2021

Associations Between Paternal Mental Health and Child Obesity Using the National Survey on Children's Health

Kerry Morlock
The University of Vermont

Jenna Nash
The University of Vermont

Hilary Nardone
The University of Vermont

Kathleen Bryant
The University of Vermont

Jennifer Fofi
The University of Vermont

See next page for additional authors

Author

Kerry Morlock, Jenna Nash, Hilary Nardone, Kathleen Bryant, Jennifer Fofi, and Kristin Fontaine

ABSTRACT

Objective: To examine associations between paternal mental health status and childhood obesity outcomes.

Methods: A cross-sectional study was designed from the 2018 National Survey of Children's Health to analyze potential variance in childhood obesity between paternal and maternal mental health. Multivariable logistic regression was used to determine effects on obesity in 11,394 children aged 10-17 years.

Results: Children of fathers who reported fair or poor mental health had 10% higher odds of being overweight or obese than children whose fathers reported excellent, very good, or good mental health, while controlling for the effects of paternal physical health, and lifestyle, support, and demographic factors (AOR= 1.103; 95% CI: 1.097-1.110).

Conclusions: We offer new information that shows a link between poor paternal mental health and childhood obesity.

INTRODUCTION

The obesity epidemic among children continues to be a primary health concern and public health crisis throughout the United States population. A review of the existing literature suggests associations between maternal mental illness and increased child weight, body mass index (BMI), and obesity rates; however, research surrounding the impact of paternal mental health status is lacking.[1,2]

Factors that can affect maternal or paternal mental illness are known to impact the potential for childhood obesity; indirect pathways that influence the family environment include family food behaviors and nutritional habits, geographical area, and parenting style moderated by socioeconomic status.[3-5] Few studies have evaluated the impact paternal depression has on the family environment as it relates to childhood obesity despite evidence that a father's involvement is associated with positive health outcomes including lower obesity rates.[2,3,6] Further investigation is needed to assess the ways in which paternal mental illness impacts childhood obesity both through direct and indirect pathways.

The objective of our research is to examine the associations between paternal mental health status and childhood obesity while controlling for relevant confounders such as maternal

mental health, socioeconomic status, race, household food situation, and a child's amount of physical activity and screen time.

METHODS

Study Design: A cross-sectional study was designed utilizing the 2018 weighted survey data from the National Survey of Children's Health (NSCH).[7] A total of 16,013 self-reported responses from a parent/caregiver endorsed a child aged between 10-17 years.

Independent variable: Paternal Mental Health Status responses were dichotomized to "good" (included survey response options "excellent" and "good") and "poor" (included survey response "fair" or "poor"). Paternal and maternal mental health status were parsed from the data to analyze potential variance in childhood obesity between paternal and maternal mental health.

Dependent variable: Body Mass Index (BMI) was collected only on children aged 10-17 years. BMI variables were dichotomized to "underweight or normal weight" and "overweight or obese" based on percentiles.

Covariates:

Child's Physical Activity, Food Insecurity, Impacts of Cash Assistance, Insurance Coverage, and Paternal Physical Health were assessed as covariates. Responses were categorical and reflected the options given on the NSCH. Demographic variables included race/ethnicity, child age, child sex and Federal Poverty Level (FPL).

Analytic Approach: Descriptive statistics were used to analyze demographic variables. Multivariable logistic regression analysis was used, followed by evaluation of Cramer's V or phi values to determine if the predictor variables affect obesity in children (level for selection and elimination: $p = 0.25$ and $p = 0.05$, respectively). Non-clinical covariates with Cramer's V or phi values below 0.07 with BMI or above 0.7 with another covariate were removed from the model. Results were presented in odds ratios with 95% confidence intervals. Analyses were performed using IBM SPSS Statistics 26.

The University of Vermont Institutional Review Board has reviewed this project and determined that it qualifies as exempt from additional review.

RESULTS

Sample Characteristics and Demographics: After excluding cases missing BMI, the raw unweighted sample size was 11,394 and consisted of 6,006 (52.7%) male and 5,388 (47.3%) female children, whose mean age was 13-14 years. 8,821 (77.4%) children identified as White, 806 (7.1%) as Black or African American, 93 (0.8%) as American Indian or Alaskan Native, 558 (4.9%) as Asian, 31 (0.3%) as Native Hawaiian or other Pacific Islander, 740 (6.5%) as two or more races, and 345 (3%) as other. FPL measured household income and the sample included 782 (6.9%) in the 0-99%, 1,445 (12.7%) in the 100-199%, 3,507 (30.8%) in the 200-399%, and 5,560 (49.7%) in the 400% and above categories. 35% of observations were excluded for both paternal mental and physical health, and below 8% were excluded for other covariates due to missing data.

