Exploring the Link Between Depression and Obesity in a Clinically-Referred Pediatric Sample

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INTRODUCTION

Obesity and depression are major public health burdens that are increasingly recognized in youth. An estimated 17% of individuals between the ages of 2 and 19 are overweight (1), while 2% of children and 4-8% of adolescents suffer from major depressive disorder (2). Studies have consistently shown a comorbidity of depression and obesity (4,5), however, the nature of the exact processes linking these conditions remains unclear, particularly in children.

One proposed mechanism involves depressive symptoms prompting a withdrawal from previously enjoyed physical activities, thereby reducing energy expenditure and promoting weight gain. While some studies indicate that depressive symptom severity may influence physical activity levels (7), others contradict this finding (8).

Other studies have identified sleep patterns, eating behaviors, and stress and coping to be involved in the relationship between depression and obesity.

Study Aim: To examine the relationship between depression and obesity in a pediatric sample, with particular focus on the role of physical activity, eating behavior, coping strategies, and sleep.

METHODS

Participants:

Data were derived from 266 participants of the Healthy Brain Network, an ongoing clinically referred sample of children (ages 5-21) in the New York City Area. Participants selected for inclusion here ranged in age from 8 to 18, with the average age of 11.9. The participant group included 140 males and 126 females. As a part of the study, a variety of behavioral and physical measures are collected to assess the mental and physical health of participants.

Measures:

Child Behavioral Checklist (CBCL): A 113-item parent-report questionnaire assessing behavioral competency and behavioral problems in children (ages 6 – 18) within the past six months

Youth Self Report (YSR): a 112-item self-report designed for children and adolescents (ages 11-17), that assesses behavioral competency and behavioral problems and parallels the (CBCL).

Bioelectrical Impedance Ananlysis (BIA): a measure of body composition using the bioimpendance method to access participant's percent body fat, Body Mass Index (BMI), and Fat Mass Index (FMI)

Physical Activity Questionnaire (PAQ): a self-report questionnaire assessing a child's level of engagement in physical activity over the past 7 days

Children's Coping Strategies Checklist (CCSC): a self-report inventory in which children describe their coping efforts

METHODS CONT'D

Sleep Disturbance Scale for Children (SDS-C): a 27-item inventory rated on a 5 point Likert-type scale used to categorize sleep disorders in children

Yale Food Addiction Scale (YFAS): a 25-item self-report measure that has been developed to identify those who are most likely to be exhibiting markers of substance dependence with the consumption of high fat/high sugar foods

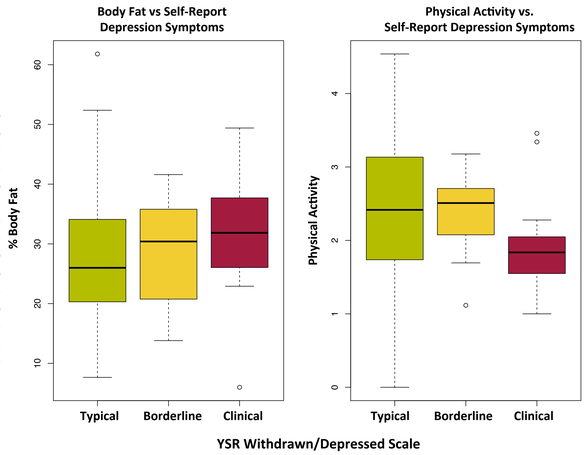
Statistical Analysis:

Correlation and linear regression were used to examine the relationship between depressive symptoms, physical activity and body composition. Separate models were run for parent (CBCL) and self reported (YSR) depression symptoms as a disparity of symptom reporting is often found between parents and children.

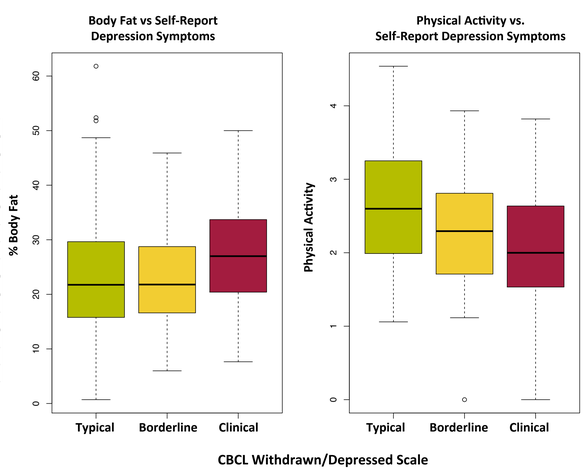
Depression was treated as both a linear and a categorical variable in our analyses using the CBCL and YSR cutoffs for borderline and clinically significant symptom levels.

