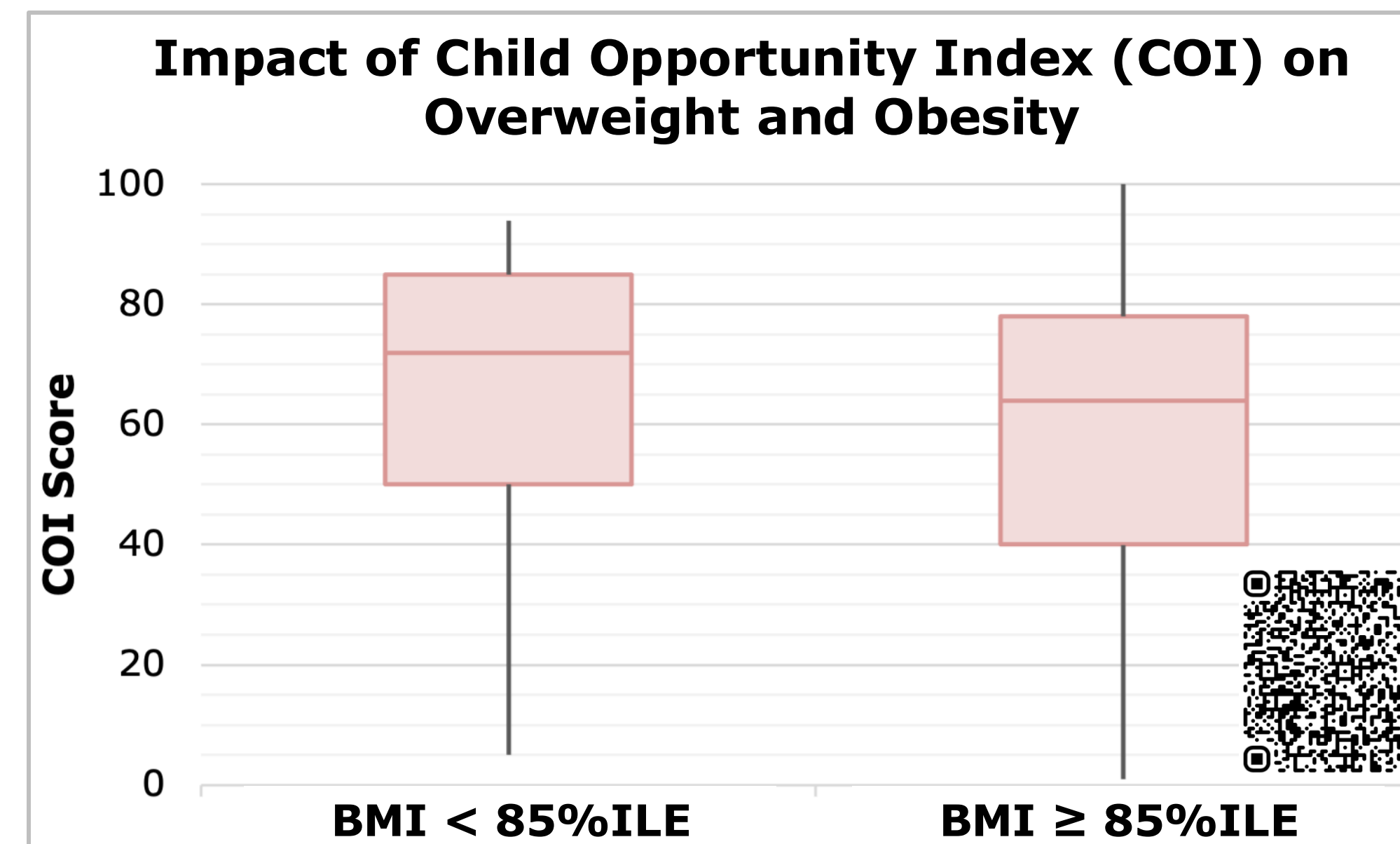


Figure 4. Box plot of COI scores in consolidated BMI categories. Fences are 25th and 75th percentiles; middle line is median; bars represent minimum and maximum. Higher BMI%ile had lower COI scores (P = 0.03; Wilcoxon).

DISCUSSION

- Adolescents with DS have a *very high* prevalence of overweight and obesity, over *two times higher* than reported rates in their peers without DS.
- Thus, DS is *high-risk population* that should be prioritized for targeted obesity prevention and early intervention strategies.
- These findings also highlight priority subgroups (females, lower SES) who may benefit from similar strategies.
- Results could appear differently in higher or lower opportunity states.
- No significant associations with any common comorbidities or surgeries seen in DS.
- The number of comorbidities did not change outcomes.
- This could suggest individuals with DS have an underlying predisposition to weight gain irrespective of comorbid conditions.

FUTURE STEPS

- Collection of remaining patient data (total n=543) will increase statistical power.
- Extend analysis to early and middle childhood to track onset of overweight and obesity.
- Prospective cohort study in adolescents with DS to investigate the impacts of nutritional and exercise interventions.
- Apply findings to improve patient outcomes.

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HYPOTHESIS

PRIMARY AIM

What is the prevalence of overweight and obesity in adolescents with DS at Children's Wisconsin?

SECONDARY AIM

What demographic or clinical attributes are associated with overweight and obesity?

HYPOTHESES

Adolescents with DS will have higher rates of overweight and obesity compared to their peers without DS.

Comorbidities (diabetes, obstructive sleep apnea, and hypothyroidism) will be associated with these conditions in this population.