Bivariate Associations: All covariates were significantly associated ($p<0.01$) with childhood BMI. In a single binomial logistic regression, fair or poor mental health was significantly negatively associated ($p<0.01$) with childhood BMI (odds ratio [OR] = 0.691, 95% confidence interval [CI] = 0.688, 0.695).

Multivariable Binomial Logistic Regression of Paternal Mental Health and BMI: Due to collinearity with paternal mental health (Cramer's V=0.757), maternal mental health was excluded from the model. The final multivariate model had a Nagelkerke r-squared value of 0.082 and all covariates remained significant ($p<0.01$). Paternal mental health was significantly associated ($p<0.01$) with overweight or obesity in children (Table 1). Children of fathers who reported fair or poor mental health had 10% higher odds of being overweight or obese than children whose fathers reported excellent, very good, or good mental health, while controlling for the effects of age, sex, race, paternal physical health, physical activity, screen time, food situation in the household, whether the child received free or reduced-cost lunches at school and FPL (adjusted OR = 1.103; 95% CI= 1.097, 1.110).

Table 1-- Multiple Logistic Regression Results for Odds of Childhood Overweight or Obesity: US National Survey on Children's Health, 2018				
Predictor	B	SE	AOR	95% CI
Age (years)	-0.04	0	0.961	0.961-0.961*
Sex				
Male (ref.)				
Female	0.254	0.001	1.289	1.287-1.292*
Race				
White (ref.)				
Black or African American	0.073	0.002	1.076	1.071-1.080*
American Indian or Alaska Native	-0.243	0.003	0.784	0.780-0.789*
Asian	-0.192	0.007	0.825	0.814-0.837*
Native Hawaiian and Other Pacific Islander	-0.029	0.003	0.971	0.966-0.977*
Other race	-0.63	0.013	0.533	0.519-0.547*
Two or More Races	-0.369	0.004	0.691	0.686-0.697*
Physical Activity				
0 days (ref.)				
1 -3 days	0.744	0.002	2.103	2.095-2.112*
4-6 days	0.535	0.002	1.707	1.702-1.712*
Everyday	0.322	0.002	1.381	1.376-1.385*
Screen Time				
Less than 1 hour (ref.)				
1 hour	-0.177	0.022	0.89	0.886-0.894*
2 hours	-0.331	0.002	0.718	0.715-0.721*
3 hours	-0.056	0.001	0.945	0.943-0.948*
4 or more hours	-0.007	0.001	0.993	0.991-0.996*
Food Situation in Household				
Always afford good nutritious meals (ref.)				
Always afford, not always nutritious meals	0.472	0.011	1.603	1.569-1.637*
Sometimes not afford enough to eat	0.663	0.011	1.94	1.900-1.981*
Often not afford enough to eat	0.646	0.011	1.907	1.866-1.949*
Free or Reduced Cost Meals at School				
Yes (ref.)				
No	0.464	0.001	1.591	1.587-1.595*
Federal Poverty Level				
0-99% FPL (ref.)				
100-199% FPL	0.416	0.002	1.516	1.511-1.522*
200-399% FPL	0.419	0.002	1.521	1.516-1.525*
400% FPL or greater	0.307	0.001	1.359	1.356-1.363*
Paternal Physical Health				
Excellent, very good (ref.)				
Good	-0.589	0.002	0.555	0.553-0.557*
Fair or poor	-0.359	0.002	0.698	0.695-0.701*
Paternal Mental Health				
Excellent, very good, good (ref.)				
Fair or poor	0.098	0.003	1.103	1.097 -1.110*

Note. B = Beta coefficient; SE = standard error; CI = confidence interval; AOR = adjusted odds ratio.
**P<.01.*

DISCUSSION

Findings show that children aged 10-17 are more likely to be overweight if they have fathers with fair or poor mental health. The study was strengthened by the utilization of a national dataset, which allows for greater generalizability.