RESULTS

Predictors of % Body Fat			
Categorical Depression Score: Forward Stepwise Regression			
Step 1	Intercept	26.9923	<2e-16 ***
	YSR Withdrawn/Depressed Boderline	1.9227	0.451
	YSR Withdrawn/Depressed Clinical	4.6843	0.054 ^
Step 2	Intercept	32.663	<2e-16 ***
	YSR Withdrawn/Depressed Borderline	0.6866	0.7932
	YSR Withdrawn/Depressed Clinical	3.189	0.1973
	Physical Activity Questionnaire	-2.1884	0.0151 *
Dimensional Depression Score: Forward Stepwise Regression			
Step 1	Intercept	16.269	0.00285 **
	YSR Withdrawn/Depressed Score	0.1953	0.03307 *
Step 2	Intercept	27.0472	0.000114 ***
	YSR Withdrawn/Depressed Score	0.10027	0.306668
	Physical Acitvity Questionnaire	-2.1226	0.022122 *



Predictors of % Body Fat			
Categorical Depression Score: Forward Stepwise Regression			
Step 1	Intercept	22.9612	<2.00E-16 ***
	CBCL Withdrawn/Depressed Boderline	0.1066	0.94235
	CBCL Withdrawn/Depressed Clinical	3.7587	0.00995 **
Step 2	Intercept	31.1273	<2.00E-16 ***
	CBCL Withdrawn/Depressed Borderline	-0.6822	0.699421
	CBCL Withdrawn/Depressed Clinical	3.2487	0.056058 ^
	Physical Activity Questionnaire	-2.5286	0.000413 ***
Dimensional Depression Score: Forward Stepwise Regression			
Step 1	Intercept	16.8732	0.0000426 ***
	CBCL Withdrawn/Depressed Score	0.14116	0.0385 *
Step 2	Intercept	27.0312	6.84E-08 ***
	CBCL Withdrawn/Depressed Score	0.07753	0.260108
	Physical Acitvity Questionnaire	-2.5627	0.000383 ***



RESULTS CONT'D

	CBCL		Body Fat		
	r	p-value	r	p-value	
Positive Reframing Coping	-0.1	0.11	-0.11	0.05*	Coping Strategies
Avoidance Strategoes	0.15	0.011*	0.107	0.085^	
Support Seeking	0.004	0.94	-0.1041	0.095^	
Unsuccessful attempts to quit	0.0844	0.31	0.214	0.007**	Eating Behaviors
Withdrawal symptoms	0.025	0.76	-0.12	0.13	
Clinically significant impairment/distress	-0.02	0.756	-0.0021	0.97	
Initiating and maintaining sleep	0.251	0.001***	0.2	0.01**	Sleep Problems
Excessive somnolence	0.272	0.0004***	0.23	0.003**	
Arousal	0.233	0.003***	0.08	0.308	
Sleep Hyperhydrosis	0.17	0.028*	0.148	0.05*	
Sleep-Wake Transition	0.297	0.0001***	0.061	0.43	

Predictors of % Body Fat: Perspectives from Multiple Regression

Sleep Problems (N=99)	Beta	p-value
Withrawn/Depressed	0.077	0.558
Initiating and Maintaining	0.008	0.884
Excessive Somnolence	0.097	0.193
Sleep Hyperhydrosis	0.110	0.369
Sleep-Wake Transition	-0.147	0.0832^
Arousal	0.075	0.401
Physical Activity	-2.103	0.0847^

Coping Strategies (N=239)	Beta	p-value
Withrawn/Depressed	0.031	0.673
Avoidance	2.869	0.028*
Support Seeking	-0.765	0.522
Positive Reframing	-1.700	0.159
Physical Activity	-2.361	0.003**

Eating Behaviors (N=87)	Beta	p-value
Withrawn/Depressed	-0.131	0.274
Attempts to Quit	0.897	0.009**
Withdrawal	-0.034	0.918
Impairment	-0.761	0.258
Physical Activity	-2.331	0.038*

Note: * denotes significance at p<.05; ** p<.01, *** p<.001; ^ marginal significance at p<.10; grayed text denotes non-significant findings.

DISCUSSION

- Consistent with previous research, children with high rates of depressive symptoms had significantly higher body fat than those without depressive symptoms.
- Further, children with higher depressive symptoms reported significantly lower rates of physical activity. Models accounting for depressive symptoms and physical activity show that only physical activity independently predicted body fat. This relationship is seen in both parent and self reported symptoms of depression.
- Additional analyses showed that parent-reported symptoms of depression were significantly correlated with poor coping strategies, and sleeping patterns. Multiple regression showed that specific subscales of these domains, and physical activity are significant predictors of body fat.
- The current data is limited by the small sample that have completed measures on sleep, eating and coping strategies. As this is an ongoing study, future analysis will further analyze the relationship between these factors and each - depression and obesity. Longitudinal data will be needed to establish causal relationships.
- An increased understanding of the comorbidity of obesity and depression, as well as associated risk factors, can lead to increased detection and prevention of both in clinical and primary care settings.

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