The finding of a higher rate of obesity for families who struggled to afford nutritious foods is consistent with previous research.[8] Less consistent with current research was a higher risk of obesity in individuals who reported 1-3 days of exercise versus those who reported no exercise, as well as lower odds of obesity for children who had more screen time.[9]

There were some limitations to our study. Most of the surveys were reported by mothers, who may not be accurate reporters of a father's mental health status. Inaccurate information about a father's mental health status may cast doubt on the validity of this data. Non-response for paternal mental health could have biased the results because of missing data.

With a cross-sectional design there is potential for reverse causality. A child's BMI might impact paternal mental health rather than paternal mental health impacting the child's BMI. Residual confounding may be a reason we had unexpected results such as those related to screen time and exercise.

This study has implications for future research, clinical practice, and public health. Future research could compare weight status between children of fathers formally diagnosed with depression or anxiety and fathers without a mental health diagnosis. Recruiting fathers with depression or mental health issues has been shown to be feasible and would be helpful in studying the correlation between poor mental health and childhood obesity.[2]

Women are often screened for depression prenatally, yet paternal postpartum depression has been shown to have adverse impacts on family functioning.[10] This research provides evidence that paternal mental health has an impact on the health of children, specifically obesity. Providers who care for children should consider asking questions about paternal mental health to understand risks for childhood obesity. Identifying paternal mental health as a risk factor for obesity, and better screening for paternal mental health, has the potential to modify health risks, impact public health and save health care dollars.

REFERENCES

1. Marco PL, Valerio ID, Zanatti CLM, Goncalves H. Systematic review: Symptoms of parental depression and anxiety and offspring overweight. *Rev Saude Publica.* 2020;54:49. doi: 10.11606/s1518-8787.2020054001731.
2. Sherr L, Davé S, Lucas P, Senior R, Nazareth I. A Feasibility Study on Recruiting Fathers of Young Children to Examine the Impact of Paternal Depression on Child Development. *Child Psychiatry Hum Dev.* 2006;36:295-309. doi: 10.1007/s10578-005-0004-3.
3. McCurdy K, Tovar A, Kaar JL, Vadiveloo M. Pathways between maternal depression, the family environment, and child BMI z scores. *Appetite*. 2019;134:148-154. doi: 10.1016/j.appet.2018.12.010.
4. Foster BA, Weinstein K, Mojica CM, Davis MM. Parental mental health associated with child overweight and obesity, examined within rural and urban settings, stratified by income. *J Rural Health*. 2019;36(1):27-37. doi:10.1111/jrh.12395.
5. Topham GL, Page MC, Hubbs-Tait L, Rutledge JM, Kennedy TS, Shriver L, Harrist AW. Maternal depression and socioeconomic status moderate the parenting style/child obesity association. *Public Health Nutr*. 2010 Aug;13(8):1237-1244. doi: 10.1017/S1368980009992163.
6. Allport BS, Johnson S, Aqil A, Labrique AB, Nelson T, KC A, Carabas Y, Marcell AV. Promoting Father Involvement for Child and Family Health. *Acad Pediatr.* 2018 Sept;18(7):746-753. doi: https://doi.org/10.1016/j.acap.2018.03.011
7. The Child & Adolescent Health Measurement Initiative. NSCH Survey Methodology. Data Resource Center for Child & Adolescent Health. Accessed March 29, 2021. https://www.childhealthdata.org/learn-about-the-nsch/methods.
8. Lee H, Andrew M, Gebremariam A, Lumeng JC, Lee JM. Longitudinal associations between poverty and obesity from birth through adolescence. Am J Public Health. 2014 May;104(5):e70-6. doi: 10.2105/AJPH.2013.301806.
9. Katzmarzyk PT, Barreira TV, Broyles ST, Champagne CM, Chaput JP, Fogelholm M, Hu G, Johnson WD, Kuriyan R, Kurpad A, Lambert EV, Maher C, Maia J, Matsudo V, Olds T, Onywera V, Sarmiento OL, Standage M, Tremblay MS, Tudor-Locke C, Zhao P, Church TS. Physical Activity, Sedentary Time, and Obesity in an

International Sample of Children. Med Sci Sports Exerc. 2015 Oct;47(10):2062-9. doi: 10.1249/MSS.0000000000000649.

10. Walsh TB, Davis RN, Garfield C. A Call to Action: Screening Fathers for Perinatal Depression. *Pediatrics*. 2020 January, 145 (1) doi.org/10.1542/peds.2019-1193.